Aleksas Girdenis

Theoretical Foundations
of Lithuanian Phonology

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NOTES ON THE TRANSLATION

In more specific contexts, I translated *kalbėjimo aktas* as either "act of speech" or "act of speaking," and in broader contexts simply as "speech"; "speech act," of course, has a different meaning in English linguistic usage.

In most works in English, *priegaidė* is rendered "tone," but Girdenis emphasizes a distinction between "pitch accent" languages (such as Lithuanian) and "tone" languages (in the narrow sense). The term "intonation" would not have been suitable here (although the equivalent is found in Russian and German), since it typically suggests sentence or phrasal intonation. I therefore chose "pitch accent" as the general term, with the particular expressions "circumflex accent" and "acute accent" (as well as "rising accent" and "falling accent").

For *lūpinis*, I used "labial" for reference to consonants and "rounded" for reference to vowels. Although this splits up the uniform Lithuanian term, "labial" or "labialized" seems unusual with reference to vowels, where the English linguistic tradition has "rounded" and "lip-rounding" ("labialized" is used for *labializuotas*, with reference to consonants).

The term *junginys* = Ru. *сочетание* (or *последовательность*) = Germ. *Verbindung* also presented a challenge. In cases where reference is to the linear arrangement of phonemes, I generally followed the American descriptivists in using "sequence": "sequence of vowels," "phoneme sequence," etc. Where reference is to a true non-linear "combination" (say of prosodic and segmental features), I used "combination." I also followed the descriptivists in using "cluster" in most cases for (*priebalsių*) *grupė* = Ru. *группа* (*соглас-ных*).

I generally used "(syllable) nucleus" for *skiemens centras* = Ru. *центр слога* = Germ. *Silbenkern*, and "onset" and "coda" for *eksplozinė* (*grupė*) = Ru. *эксплозивная* (*группа*) and *implozinė* (*grupė*) = Ru. *имплозивная* (*группа*).

For *liežuvio priešakinis* and *liežuvio užpakalinis* (= Ru. *переднеязычный* and *заднеязычный*), I used "apical" and "dorsal" respectively, for want of equivalent terms, although "apical" is more restricted in meaning than *liežuvio priešakinis*. In addition, *alveolinis* is sometimes used in the original where it clearly means "alveolar" (and I have translated it that way); elsewhere, it is used to describe what are typically referred to as palato-alveolars in English linguistic literature. In these cases, I used the latter term (cf. Girdenis's discussion of dental "hissing" sibilants as opposed to "alveolar" = palato-alveolar "hushing" sibilants).

For the major dialect terms *žemaičių* and *aukštaičių*, I used "Žemaitic" and "Aukštaitic," rather than the alternative "Žemaitian" (or Samogitian) and "Aukštaitian," since I have always found the latter terms a bit awkward—it seems unclear how to pronounce the -*ti*- here in English.

Since most grammatical meaning is lost in English glosses, I generally used interlinear-type glossing abbreviations and conventions to represent grammatical categories of word forms where this is important (for example, *vìrsi* [v̂írŝi] 'boil-2SG.FUT'). A list of glossing abbreviations has been included.

A number of typographic and citation errors in the original text have been corrected. Abbreviations of dialect names (like Dkš > *Daukšiai* and Gž > *Gižai*) have been expanded to make the references more convenient for non-Lithuanian readers. Occasional brief translator interpolations are enclosed in square brackets.

My special thanks to Aleksey Andronov (St. Petersburg) for his valuable comments on a draft of this translation.

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ABBREVIATIONS OF LANGUAGES AND DIALECTS

Akkad. – Akkadian
Arab. – Arabic (Classical)
Bel. – Belarusian (Byelorussian)
Chin. – Chinese
Cz. – Czech
Dan. – Danish
Du. – Dutch
EAukšt. – East Aukštaitic
Eng. – English
Est. – Estonian
Fi. – Finnish
Fr. – French
Ger. – German
Gk. – Greek
Ha. – Hawaiian
Icel. – Icelandic
It. – Italian
Lat. – Latin
Latv. – Latvian
Lith. – Lithuanian

Norw. – Norwegian
NŽem. – North Žemaitic
OCS – Old Church Slavic (Old Bulgarian)
OInd. – Old Indic
OPr. – Old Prussian
PIE – Proto-Indo-European
Pol. – Polish
Rom. – Romanian
Ru. – Russian
SAukšt. – South Aukštaitic
SCr. – Serbo-Croatian
Skt. – Sanskrit (Old Indic)
Sp. – Spanish
Swed. – Swedish
SŽem. – South Žemaitic
Ta. – Tahitian
WAukšt. – West Aukštaitic
Žem. – Žemaitic

ABBREVIATIONS USED IN GLOSSES

1, 2, 3 – first, second, third person
ABL – ablative
ACC – accusative
DAT – dative
DEF – definite (adjective)
DU – dual
F – feminine
FUT – future tense
GEN – genitive
IMP – imperative
INF – infinitive
SHORT-INF – short form (apocopated) infinitive (-*t*)
SHORT-LOC – apocopated form of the locative
INS – instrumental
LOC – locative

M – masculine
N – neuter (predicate adjective and participle)
NOM – nominative
PAP – past active participle
PL – plural
PNL – pronominal adjective
PPP – past passive participle
PRS – present tense
PRS-AP – present active participle
PST – past tense
REFL – reflexive
SBJV – subjunctive mood
SG – singular
SUPE – superessive
VOC – vocative

FOREWORD

The present work is a new, somewhat expanded and revised version of *Teoriniai fonologijos pagrindai* 'Theoretical Foundations of Phonology' (Vilnius, 1995).

We have attempted to maintain the structure of the basic text, including the system of paragraphs and footnotes. Only obvious proofreading errors have been corrected; some formulations have been extended and refined, and recent works by Lithuanian phonologists, which fortunately have seen an increase in recent years, have been taken into account, among them valuable dissertations devoted to various aspects of dialectal phonology (for example, [Atkočaitytė 2000; Bacevičiūtė 2001; Kazlauskienė 1998; Leskauskaitė 2001; Murinienė 2000]) and publications based on these. More recent works on theoretical phonology have been utilized only in so far as they are consistent with the main principles of classical phonology. The list of references has been increased to some 950 titles.

Continuing a tradition begun in *Kalbotyros darbai* 'Studies in Linguistics' (Vilnius, 2000–2001; see [Girdenis 2000b; 2000c; 2001]), I have included a table of contents, a foreword, and a summary in another language (on this occasion, German[*]); the Russian summary has been left as it was.

I am grateful to Dr. Skaidra GIRDENIENĖ and Vida KAROSIENĖ, who helped prepare the German texts. Many thanks to Dr. Žaneta MARKEVIČIENĖ, the publication's official reviewer, to editor Agota SRIUBIENĖ, and to the State Commission on the Lithuanian Language for their financial support of the book.

Vilnius, January 2002   Aleksas Girdenis

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[*] The present translation does not include the German summary—TRANS.

FOREWORD TO THE 1995 EDITION

1. The present work discusses and offers solutions to key issues in the synchronic phonology of standard Lithuanian and its dialects, and also sets forth a synthesized theoretical model of classical (autonomous) phonology, crystallized over many years of reflecting on the phonological nature of Lithuanian and its dialects.

The book limits itself to classical synchronic phonology, since generative phonology is undoubtedly only an updated version of morphonology, and should therefore be assigned to grammar (see, for example, [Kuryłowicz 1968b: 79; Linell 1977; 1979: 142; Dressler 1985: viii, 1ff.]; cf. [Achmanova 1966: 52; Klimov 1967: 75; Reformatskij 1975: 88ff.]).[1] This, of course, does not prevent us from applying certain phonetic results of generative studies and several formal methods. We also take some account of more recent versions of generative phonology—so-called autosegmental and metrical phonology—although these seemingly represent a return to the classical roots of phonology.

From a formal standpoint, the concept of general linguistics presented in this work is close to the well-known views of the Prague Linguistic Circle (on the vitality of this school's theoretical principles, see, for example, [Fischer-Jørgensen 1975: 401–402]), but in no way coincides with them. First, greater emphasis is placed here on technical aspects of identifying phonological units; it therefore seemed quite

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[1] For a detailed critical analysis of the principles and methods of the generative school, see [Linell 1979; Kodzasov, Krivnova 1981 and references] (cf. also [Klimov 1967: 10; Vinogradov 1976: 292; Anttila 1977]). As a kind of oddity we might mention the highly subjective, scathing criticism of generative phonology found in the article [Hammarström 1971]. We might add that from the beginning, generativists have used the term morphonology, rather than phonology (see, for example, [Chomskij 1965: 260 et passim]).

appropriate to draw on the experience of descriptive linguistics, which in its essence (though not of course in form) does not contradict Prague School principles, already formulated *in nuce* by Saussure (see [Sljusareva 1975: 83–84]). Secondly (and perhaps most importantly), this book treats syntagmatic, rather than paradigmatic, relations as the basis for distinguishing phonemes and their distinctive features, and therefore makes broad and consistent reference to the Scandinavian region, especially the achievements of the Copenhagen School in theoretical ideas (see, for example, [Fischer-Jørgensen 1972 and references; Sigurd 1955; 1965: 39; El'mslev 1960c: 59]), as well as the works of the distinguished Polish linguist Jerzy Kuryłowicz (for example, [Kuryłowicz 1960 = Kurilovič 1962]), quite close in spirit to the Copenhagen School.[2] The numerous works of Russian phonologists have also been considered, especially those which provide a comprehensive and sober assessment of the above-mentioned major schools of modern linguistics (for example, [Ivanov 1962; Bulygina 1964; Arutjunova, Klimov, Kubrjakova 1964; Murat 1964; Postovalova 1972; Stepanov 1966; 1975a; 1975b; Stepanov, Ėdel'man 1976: 207]; see also fn. 1).

Reference to the ideas and methods of various schools should not be viewed as a kind of eclecticism, since it has been apparent for some time that all phonological theories have more in common than they have differences ("во всех фонологических теориях гораздо больше общего, чем различного" 'all phonological theories have far more similarities than differences' [Zinder 1972: 134]), so that a synthesis of various views very much suggests itself. Moreover, it has long been observed that the major schools of classical phonology harmoniously complement one another precisely because they focus attention on diverse aspects of the expression plane (cf. [Mačavariani 1965: 135–136; Klimov 1967: 49]).

The work also includes diachronic digressions; an indirect diachronic orientation can also be found in certain typological comparisons. There is no question that Baltic linguistics has been and always

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[2] But too perfunctory an approach to the material aspect of language and a certain schematicity in this connection, characteristic of both glossematics and some of Kurylowicz's work (cf. [Ivanov 1954: 133, 135, etc.]), is scarcely acceptable in a theoretical work wholly devoted to the living "substance" of the standard language and its dialects.

will be a historical discipline *par excellence*, and the present work is essentially only a preliminary stage in contemporary diachronic research. But it is perhaps not necessary to dwell in detail on diachrony, especially since it is covered in sufficient breadth and depth by Lithuanian linguists themselves (see, for example, [Steponavičjus 1973–1975; 1982a; 1982b]).

2. Existing attempts at analyzing the phonology of the Baltic languages and dialects reflect diverse approaches, often not explicitly formulated, and are therefore in many cases not directly comparable (for an overview of earlier studies, see [Klimas 1970], cf. also [Schmalstieg 1958; Matthews 1958; Lelis 1961; Augustaitis 1964; Ulvydas 1965; Kazlauskas 1966; Girdenis 1971b (= Girdenis 2000b: 211ff.); Toporova 1972; Sudnik 1975; Garšva 1977a; 1977b; 1977c; 1982; Kosienė 1978; Kačjuškene 1984; Ambrazas 1985; 1997 (= Girdenis 2001: 200ff.); Jasiūnaitė 1993], also [Heeschen 1968; Kenstowicz 1969; 1970; 1972]). Moreover, some of these works (for example, [Schmalstieg 1958; Matthews 1958; Augustaitis 1964]) are, we might say, only a reinterpretation of written texts and traditional superficial phonetic descriptions, rather than the result of independent observations of living language. Unfortunately, in almost all cases, these studies lag far behind the classical interpretations found, for example, in the works of Nikolai Trubetzkoy (see [Girdenis 1970b; 1977b (= Girdenis 2000c: 79ff.)]). Diachronic convictions and conjectures often adversely affect synchronic interpretations, promoting the acceptance and defense of precisely those phonological treatments which seem more easily derived from an imagined prehistoric situation (cf., for example, [Kazlauskas 1968a] and [Girdenis, Žulys 1972 (= Girdenis 2000b: 355ff.)]). A general theoretical foundation is thus imperative for further progress in diachronic phonological research in Baltic linguistics; key issues in the phonological structure of the Baltic languages and especially Baltic dialects must also be addressed, at least in a preliminary fashion. Also in need of serious theoretical re-evaluation is the abundant research in experimental phonology (unfortunately, hopelessly fading in recent years) being done by Lithuanian and Latvian linguists (see the major survey works [Ceplitis 1974; Pakerys 1982] and their reviews [Girdjanis 1976 (= Girdenis 2000c: 367ff.); Vitkauskas 1983a; Girdenis, Stundžia 1983 (= Girdenis 2000c: 400ff.)]). Finally, it is now obvious that without serious phonological

analysis even an adequate recording of dialects is impossible (cf. [Ringgaard 1965; Vitkauskas 1983b]).

3. An extensive list of bibliographic references (926 titles) and a summary in Russian can be found at the end of the book. It was decided not to include a summary in other languages; the exhaustive German review of *Fonologija* 'Phonology' published in *Baltistica* [Tekorius 1984] more than makes up for this. The Appendix presents several supplementary tables and the more important phonostatistical data.

4. As noted above, the present work is essentially only a new, now fully scholarly, version of *Fonologija* 'Phonology', published in 1981. I am therefore grateful to all colleagues mentioned in the foreword to that publication [Girdenis 1981a: 5]. It is unfortunate that not all of them will be able to read my appreciation…. Once again, I would like to thank all of the book's reviewers: Elvyra BUKEVIČIŪTĖ, Valerijus ČEKMONAS [1983], Simas KARALIŪNAS, William R. SCHMALSTIEG [1983], Bonifacas STUNDŽIA [1981; 1982; 1983], Alfonsas TEKORIUS [1984], Vladas ŽULYS, and also the notable Russian linguists Tatjana BULYGINA-ŠMELIOVA, Viačeslav IVANOV, Jurij STEPANOV, Oleg ŠIROKOV, and Vladimir ŽURAVLIOV, who thoroughly evaluated both the book itself and the dissertation prepared on its basis. I have tried to take their critical remarks into account, though not always directly. I thank the orientalist Dalia ŠVAMBARYTĖ for the Japanese examples and Oleg POLIAKOV, who carefully read and corrected the first version of the summary.

The preparation of this work benefitted greatly from the advice and subtle observations of its editor, Bonifacas STUNDŽIA, and also Lina MURINIENĖ; the bibliographic references were carefully handled by Rūta BAGUŽYTĖ and Giedrė SUCKELIENĖ. A large portion of the complex text was painstakingly entered onto a computer by Liucija BUTKŪNAITĖ. The book could not have appeared without the special linguistic fonts designed by Mindaugas STROCKIS and Petras SKIRMANTAS; the latter also managed the publication's layout. I thank them all sincerely, well aware that even the utmost gratitude will not compensate for such immense, selfless, and dedicated work.

Vilnius, 1995   Aleksas Girdenis

I. THE PLACE OF PHONOLOGY IN LINGUISTICS

1. BASIC CONCEPTS

§ 1. Phonology (Gk. *φωνή* 'sound', *λόγος* 'word, study') is the component of contemporary structural linguistics which studies the sound aspect of language.

Phonology arose as an independent discipline in the 1920s, especially through the efforts of Nikolai Trubetzkoy and Roman Jakobson, Russian-born members of the Prague Linguistic Circle (see [Vachek 1966: 18; Fischer-Jørgensen 1975: 19–20; Zinder, Maslov 1982: 48]). Nevertheless, some key principles of phonology had been formulated earlier. The Polish scholars Baudouin de Courtenay and Mikołaj Kruszewski, founders of the so-called Kazan School, as well as the great Swiss linguist Ferdinand de Saussure, are almost universally considered the pioneers of phonology (see [Bulygina 1964: 48–49, 59–60; Fischer-Jørgensen 1975: 1; Šaradzenidze 1980: 53–61, 119 and others]).[1] It could be said that phonology was born when Trubetzkoy and Jakobson brought together certain concrete phonological ideas stemming from Baudouin de Courtenay's school[2] and the

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[1] For a brief overview of the history of phonology and its main directions (in addition to those noted above), see [Achmanova 1966: 8–25; Reformatskij 1970; Žuravlev 1979; Voronkova 1981: 76–113].

We might note here that the first Lithuanian to use the term *phonology* (not in the meaning of true phonology, of course, but rather scientific phonetics) was Antanas Baranauskas, as early as 1876, in a letter to Weber: "Tai prisieis perkratyti rusiszka *fonologija* ir su lëtuviszką sulyginti" 'So Russian *phonology* (our emphasis—*A. G.*) will have to be sorted through and put on a par with Lithuanian' [Baranauskas 1931: 69].

[2] It could be said that the influence of this scholar is now acknowledged by all schools of phonology; cf. [Šaradzenidze 1980: 11–12, 119–120].

new principles of general linguistics set forth in Saussure's *Course in General Linguistics* (*Cours de linguistique générale*, first published in 1916 [Saussure 1967]). Nevertheless, the principles of phonology were intuitively grasped and even applied much earlier (see, for example, [Benediktsson 1972: 35–38; Fischer-Jørgensen 1975: 141; Girdenis, Piročkinas 1977–1978: 32–33 (= Girdenis 2000c: 29–31); Jakobson, Waugh 1979: 29]). In the early twentieth century, several more progressive linguists were already thinking phonologically; we need only recall Lev Ščerba's study of Russian vowels, published in 1912 [Ščerba 1983], or the third chapter of Edward Sapir's *Language* [Sapir 1949: 42–53 = Sepir 1993: 57–67].

Of great importance for theoretical phonology are the works of the Copenhagen School, or glossematics, especially those of its most distinguished theoretician, Hjelmslev (for example, [El'mslev 1960a; 1960b; 1960c; Hjelmslev 1936; 1936–1937; 1938; 1959; 1963]). This linguistic school especially promoted the significance of syntagmatic relations and neutralization for the classification of phonological units (and linguistic units in general), and demonstrated in actual studies how to investigate language (and its phonological system) almost without considering its material aspect. Directly or indirectly, almost all works of Scandinavian phonologists are connected with the Copenhagen School (see [Koefoed 1967]); the great Polish linguist Kuryłowicz relied on their ideas [Kuryłowicz 1960; Kurilovič 1962; etc.]. Stratificational linguistics (for example, [Lamb 1966; Lockwood 1972a; 1972b]) and the distinctly original theory of two-level phonology [Šaumjan 1962] may be considered updated versions of glossematics.

The methodology for establishing phonemes was perfected for the most part by the American structuralists, adherents of so-called descriptive linguistics, often simply called the descriptivists (see, for example, [Bloomfield 1935 = Blumfild 1968; Pike 1947; Hockett 1955; Glison 1959; Harris 1963; etc.]). From this school there split off generative linguistics, which somewhat later gave rise to generative phonology (for its classical model, see [Chomsky, Halle 1968; Harms 1968]). There later arose many distinctive varieties of generative phonology—natural phonology (for example, [Schane 1972; Schane, Bendixen 1978]), autosegmental and metrical phonology (for example, [Clements 1977; Hulst, Smith 1982; Goldsmith 1995]), and others.

Only the more recent branches are close to classical schools of phonology; "pure" generative phonology, as already noted, should rather be considered a highly formalized morphonology.

§ 2. Structural linguistics differs from so-called traditional (or classical) linguistics in several essential features. First, as the name itself shows, it studies language not as a mechanical accumulation of individual facts and expressions, but as a structure, in other words, as a system in which everything is interconnected, in which every element or linguistic phenomenon depends on other elements or phenomena (see, for example, [Martine 1960: 90]; regarding this in Baudouin de Courtenay's theory, see [Šaradzenidze 1980: 38–43]). Thus the object of study in structural linguistics is first of all not individual facts, but their totality and interrelations, which create so-called linguistic structure (cf. [Stepanov 1966: 5; 1975b: 228–229]). Secondly, structural linguistics, more consistently than other schools of linguistics, defines and studies language as a system of signs, rather than, say, a source of history, or a reflection of the psychology of people and nations, or an aesthetic value [Vachek 1964: 115; Sacharova 1974: 230]. Thirdly, structural linguistics vindicates the synchronic (descriptive, ahistorical) study of language, considering it not just equal to a diachronic (historical) study, but even more important, since as a system of signs language can function only in real time: speakers encounter only a single synchronic "slice" of an actual language [Saussure 1967: 117 = Sossjur 1977: 114–115; Tezisy 1960: 69; Bulygina 1964: 49–50]. As we know, linguistics was dominated in the late nineteenth and early twentieth centuries by the view (perhaps most categorically formulated by the Neogrammarian theoretician Hermann Paul [Paul' 1960: 42–43]) that only historical linguistics is scientific.

§ 3. The "primer" of the structural approach to language, already formulated by Saussure and in part by Baudouin de Courtenay (later essentially only refined and made more specific), can be concisely summarized by a few twinned concepts or antinomies, all of which seem logical and easily understood if we keep in mind that language is a system of signs.

§ 4. If we consider language as a system of signs, we must strictly distinguish the concepts of linguistic system and act of speech. These were clearly distinguished by Saussure [Saussure 1967: 23–31],

who applied the French term *langue* for the first and *parole* for the second (in Russian the corresponding distinction is язык and речь [Sossjur 1977: 46–53 et passim], in German *Sprachgebilde* and *Sprechakt* or *Sprache* and *Rede* [Trubetzkoy 1977: 5; Heike 1972: 4–5; Meinhold, Stock 1982: 11], in Polish *język* and *mowa* [Saussure 1961: 24–32]. English usually uses Saussure's French terms (for example, [Hockett 1955: 176]), but *language* and *speech* are also found. Italian linguists do not translate these terms either (for example, [Muljačić 1973: 27 et passim]; cf. Spanish *lengua* and *habla* [Alarcos Llorach 1975: 261]). Mechanically translating these terms into Lithuanian, we have the artificially-formed equivalents *kalba* and *šneka* (first used, apparently, in translation [Reformatskis 1963: 27ff.]), but they do not suggest the essential meaning of these concepts: Lithuanian *kalba* has the meanings of both *langue* (Ru. язык) and *parole* (Ru. речь): "Gimtąja *kalba* (*langue*) pasakyta Vilniaus mero *kalba* (*parole*) domino ne visus priėmimo dalyvius" 'Not all participants at the reception were interested in the *speech* (*parole*) delivered by the mayor of Vilnius in his native *language* (*langue*)' [*Lietuvos rytas*, 1997-09-08, p. 2]. The artificial narrowing of the meaning of an everyday word is not the best approach for creating terms. Since it is necessary to distinguish these concepts only in special cases, word collocations formed on the basis of the above German terms *Sprachgebilde* and *Sprechakt* are quite acceptable. The term *kalba* can remain for the undifferentiated expression which Saussure termed *langage*, i.e., language in general. In certain cases, the terms *kalba* and *kalbėjimas* (the latter corresponding to *speech*, *parole*), suggested by Vincas Urbutis [1978: 41], are appropriate.

A linguistic system consists of rules and abstract elements on the basis of which we are able to speak and understand language. Speech is the actual stream of sounds or the symbols which substitute for them (for example, letters, logograms, etc.), together with the concrete information which they convey [Saussure 1967: 23–31 = Sossjur 1977: 46–53; Sljusareva 1975: 9–29; Kasevič 1977: 10–18].[3] This concept could also be rendered quite nicely by the term *text*, suggested

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[3] V. Solncev maintains, on the basis of information theory, that language should not be identified with a system, since speech (or more accurately, every concrete example of speech: a text) also forms a system [Solncev 1977: 64]. In this case, the meaning of *system* is undoubtedly not the usual one.

by Polish linguists (for example, Tadeusz Milewski [1965: 61], Leon Zawadowski [1966: 59–71] and others; cf. [Muljačić 1973: 30]), if we include here those concrete stretches of speech which are not recorded by instruments or graphically (though of course they could be; on the possibility of this interpretation, see also [Sljusareva 1975: 23–25]).

Generative linguistics uses the terms *competence* and *performance* in more or less the same meanings, and characterizes competence (i.e., linguistic system) figuratively as the apparatus residing in the human brain which enables one to create (generate) and understand acts of concrete performance (i.e., speech) or texts [Chomsky, Halle 1968: 3; Kasevič 1977: 108; Kodzasov, Krivnova 1981: 8]. For our further presentation, this simplified account is quite sufficient, but it is far from being the only one (opinions on Saussure's concept of *parole* are particularly varied).

It is quite clear that a linguistic system and act of speech cannot exist without one another; they are simply two different aspects of the same phenomenon (cf. [Serebrennikov 1983: 11–16]).

§ 5. In addition to linguistic system and act of speech, so-called language norm is now sometimes distinguished (see, for example, [Koseriu 1963: 173–175; Stepanov 1966: 5ff.; Sljusareva 1975: 27; Verbickaja 1979]), an intermediate concept characterizing the material properties shared by all (or more accurately, nearly all) acts of speech within a language community, but not necessary for communication; sometimes norm and system (or structure) are justifiably considered two aspects, concrete and abstract, of a linguistic system (*langue*) [Stepanov 1966; Alarcos Llorach 1975: 26]. For example, the norm for standard Lithuanian requires that the consonant [r] be pronounced as an alveolar trill with one or two strokes, but speech will be comprehensible and the linguistic system will remain intact if we pronounce a trill of several strokes (like the Spanish [rr] in the word *rato* 'moment') or even a uvular trill. Norm, understood in this way (it is close to the term *uzus* used by other linguists, cf. [El'mslev 1960c: 59])[4] must be distinguished from codification (prescription)—the

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[4] This concept is already found in the works of the Neogrammarians (for example, [Paul' 1960: 51–54]).

It should be mentioned here that Hjelmslev also attributed to norm material properties and phenomena which are usually (and undoubtedly should be) con-

intentionally formulated rules of a standard language, also sometimes called *norm* (or *norms*; cf. [Girdenis, Pupkis 1978 (= Girdenis 2000c: 97ff.) and references]).

A linguistic system is more abstract than its norm, and a norm, in turn, is more abstract than speech; the latter is always concrete, connected with a certain time and place, and is distinguished by unique, non-repeating, and in principle unrepeatable properties [Avram 1958] (cf. [Andreev, Zinder 1963: 21]). Nevertheless both language norm and linguistic system can only be recognized from acts of speech, in recording and analyzing texts of the corresponding language.[5] Children also learn a linguistic system by observing and imitating concrete manifestations of speech and accompanying actions and reactions; deliberate instruction and correction by adults means little here.

§ 6. As a system of signs, language has two planes—the content plane ([Lith. *turinio planas*], Fr. *signifié*, Ru. *о(бо)значаемое* 'that which is signified') and the expression plane ([Lith. *išraiškos planas*], Fr. *signifiant*, Ru. *о(бо)значающее* 'that which signifies') [Saussure 1967: 97–100 = Sossjur 1977: 98–100; El'mslev 1960b: 305ff.; Sljusareva 1975: 34; Serebrennikov 1983: 55–76] (cf. Ger. *bezeichnete* and *bezeichnende* [Trubetzkoy 1977: 5]). Other Lithuanian terms are *signatas* and *signantas* or *žyminys* and *žymiklis* [Urbutis 1978: 56]; the latter term seems inconvenient because of its formation: derivations with the suffix *-iklis* are most often names of instruments.

All signs, linguistic and non-linguistic, exist on two planes. Content is the information conveyed by a sign (a mental image, a concept, etc.), its meaning; a sign's expression consists of its material embodiment—physical objects, their properties, location, etc. For example, the content of a certain road sign consists of the warning "Danger!" "Caution!" and its expression is a large black dot on a white triangular panel.[*] The content of a traffic signal which stops

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sidered elements of a linguistic system. As we know, for glossematics (and stratificational linguistics, which developed from it), language and its system (its "schema") is a "network" of pure relations [Hjelmslev 1959: 27ff.; El'mslev 1960b: 308 et passim].

[5] One of the most interesting contemporary theories of language development, especially its phonological aspect, is based on this fact (see [Andersen 1978]).

[*] A road sign found in Lithuania—TRANS.

traffic is "Stop!" "Do not go!" and its expression is a red light. The content of the root of the word *ẽglė* 'fir' is the familiar coniferous tree and its expression is the sound sequence [e·gl̂-]; the content of its ending is "nominative singular" and the expression is the vowel [-ę·].[6]

It is not difficult to understand that a sign is, by its very nature, bilateral; it necessarily has both content and expression [Saussure 1967: 97–100 = Sossjur 1977: 98–100] (for another view, see [Zawadowski 1966: 33; Solncev 1977: 105–106 and references]; for a critical review, see [Serebrennikov 1983: 63ff., 314]). A red light in a photographer's laboratory is only an ordinary physical event and not a sign. Nor would the command "Stop!" which arises in someone's thoughts be a sign until it is embodied as some physical event comprehensible to some person (a sound sequence, a light, etc.). Nor would we consider the sound sequence [sprá.ikšła] (or Ru. *кýздра* [kúzdrə]) a Lithuanian sign, although it sounds like a real word.

§ 7. The connection between the content and expression of signs (for example, words) is unmotivated, as if by convention [Boduèn de Kurtenè 1963: vol. 1, 261–262; Saussure 1967: 100–103, 180–184 = Sossjur 1977: 100–102, 163–166; Sljusareva 1975: 40–44; Milewski 1965: 21; Koefoed 1967: 8–9] (cf. also [Šaradzenidze 1980: 37–38, 105 and references]). This is most clearly shown by words of different languages which have the same meaning, for example Lith. *arklỹs*, Latv. *ziȓgs*, Ru. *лóшадь*, Cz. *kůň*, Ger. *Pferd*, Eng. *horse*, Lat. *equus*, Gk. *ἵππος*, Skt. *aśvas*, Sp. *caballo*, Dan. *hest*, Hindi *ghoṛā*, Est. *hobune*, Chin. *mǎ* (cf. Meje 1938: 49]), and by homonyms—words of the same language having the same expression but different meaning, for example: *bandà* 'herd, flock' and 'loaf of bread', *svíestas* 'thrown' and 'butter', and synonyms—words having the same meaning but different expression: *alsúoti* and *kvėpúoti* 'breathe-INF', *métyti* and *sváidyti* 'throw-INF'. Nor are derived words an exception here, since there is no necessary connection between form and meaning for their smallest ("terminal") components. For example, we can explain the meaning of the word *arklìdė* 'stable' from the meanings of the basic word *arklỹs* 'horse' (or the root [aȓkl̂-]) and the suffix -*id*(*ė*), but in the

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[6] This example may not be quite correct; cf. the interesting view of Sliusareva that morphemes (or, more accurately, morphs) are not signs, but only sign-like formations (*знакоподобные образования* [Sljusareva 1975: 39–40 and 60]).

contemporary language there are no rational grounds for why *arklỹs* (or more accurately, its root) and -*id*(*ė*) have in fact this content, rather than some other. Often there is even no connection between the meaning of the components of a derived word and the content of the entire word, cf. Žem. *gaĩdkojė* 'chanterelle' : *gaĩdžio kója* 'rooster foot', *kalìkė* 'footman (part of a spinning wheel)' : *kalìkė* 'bitch (dim.)', *sáulašarė* 'sundew (plant)' : *sáulės ãšara 'sun tear' (the sun does not cry!), etc. It is true that in every language we can find words whose content seems quite connected with their expression. These are various imitations of natural sounds (so-called onomatopoeia), for example, *áu* 'woof', *bẽ* 'baa', *mũ* 'moo', *tàkšt* 'tap!', etc. But even in this case there is no strict connection between content and expression, cf. Lith. *švil̃pti* 'whistle-INF' and Pol. *gwizdać*, Ger. *pfeifen*, Eng. *whistle*, Dan. *fløjte*, Fr. *siffler*, Est. *vilistama*; or Lith. *kakariekũ*, Hindi *kukarũ-kũ*, Eng. *cock-a-doodle-doo* ['kɔkədu:dl'du:], Chin. *wō-wō*. However, words of this type are not quite normal, since their content consists of the sound itself (cf. [Saussure 1967: 102 = Sossjur 1977: 102]). They occupy in language the same marginal place as, for example, words used in "communicating" with domestic animals: *trrr* [tr̃·] 'whoa!', *škàc* 'shoo!, scat!', *tprùka tprùka* 'sound used in calling a cow', etc., which are generally not considered true elements of language [Pazuchin 1963: 101]. In describing a linguistic system such words are usually not considered or they are presented as special secondary members of the system [Trubetzkoy 1977: 230 = Trubeckoj 1960: 286] (see also § 168 and references).[7]

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[7] Of course, words in the system of a specific language are related in quite diverse and complex ways, and therefore the arbitrary nature of their content and expression may be quite limited (cf. [Stepanov 1975a: 304; 1975b: 264–265]). Hence recent studies which in all seriousness attempt to demonstrate the organic nature of a connection between content and expression are apparently not accidental (for example, [Žuravlev 1974; Voronin 1982], among works of Lithuanian linguists: [Zabarskaitė 1994]; for critical remarks, see [Solncev 1977: 129–136], cf. [Hockett 1968: 343–345]). Many of the facts and pieces of evidence presented in works of this sort do not raise serious doubts, but we can say quite confidently that so-called phonetic (phonosemantic) meanings are only connotational nuances, reminiscent of the expressive properties of sentence intonation and so-called emphatics (see § 17–18 and 66). Therefore, the existence of such meanings would scarcely compel one to reject the view that the relationship between non-expressive referential content and expression is

The fact that there is no motivated, organic connection between the content and expression of linguistic signs now seems self-evident. But arriving at such an understanding is by no means as easy as it might seem. In Ancient Greece, for example, quite a few philosophers and linguists were convinced that the linguistic connection was organic (Gk. *φύσει* 'by nature') and long argued with those who thought it was unmotivated and conventional (Gk. *θέσει* 'by convention').

§ 8. The concepts of synchrony and diachrony (Gk. *σύν* 'with', *διά* 'through', *χρόνος* 'time') occupy a significant place in contemporary linguistic theory [Saussure 1967: 114–134 = Sossjur 1977: 112–127; Sljusareva 1975: 87; Hammarström 1966: 64–66].[8]

We deal with synchrony when we study language as a real system of signs actually used by people living at a certain period of time. Here the linguist steps into the position of the speakers of a language, as it were, and observes facts from their perspective. As an example of synchronic analysis and description we could first of all point to the study of any aspect of a contemporary language: lexicology, phonetics, morphology, accentology, syntax. But the investigation of a past language can also be synchronic, if we abstract ourselves from time, from the earlier and later development of the language. It is not at all difficult, for example, to imagine a synchronic grammar of the language of Mažvydas, Sirvydas, Daukša; synchronic studies of Old and Middle English or German, etc., are well known. The focus of attention in diachronic works is not so much the linguistic system itself, as its development:[9] the processes whereby one synchronic

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nevertheless unmotivated (without this assumption, phonological and even comparative-historical language studies would scarcely be possible; cf. [Meje 1938: 49–50]).

[8] These concepts were already distinguished by Baudouin de Courtenay (cf. [Šaradzenidze 1980: 43–49]), although he used the terms *statics* and *dynamics*, which now have a different meaning (it has been shown that dynamism is also characteristic of a synchronic system, see [Vachek 1968: 15–26 and references; Jakobson, Waugh 1979: 165–173]).

[9] The language of every people, even the most primitive tribe, is a perfect vehicle for communication [Sapir 1949: 22 = Sepir 1993: 41; Baugh 1990: 66]. There are perhaps backward and primitive peoples and tribes, but there are no primitive languages. Therefore, it would be more accurate to depict language change not as a *development*, but as an *evolution* or simply as *change*. Language

system replaces another. A characteristic example of the diachronic study of language is so-called historical grammar, as well as the comparative grammar of the Indo-European languages. Dialect researchers must always contend with various diachronic matters.

Structural linguistics, as mentioned above (§ 2 and references), highlights the synchronic aspect of the study of language, since only synchrony allows us to see a language as it really is, as it is used by a real speech community. However, diachrony is also important, since it is often only diachrony which allows us to fully grasp the essence of a language, its concrete facts and even its systematic nature, and to explain various phenomena which are inconsistent or even incomprehensible from a synchronic standpoint. Thus alongside such forms as *mẽdis* 'tree-NOM.SG', *mẽdį* 'tree-ACC.SG', *mẽdyje* 'tree-LOC.SG', *medẽlis* 'tree (dim)-NOM.SG', in contemporary Lithuanian we have *mẽdžio* 'tree-GEN.SG', *mẽdžiui* 'tree-DAT.SG', *medžiù* 'tree-INS.SG', *mẽdžiai* 'tree-NOM.PL', although bearing in mind other words of this declension pattern we would expect either *mẽdis*, *mẽdį*, … , **mẽdio*, **mẽdiui*, or **mẽdžis*, **mẽdžį*, **mẽdžyje*, **medžẽlis*, *mẽdžiai*, etc. Indeed, alongside *brólis* 'brother-NOM.SG', we say *brólio* 'brother-GEN.SG', *bróliui* 'brother-DAT.SG' and alongside *úosis* 'ash (tree)-NOM.SG', *úosio* 'ash (tree)-GEN.SG', *úosiui* 'ash (tree)-DAT.SG', etc. This lack of regularity becomes fully understandable only once it has been established that *dž′* and *č′* arose from the original clusters **dį*, **tį*, which lost the **į* before front vowels and became affricates before back vowels. Only knowing Leskien's law (the shortening of acute endings) can we understand the alternation *-a* : *-o*, *-i* : *-ie*, *-u* : *-uo* in simple forms [of adjectives] and in pronominal and reflexive forms (cf. *gerà* 'good-NOM.SG.F' : *geró-ji* 'good-NOM.SG.F.PNL', *gerì* 'good-NOM.PL.M' : *geríe-ji* 'good-NOM.PL.M.PNL', *nešù* 'carry-1SG.PRS' : *nešúo-si* 'carry-1SG.PRS.REFL').

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is always changing, passing from one synchronic state to another, but it does not become more perfect because of this. The illusion of an allegedly imperfect language may come about when a people suddenly changes its cultural orientation, i.e., when it begins to talk about completely new things. Therefore, with certain reservations, we can speak of cultivated, or honed, and less-cultivated standard languages, but in so doing we characterize not the linguistic system itself, but only a certain functional style (thus a partial norm), especially its lexical variety or lack thereof.

§ 9. Therefore, to better understand a contemporary language, we must also study its development: its diachrony. Moreover, at any moment in a language's history, synchrony and diachrony are interwoven; there is no strict boundary between the two (see [Bulygina 1964: 5 and references; Stepanov 1975b: 260–264]). In every language and dialect we can find archaisms slowly going out of use and innovations which have not fully caught on; often speakers themselves can give an entirely plausible diachronic characterization of such phenomena, accurately indicating their "newness," their "old-fashioned" or "ordinary" character, etc. These can all be understood as special stylistic variants. Thus the terms synchrony and diachrony refer not so much to actual states of a language as to research perspectives or projections (cf. [Koseriu 1963: 148–155]). If we ignore the time factor, stepping into the position of real speakers, we have a synchronic investigation; if we include the time factor and examine various synchronic "slices" of a language, we have a diachronic investigation. A synchronic description of a language thus understood can be simply regarded as one of the main stages in a diachronic reconstruction [Stepanov 1975a: 119–122].

Nevertheless, in each concrete case these perspectives and projections need to be strictly distinguished (see, for example, [Saussure 1967: 129 = Sossjur 1977: 124; Kuznecov 1970a: 167]);[10] otherwise we will have a distorted or at least incomplete picture of the linguistic system. As an elementary example, we can point to the word *avìdė* 'sheepfold'. From a diachronic perspective, this is a clear derivative formed from two stems: *avi-* 'sheep' and *-dė* 'put'. The first stem consists of the root *av-* and the stem formant *-i*; the second, of the root (with a zero-grade vowel) *d-* (cf. *dė́-ti* 'put-INF' : *iñ-d-as* 'dish, vessel') and the stem formant *-ė*. But in contemporary Lithuanian, this word is simply considered a form derived with the suffix *-id(ė)* (see [Urbutis 1978: 159]; cf. the innovations *arklìdė* '(horse) stable', *karvìdė* 'cowshed', *šunìdė* 'kennel', instead of the historically

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[10] This had already been discussed by Baudouin de Courtenay [Boduėn de Kurtenė 1963: vol. 1, 68].

The relationship between synchrony and diachrony is without question not fully symmetrical. Diachrony always requires a solid synchronic (or typological) foundation, while synchrony can get along perfectly well without diachrony (cf. [Steblin-Kamenskij 1966: 67–68]).

"correct" *arkliãdė, *karvė́dė, *šuñdė). We no longer have other compound words with a zero-degree vowel; this type of ablaut has generally disappeared as a productive auxiliary means of word formation. Nor is the Modern English word *lord* a compound, although it arose from the Old English compound *hlāford* 'keeper of the bread' (from *hlāf* 'bread, loaf' and *weard* 'keeper'). If we were to consider this a compound, we would have to assume fantastical synchronic phonetic and semantic connections, no longer perceived by anyone (except perhaps etymologists), with the words *loaf* and *ward*.

§ 10. All that has been said here now seems easily understood, but the confusion of synchrony and diachrony is nevertheless not so uncommon. For example, the ending of the dative singular form *Vìlniui* 'Vilnius' is sometimes described as consisting of the diphthong /ui/, while the ending of the locative *Vìlniuj*, pronounced in the same way, is presented as a combination of the phonemes /u/ + /j/, since the latter ending is abbreviated from /uje/ (see, for example, [Vaitkevičiūtė 1961: 41, fn. 12]). And instead of synchronically explaining the formation of the verbal adverb, it is occasionally stated in an otherwise synchronic grammar (for example, [Ulvydas 1971: 385]) that it arose from the old dative case of active participles (in greater detail, see [Girdenis, Žulys 1973: 205–206 (= Girdenis 2000b: 373–375) and references]). Such diachronic incrustations were common in the works of nineteenth-century linguists; they wanted studies of a descriptive nature to appear more scientific.[11]

§ 11. The concepts of syntopy and diatopy (Gk. *τόπος* 'place') are now often distinguished [Hammarström 1966: 93–94 and fn. 199]; Saussure never mentioned these, but undoubtedly felt a need for them (cf. [Saussure 1967: 128 = Sossjur 1977: 123]). Syntopy reflects the study of the language of a single, specific location, single social stratum, and single style. Works which use the data of various territorial dialects, sociolects, and styles are diatopic. More broadly understood, diatopy also includes language typology. Classical comparative-historical linguistics is a distinctive synthesis of diachronic and diatopic research.

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[11] Unfortunately sometimes even now, in writing (for example) "historical grammar gives a scientific understanding of linguistic phenomena" [Zinkevičius 1980: 9]; we indirectly suggest that a synchronic grammar is incapable of providing such an understanding.

Only a syntopic study gives a true picture of a linguistic system. If, in describing some language, we were to rely on the material of various dialects, we would get a picture which has nothing in common with a normally functioning system. For example, the facts of some Lithuanian dialects would show that vowels in unstressed syllables are only short, while the data of other dialects would show that they can be both long and short; some data would show that Lithuanian has the diphthongs *ọu*, *ẹi*, while other data would show that it does not. In some places, we would find one type of declension pattern for words like *klė́tis* 'granary'; elsewhere, we would find other types, and so forth. Works on dialectology have therefore long distinguished mono-graphic (syntopic) and geographic (diatopic) methods.

2. THE RELATIONSHIP BETWEEN PHONOLOGY AND PHONETICS

§ 12. Phonology studies the expression plane of a linguistic system, rather than all sounds of a language in general. It is therefore interested only in those properties of speech sounds which allow us to distinguish some units of content (referential meaning, see § 16, 21) from others; that is, phonology forms the expression of signs and is their material basis[12] (see, for example, [Bloomfield 1935: 76–78 = Blumfild 1968: 74–76; Trubetzkoy 1977: 14 = Trubeckoj 1960: 18; Avanesov 1956: 17; Koefoed 1967: 17–18; Švedova 1970: 7; Jakobson, Fant, Halle 1972: 1; Postovalova 1972: 121; Muljačić 1973: 33; Philipp 1974: 9; Alarcos Llorach 1975: 28–29]). At the end of the Lithuanian word *dù* 'two', for example, we almost always pronounce an *h*-type element, and at its beginning, if we listen carefully, we can hear a transitional nasal element. Both of these sounds are perfectly audible when listening to a reversed tape recording: *dù* most often sounds like [hùdn]. Thus *dù* often "consists" not of two, but of four sounds: [ⁿd˚ùh]. Nevertheless, a phonologist finds in this word only

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[12] In this context, Russian linguists often use the rather unfortunate term *звуковая оболочка* 'sound envelope' (for example [Avanesov 1956: 7 et passim]; cf. Ger. *Wortkörper* or *Zeichenkörper* (plural) [Trubetzkoy 1977: 31 et passim; Meinhold, Stock 1982: 14 et passim]). Kazlauskas [1966: 75] sporadically tried to introduce into Lithuanian the slavish translation *garsinis apvalkalas*.

two sound units, since it is the same word for all Lithuanian speakers, whether pronounced with an initial [ⁿ] (so-called prenasalization) and a final [h] or not. A "naive" speaker will also only hear two "sounds" here, since from an early age he or she is accustomed to reacting only to those properties of sounds which distinguish content. A speaker's reaction will be completely different if in this word we replace [d°] with [t°], and thus get the new sound sequence [t°ù(h)]. The speaker will notice this change immediately, since in this case it is not just the sound of the word which has changed, but also its meaning ([t°ù(h)] = *tù* 'you'). This shows that the phonetic difference [ⁿd°] and [d°] is phonologically insignificant, while the difference between [t°] and [d°] is phonologically significant.

Only phonologically significant, or relevant, sound features and distinctions form the object of phonology (cf. [Muljačić 1973: 31–33; Alarcos Llorach 1975: 29]). The physical salience of features, or lack thereof, does not play a great role here. A quite distinct sound or feature, easily picked up by a recording device, may be phonologically insignificant, while a barely noticeable sound or property, even one difficult to record, may be significant. Thus, between [d] and [r], [g] and [r] (in words of the type *draũgas* 'friend', *grõžis* 'beauty'), we pronounce a "parasitic" vowel, clearly seen even on oscillograms or kymograms of poor quality (see, for example, [Ekblom 1922: 15, 20; Kačiuškienė, Girdenis 1982 (= Girdenis 2000c: 268ff.)]). However, it always appears spontaneously between these sounds and therefore cannot be relevant. But the extremely reduced vowel pronounced at the end of forms of the type *šȧ.kᵉ* "*šãkė*" 'branch' in North Žemaitic dialects (Mažeikiai, Seda, etc.) is barely shown in a direct way by recording devices, yet it is nevertheless phonologically significant, since it distinguishes, for example, forms such *šȧ.kᵉ* "*šãkė, -ę̃*" 'branch-NOM.SG/ACC.SG' : *šȧ.kⁱ* "*Šãkį̃*" 'Šakys [surname]-ACC.SG', *àkᵉs* "*akìs*" 'eye-NOM.SG' : *àkⁱs* "*akìs*" 'eye-ACC.PL', etc. (see [Zinkevičius 1966: 117]. On the difficulties faced by non-native linguists attempting to distinguish and record these sounds, see [Tolstaja 1972] and [Girdjanis 1977: 305 (= Girdenis 2000c: 383f.)]).

§ 13. The phonological significance, or relevance, of certain sounds or their features is not universal; it depends on a specific dialect or language (cf. [Martine 1963: 410]). For Lithuanian speakers, for example, an [h]-type sound following a final vowel is not relevant,

and therefore not even noticed; but for Indonesian speakers it is an important phonological unit, often distinguishing words which are exactly the same in other respects: *dara* 'girl' : *darah* 'blood', *kuku* '(finger)nail' : *kukuh* 'sturdy, stable'. A Lithuanian aspirated [tʿ], pronounced only at the end of a word, easily alternates with an unaspirated [t] without changing either lexical or grammatical meaning (cf.: [kaŝm̂æ̃·tʿ] = [kaŝm̂æ̃·t] "*kasmẽt*" 'yearly', [łàkʿ] = [łàk] "*làk*" 'lap-2SG.IMP'). In Swahili (Africa) and Old Indic, aspiration (usually transcribed with the letter *h*) is a relevant phonological property: Swahili *thembo* 'elephant' : *tembo* 'wine', Skt. *khalas* 'villain' : *kalas* 'mute person', *phalam* 'fruit' : *palam* 'drop; meat', *rathas* 'cart' : *ratas* 'satisfied'. In the languages of Europe, relative pitch may be just an individual trait or a component of sentence intonation; in other world languages it is often the same sort of phonological unit of a word as vowels or consonants, cf. Yoruba (Africa)[13] *abá* 'part' : *abà* 'warehouse' : *àbá* 'situation' : *àbà* 'a species of tree', *fọ́* 'break-INF' : *fọ̀* 'wash-INF' : *fọ* 'speak-INF'. Thus, a decision regarding what is phonologically significant and what is not in a particular language or dialect can only be made by speakers of that language or dialect: so-called informants.[14] There are no devices with which we could objectively establish phonological units. Instruments analyze sounds as purely physical phenomena, and, to the extent permitted by the technology of a particular period, capture all of their properties indiscriminately—those which are phonologically significant and those which are not (cf. [Fant 1964: 161]). Therefore progress in instrumental phonetics cannot have a decisive impact on phonology (cf. [Klimov 1967: 38]).

§ 14. All phonetic properties occurring in acts of speech, whether relevant or not, are studied by another discipline, in some sense occupying an intermediate position between linguistics and the natural sciences (mainly physics and physiology). This discipline is traditionally called phonetics (from Gk. ἡ [τέχνη] φωνητική '[the art of] sounds'). The branch of phonetics which focuses on the acoustic

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[13] The grave [`] here denotes low tone, acute [´] denotes high, and lack of a mark—middle tone.

[14] Therefore, even the best phoneticians make many mistakes when they try to record the data of a foreign language or dialect before analyzing their phonological systems (cf. [Ringgaard 1965]).

(physical) properties of sounds is in some of its methods essentially applied physics;[15] the branch of phonetics which studies the articulatory properties of sounds could be considered applied physiology (and, in part, anatomy). Of interest to the specialist in this area are not just those sounds and their properties which allow us to convey and distinguish meaningful units, but also those which do not perform any function. The above-mentioned transitional [n] and [h]-type consonants sometimes heard in the word *dù* 'two' are just as important an object of phonetic investigation as any other sounds. Of course, "pure" phonetics also seeks generalizations in individual acts of speech, but the direction and nature of this research is determined not so much by the function of the phenomena in question as by various methods for classifying and analyzing sounds which are independent of an actual language, and also by principles of mathematical statistics and inductive logic common to all empirical sciences.

Classical phonologists (for example, Trubetzkoy) were convinced that phonetics and phonology are entirely distinct branches of science [Trubetzkoy 1977: 5–17 = Trubeckoj 1960: 7–22; Vachek 1966: 42–43] (for a survey of opinions and arguments see [Bulygina 1964: 59–62; Fischer-Jørgensen 1975: 22–23]); only phonology is a linguistic discipline, while phonetics should be assigned to the natural sciences [Trubetzkoy 1977: 12–14 = Trubeckoj 1960: 16–17]. Such an approach is, of course, not impossible, since, viewed abstractly, the study of sounds as purely physical phenomena should not belong to the social sciences—linguistics. In fact, however, there is no "ideal" phonetics which would completely neglect the function of sounds, and there never has been. Every phonetic study relies, either consciously or intuitively, on a phonological analysis [Zwirner, Ezawa 1966: 106ff.; Zinder 1979: 8]. Even the purest experimental phonetician carefully studies only those sounds or their properties which perform (at least in some language) a phonologically distinctive role (cf. [Hammarström 1966: 2 and references]). On the other hand, phonology cannot completely dissociate itself from pure phonetics and its

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[15] This status of acoustic phonetics has been officially recognized in Poland; here serious work in experimental phonology is published in the series *Biblioteka mechaniki stosowanej* ('Library of Applied Mechanics'); see, for example, [Jassem 1973]).

discoveries, since even the most abstract phonological units and rela-
tions are found only in specific acts of speech and are described only
by means of phonetic categories and concepts (cf. [Lehiste 1970: vi]).
Even Trubetzkoy himself could not avoid this; indeed, his entire clas-
sification of phonemes, and even definitions of the vowel and conso-
nant classes, is completely phonetic rather than functional [Trubetzkoy
1977: 82–83 et passim = Trubeckoj 1960: 102–103 et passim].

With this in mind, many theoreticians of contemporary linguis-
tics are justifiably persuaded that pure phonetics and phonology are
not independent branches of science, but two aspects of a single
broader linguistic discipline [Malmberg 1971: 9–12, 233 et passim;
Bernštejn 1962: 64; Martine 1960: 97; Pilch 1964: 102–104; Cacher
1969: 8–11; Linell 1979: 30–31; Zinder 1979: 4–12] (for a survey of
views, see [Postovalova 1972: 127–129]).[16] Most often this discipline
is called *phonetics* (in the broad sense); sometimes the term *phonology*
is also used for this purpose, especially when speaking about phonetic
research which is strictly subordinated to contemporary principles of
phonology. Russian linguists, beginning with Ščerba, one of the pio-
neers of phonology, usually use the first term, and almost all maintain
the view that speech sounds are studied by a single discipline, pho-
netics (in the broad sense) [Zinder 1979: 4ff.], which consists of two
relatively independent disciplines: phonology and pure phonetics (or
phonetics in the narrow sense). This is undoubtedly the most natural
and realistic approach. It was apparently not formulated or accepted
by the classical phonologists because they wished to emphasize the
originality and novelty of their theory and dissociate themselves as
much as possible from traditional phonetics (cf: [Postovalova 1972:
127 and references; Fischer-Jørgensen 1975: 23]). In so doing, they
intentionally or not lost sight of the significant and obvious fact that
phonetics and linguistics in general has from the earliest times been

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[16] Martinet [1949], in attempting to bridge the gap between phonetics and
phonology, suggested calling phonology *functional phonetics*. The descriptiv-
ists, generally speaking, did not arrive at a single opinion; we could take as most
characteristic the view aphoristically formulated by Pike: "Phonetics gathers raw
material. Phonemics cooks it" [Pike 1947: 57]. The extremely close connection
between phonetics and phonology was also discussed by Fischer-Jørgensen, who
was close to the proponents of glossematics [1962: 120; 1975: 22–23] (cf.
[Philipp 1974: 9]).

governed by implicit (unconscious and not clearly formulated) pho-
nological principles (cf. [Voronkova 1981: 6–7]). That these princi-
ples were already spontaneously grasped in ancient times is shown by
so-called phonetic writing systems, such as those of the ancient
Greeks and Romans and even the Indic *devanāgarī*.[17] Rather than con-
crete sounds, these express only phonologically significant phonetic
elements and are thus in fact phonological.

Too strict an opposition between phonetics and phonology,
originally not difficult to understand, has now become an anachronism
impeding the actual practice of the discipline, sometimes even pre-
venting a deep and thorough investigation of some phonetic aspect of
a language or an explanation of its development (see, for example,
[Ivanov 1954: 133]).

3. THE FUNCTIONS OF SPEECH SOUNDS AND THEIR FEATURES

§ 15. As we have already noted, phonology distinguishes and
studies only those sounds and their features which perform a certain
distinctive function; that is, which convey and distinguish a certain
content. Three main functions of speech sounds are most often distin-
guished: representative, expressive and appellative (Ger. *Darstel-
lungsfunktion*, *Kundgabefunktion*, *Appellfunktion* [Trubetzkoy 1977:
17–29], Ru. *репрезентативная* (*экспликативная*), *экспрессивная*,
апеллятивная функция [Trubeckoj 1960: 22–35]; for an elaboration
of the Russian terms, see [Bulygina 1964: 62, fn. 66]). Other terms are
also found: *symbolic*, *symptomatic*, *actuative function* (cf. Sp. *función
representativa*, *sintomática*, *actuativa* [Alarcos Llorach 1975: 33–34],

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[17] For various reasons (especially sound change), a writing system can diverge
considerably from a phonological system. This has happened, for example, in
Modern English and French, where spelling is almost entirely based on the
so-called historical (or traditional) principle. But perhaps the most complex
alphabetic writing, the furthest removed from pronunciation, is that of Irish:
caoirtfheoil [kʷiːrʹoːlʹ] 'mutton', *cheannuigheas* [çaniːs] 'bought-1SG.PST',
deirbhsheathar [dʹrʹifeːr] 'sister-GEN.SG', *i n-a shuidhe* [nə hiː] '(he is) sitting',
seachnochad [šaxnoːd] 'protected' [Gercenberg 1970: passim]. One could
almost say that these are logograms composed of Latin letters.

It. *funcione simbólica*, *sintomática*, *appellativa* [Muljačić 1973: 34–35]), *referential*, *emotive*, *conative function* [Jakobson 1960], etc. This lexical variety in expressing the same concepts undoubtedly arose due to different translations and explanations of Karl Bühler's basic terms (the above-mentioned Ger. *Darstellungsfunktion*, *Kundgabefunktion*, *Appellfunktion*, cf. [Bjuler 1960b] and [Trubetzkoy 1977: 17–18 and fn. 1 = Trubeckoj 1960: 22, fn. 1]).

§ 16. Having representative function (from Fr. *répresentatif* ← Lat. *repraesento* 'I represent') are those sounds, sound sequences, or sound properties which represent referential (that is to say, intellectual) content and create and distinguish its expression. For example, the sound sequence written "*Prasidéjo kãras*" 'The war began' (and its final fragment *kãras*, and even the separate initial element of this fragment, [k]) performs a representative function, since it represents a clear content: the phrasal element which would remain nearly unchanged when translated into different languages (cf. Ru. *Началáсь войнá*, Latv. *Sâkâs kàr̦š*, Eng. *War broke out*, Ger. *Der Krieg brach aus*, Fr. *La guerre a commencé*) and which allows one to understand this content and distinguish it from other content. Without such "representatives," phonetic or otherwise, content arising in the mind or experienced by someone would remain inaccessible to others; it would often even be difficult to remember.

Units and properties of sound which perform a representative function are phonological units [cf. Vachek 1967b]. They are studied by phonology.

§ 17. When we speak, we most often express not only pure referential meaning, but also, consciously or unconsciously, we evaluate this meaning and our interlocutor; we display a certain attitude with regard to both. Those sound properties which directly reflect this attitude or evaluation have so-called expressive (from Fr. *expressif* ← Lat. *expressus* 'distinct, clear') or emotive function. The main role here falls to various markers of phrasal intonation—modulations of pitch and vocal strength, rate of speech, and, in part, voice quality (see in detail [Ceplitis 1974: 188ff.]). For example, an unnaturally high pitch and fluctuating vocal strength usually reveal a speaker's agitation, while a strong labialization and nasalization of sounds shows tenderness or affection [Ceplitis 1974: 192–194], etc. Individual phonetic properties and even certain "special" sounds can also have an

expressive function. In Lithuanian, for example, intensive long conso-
nants against a background of unusually shortened vowels often
expresses anger: [rˢùp°u·ž̬ẹ·s] *Rùpūžės!*" 'Toads!' : [rrùppu.ž̬ẹ.s],
[kåũ.kˢt̬šæ] "*Kaũk čià!*" 'Cry about this now!' : [kkɑúkˢt̬šæ];[18] often
in such cases vowels are more fronted and delabialized: [žaĨt̬i· t°ù]
"*Žaltỹ tù!*" 'You snake!' : [žžæĨt̬i. tы!].[19] Prolonged vowels against a
background of normal or weakened consonants expresses submissive-
ness, humility [b°uuũ·(k) gæææ̃·ras!] "*Bũk gẽras!*" 'Be good!' (cf.
[Bikulčienė 1975]). Žemaitic speakers (and perhaps speakers of other
dialects) even have a special vowel which performs only expressive
function: cf. the normal exhortation *dôuk* "*dúok*" 'give-2SG.IMP' and
the impatient, insistent command or request *dôuk-ə* 'Give it here!'.
This vowel is sometimes also tacked on when answering a bothersome
command or request: *kàs tu.ˌlô.ŋg*[(a)] *iŝkr̥ô.šᵃ?* – *vã·ks-ə* (Tirkšliai)
"*Kàs tą lángą* (*atsitiktinaĩ*) *išmùšė? – Vaĩkas* (*sakaũ aš táu!*)" 'Who
(accidentally) broke the window? The *child* (I'm telling you!)' (see
[Girdenis 1968a: 53–54 (= Girdenis 2000b: 167–169); 1971b: 24
(= Girdenis 2000b: 215)]; on its possible origin, see [Girdenis 1982a:
186 (= Girdenis 2000c: 281), fn. 24]).

Often considered expressives are those phonetic phenomena
which characterize a speaker as a representative of a certain group
(gender,[20] social group, class); hence everything that provides direct
information about the speaker himself, rather than the referential con-
tent of speech.

Elements performing an expressive function are also signs (some-
times they are referred to by the special term emphatics [Laziczius

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[18] The same features in other languages may have a representative function: It.
beco 'fool' : *becco* 'beak', *bruto* 'wild animal' : *brutto* 'ugly', *colo* 'sieve' :
collo 'neck', *sera* 'evening' : *serra* 'dam', Sp. *caro* 'dear' : *carro* 'two-wheeled
cart', *maron* 'sturgeon' : *marron* 'brown', *pera* 'pear' : *perra* 'bitch', Kurdish
diran 'tooth' : *dirran* 'bark-INF', *kar* 'piece' : *karr* 'deaf'.

[19] The transcription of expressive and other "non-standard" examples is
approximate, since there are no symbols with which we might more adequately
represent these sounds.

[20] For example, the female "dialect" of Chukchi has the affricate [ʦ], which is
alien to the male "dialect"; in Lithuanian Northwest Žemaitic dialects, the
vowels [a·] and [a.] are especially strongly labialized (nearly to [å·] and [å.]) by
female speakers [Girdenis, Riaubiškytė 1981: 92 (= Girdenis 2000c: 254)] (for
more examples, see [Trubetzkoy 1977: 21–22 = Trubeckoj 1960: 26–27]).

1936]); they also have both material expression (the above-mentioned phonetic properties) and a certain more or less clear content. These features convey emotional information. Such signs, as we have seen, are variously interconnected with signs expressing referential information. It goes without saying that expressive signs can be the object of scientific investigation. But they most likely do not belong to a linguistic system [Pazuchin 1963: 99–101] (cf. [Renský 1966: 100–102]) and are therefore not of direct interest to phonology.[21] They would be studied by another discipline, which Trubetzkoy called sound stylistics (Ger. *Lautstilistik* [Trubetzkoy 1977: 28]). To date, this promising area of research is only at an embryonic stage of development,[22] and its issues are only partially addressed by the comprehensive, partly phonological, partly phonetic, and partly grammatical discipline of intonology (see [Ceplitis 1974: especially 177–199; Svetozarova 1982: 22–24]).

From a phonological standpoint, phonetic properties and individual sounds with only expressive function are irrelevant or non-essential, since they do not convey or distinguish referential (intellectual, non-emotional) content. Nevertheless, they should not be entirely forgotten in a broader phonological work. Especially deserving of the phonologist's attention are those expressive features which function as phonological units in typologically (or diatopically) close languages and dialects.

§ 18. The third function of speech sounds is the appellative (from Fr. *appel* 'appeal', Lat. *appello* 'I address, I greet'). By means of appellatives (or vocatives), a speaker attempts to directly influence a listener: to encourage the listener to act in a certain way, to evoke certain emotions and moods without necessarily experiencing them himself [Trubetzkoy 1977: 24–27 = Trubeckoj 1960: 30–34; Alarcos Llorach 1975: 33–34]. For example, in Even (Eastern Siberia), when calling or addressing someone, the vowel [eː] is added to the end of a word: эмрэм 'I have arrived' : эмрэм'-ē 'I have arrived!', кэдикэн

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[21] Trubetzkoy himself considered this function linguistic: cf. his term Ger. *Kundgabephonologie* [Trubetzkoy 1977: 20] = Ru. *экспрессивная фонология* 'expressive phonology' [Trubeckoj 1960: 25].

[22] Phonostylistics, which arose later (see [Muljačić 1973: 35; Svetozarova 1982: 10 and references]), is concerned with a much narrower sphere of issues (mainly the nuances of sentence intonation connected with speech.)

'friend' : *кэдикэн'-ē* '(Oh) friend!' [Novikova 1960: 46]. This function is also performed by stress retraction, characteristic of the vocative in certain Lithuanian dialects: SAukšt. *juõzuĩi, ŝir̃.ᵭæła* "*Juozùli, širdẽle!*" 'Juozulis, dear!', Žem. *t̃ievȧ.ĩi* "*tẽvẽli!*" 'Dad!', *vàkàlê· "vaikẽliai!*" 'Children!'.[23]

The optionality of expressing emotional experience is presumably the main distinguishing feature of the expressive and appellative functions, since generally they are so interwoven that it is rare that we can clearly say whether a certain concrete phonetic phenomenon is expressive or appellative. For example, the above-mentioned drawn-out intonation of an earnest request [b˚uuũ·(k) gæææ̃·ras!] "*Bũk gẽras!*" 'Be good!' indicates simultaneously the particular mood of the person making the request and his or her attempts to influence another person; it thus combines both expressive and appellative aspects. For this reason, both functions are often combined into a single interpersonal or simply expressive function (in the broad sense)[24] (see [Laziczius 1936: 57; Jakobson, Halle 1962: 469 = Jakobson, Challe 1962: 237; Milewski 1965: 13–26; Alarcos Llorach 1975: 34]; cf. Kuznecov's terms *модальные признаки = экспрессивные признаки* 'modal features = expressive features' [Kuznecov 1970a: 180]).

This conflation of functions is convenient, since it is important for the phonologist to distinguish representative and non-representative phenomena (in other words, those which belong to a linguistic system and those which do not). Combining non-representative functions into a single function makes this distinction even clearer and more natural. In so doing, we do not deviate a great deal from the practice of classical phonology, since even Trubetzkoy, who formally distinguished two non-representative functions, in fact treated them as two aspects of the same phenomenon and considered both to be objects of sound stylistics, rather than phonology [Trubetzkoy 1977: 28–29 = Trubeckoj 1960: 35].[25]

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[23] It was Simas Karaliūnas (personal communication) who first drew my attention to the possible appellative function of stress retraction in these word forms.

[24] When emotions are expressed by ordinary lexical and grammatical means, speech has a representative, rather than expressive, function [Pazuchin 1963: 98].

[25] Apparently Trubetzkoy had complete confidence in Bühler's above-mentioned schema [Bjuler 1960b: 25] and tried to accommodate to it real facts

§ 19. Language itself, and its individual elements, also performs other functions [Jakobson 1960; Vachek 1966: 331]. In cases where the object of an act of speech (the referent) is the language itself or its various features, we have the so-called metalinguistic function. Included here are various definitions of word meanings, remarks on the peculiarities of an interlocutor's speech, etc. Where a certain value represents not only the content of an act of speech, but also its expression, language performs not just a representative function, but also a poetic function, broadly understood. It is not only the works of good poets that have this function; even utterances such as *Kàs kàs, tàs ir lès* 'Who digs, will peck (food),' *Kaĩp pasiklósi, taĩp išmiegósi* 'As you make your bed, so will you sleep', and they are interesting not just for their content, but for the way they sound. Speech which simply maintains contact between speakers and does not attempt to convey any important information performs a phatic function (Gk. *φάτις* 'rumor'). Included here are various conversations, which neither inform nor oblige, about the weather, about people and events well-known to one and all, as well as greetings, wishes, etc. This function plays a significant role in social life, since often (perhaps most of the time) we speak not for the purpose of conveying to one another our great original thoughts or some unusually important news, but simply to maintain human relationships [Pride 1977: 288–289].

It is not difficult to see that there are certain links between the metalinguistic and phatic function on the one hand, and the so-called appellative function on the other, and between the poetic and expressive functions. But these relations should be dealt with by semantics, rather than phonology. For phonology, only those functions are relevant which are represented by units of expression of language and speech, rather than language as a whole. Hence it suffices here to distinguish representative and expressive (emotive and appellative) sound units and features. Phonology is not concerned with either the validity or nature of content.

§ 20. The representative function is the most important and complex function, and therefore we usually distinguish three of its more concrete aspects, three partial functions: distinctive, culminative, and delimitative (Ger. *bedeutungsunterscheidende* or *distinktive*, *gipfelbildende* or *kulminative*, *abgrenzende* or *delimitative* [*Funktion*] [Trubetzkoy 1977: 29], Ru. *смыслоразличительная* or *дистинктив-ная*, *вершинообразующая* or *кульминативная*, *делимитативная* [*функция*] [Trubeckoj 1960: 36–37]). Jakobson used hierarchically-grouped terms: distinctive function is opposed to configurative, and configurative is further divided into culminative and demarcative (i.e.,

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and observations. (Note that the actual number of functions may also depend on a specific language.)

delimitative) [Jakobson, Halle 1962: 469 = Jakobson, Challe 1962: 237; Jakobson, Fant, Halle 1972: 15]. Culminative function is sometimes called contrastive (for example, [Martine 1963: 409; Alarcos Llorach 1975: 37]) and distinctive is also called oppositional [Martine 1963: 408] or differential [Alarcos Llorach 1975: 36].

§ 21. Those sounds and phonetic features which distinguish certain referential (semantic or grammatical) meanings from others perform a distinctive (distinguishing) function (from Lat. *distinctus* 'difference, distinction' ← *distinguo* 'I distinguish'). The Lithuanian consonants [k], [g], [b], [m], for example, have this function, since they allow us to distinguish words such as *gãras* 'steam' : *kãras* 'war' : *bãras* 'strip (of land); bar' : *mãras* 'plague', which are in other respects identical. The vowels [a] and [aˑ] also have this function; they distinguish the words *kàsti* 'dig-INF' : *ką́sti* 'bite-INF', and grammatical forms such as nominative singular *dúona* [dˊúɔna] 'bread-NOM.SG' : accusative singular *dúoną* [dˊúɔnaˑ]. Also distinctive are the pitch accents of the words *laũk* 'Get away!' : *láuk* 'wait-2SG.IMP', *vir̃siu* 'overturn, fall-1SG.FUT' : *vìrsiu* 'boil-1SG.FUT', which have the same consonants and vowels. Sounds and phonetic features having this function are distinctive units of language.

In the phonological system of every language, distinctive units are the most important—they form the basis of a language's expression plane. For this reason, the concepts of distinctive unit and phonological unit are sometimes unjustifiably identified.[26] This identification is based on a false conclusion from the correct fact that all linguistic phenomena which have a distinctive function are phonological units. What is forgotten here is that the concept of phonological unit is broader than the concept of distinctive unit: every distinctive unit is phonological, but a language can also have phonological units which do not perform a distinctive function, but nevertheless help form the expression of linguistic signs.

§ 22. Among the non-distinctive functions which certain phonological units may have, the most universal and widespread in various languages is the culminative, or contrastive, function (from Lat.

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[26] Cf. [Kazlauskas 1968a: 6 et passim]. Kazlauskas in fact inadvertently repeated Jakobson's error (along with certain of his actual diachronic interpretations; cf. [Jakobson 1963a: 159–161] and [Jasiūnaitė, Girdenis 1996: 183 (= Girdenis 2001: 260), fn. 10]).

culmen 'top, summit'). Phonetic features which show how many meaningful units there are in a certain fragment of text (or act of speech) have this function. For example, guided by our own "everyday" linguistic intuition, we can easily say that the "sentence" *[mátarašúpatení] of an imaginary language consists of three words.[27] This conjecture is determined by the fact that in Lithuanian every non-dialectal word can always be said to have only a single clear stress; stress is therefore an important culminative unit. An individual component of a word can even receive stress if it is used metalinguistically as part of a sentence; we must necessarily say: "Žodis *pasãkymas* turi priešdėlį *pà-*, priesagą *-ȳm*, ir galūnę *-às*." 'The word *pasãkymas* ['utterance'] has a prefix *pà-*, a suffix *-ȳm*, and an ending *-às*' although in so doing we are stretching the truth, as it were, since neither the prefix, suffix, or ending of this word has any stress. But this is an unavoidable "lie": the utterances *[p̃r̃iež̃d̃e̦·Î̃i·pa] "priešdėlį *pa-*," *[gał°ú·ñæ·as] "galūnę *-as*," would sound impossible and incomprehensible.

In the structure of Lithuanian, the most important meaningful unit is the word, and it is set apart by its own stress. In other languages and dialects, culminative features (various degrees of stress) can single out still other meaningful units: certain morphemes, components of compound words, closely connected words (syntagmas, breath groups), etc. In German, for example, each part of a compound is marked by secondary stress: *Sonntagsrückfahrkarte* ["zɔn͵taːks'ryk'faːʁ͵kaʁtə] 'a Sunday return ticket', and also certain suffixes: *Fischlein* ['fɪš͵la̦en] 'fish (dim.)' (cf. *Fisch* 'fish'), *Dummheit* ['dʊm͵ha̦et] 'stupidity' (see in more detail § 237 and references). French behaves quite differently; it stresses certain meaningful groups of words, rather than separate words: *Ne croyez pas qu'il suffise desormais de bonnes intentions* [nə͜kʀwa·je 'pa k͡il͜syfi·z͜dezɔʀ'mɛ də͜bɔnz͡ɛ̃·tã·'sjɔ̃] 'don't believe that good intentions will suffice from now on' [Ščerba 1955: 85, 248–249; Ladefoged 1975: 222]. Phonological units with a culminative function can also be considered a kind of "conjunction" (a so-called *syndeme* [Kacnel'son 1971: 138ff.]),

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[27] This "sentence," created by Pike, is an example of the artificial *Kalaba dialects* [Pike 1947: vii, 68, 71 et passim]. It has been checked experimentally many times by students at Vilnius University; the results are always the same.

since they fuse, as it were, separate elements of the expression of a word or other linguistic sign into a single whole.

§ 23. Certain phonetic features can also perform a delimiting (separating) function (from Fr. *délimitation* 'delimitation, setting boundaries' ← Lat. *de* 'from', *limes* 'boundary'); they signal the (word, morpheme, sentence) boundaries of meaningful units, their beginning and their end. For example, if we knew that that the above-mentioned hypothetical language consistently stressed the final syllable of every word, we would not hesitate to divide *[mátarašúpatení] into the words [ma], [tarašú], [patení], and if it stressed the first syllable, then [mátara], [šúpate], [ní]. Fixed stress not only shows the number of meaningful units, but also signals their beginning and end (see in greater detail § 230–231). Fixed stress is therefore not only culminative, but also delimitative.

A delimitative function can be performed not just by stress, but also by such phenomena as vowel harmony—specific sounds used only at the beginning or end of meaningful elements (words, morphemes, etc.) [Trubetzkoy 1977: 241ff. = Trubeckoj 1960: 299ff.]. In Hungarian, for example, all vowels of a single word are almost always either front or back: *becsület* ['bɛtšylɛt] 'honor', *esztendő* ['ɛstɛndøː] 'year', *fészek* ['feːsɛk] 'nest' : *állat* 'animal', *gondolat* 'thought', *tudomány* ['tʊdomaːɲ] 'science'; similarly in other "vowel harmony" languages, for example Turkish *atlarımızdan* 'from our horses' (ı ≈ [ы] or [ɨ]) : *itlerimizden* 'from our dogs'. If, in a text of such a language, we encounter a syllable with a back vowel and a syllable with a front vowel, it is clear in many cases that they belong to different words; cf. Trakai Karaim *Авазымны эшитикин, йашырматын эшитювлярийни йалбарматыма* 'Hear my voice, do not turn your ear from my prayer' (cited according to [Musaev 1964: 268]):[28] the vowels of the words *авазымны*, *йашырматын*, *йалбарматыма* are all back and the vowels of the words *эшитикин*, *эшитювлярийни* are all front.

In English, [h] is found only at the beginning of a word or morpheme, and [ŋ] (written -*ng*) only at the end, and therefore they are not only distinctive units, but also delimitative. The word-final aspiration of the Lithuanian consonants [tˈ] and [kˈ] (see § 13) plays only a

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[28] *ю* = [ü], *я* = [æ], *г* = [ɣ] (≈ Lith. [h]); consonants before front vowels are soft (palatalized).

delimitative role. A reliable delimitative signal in North Žemaitic dialects is the coordination of so-called retracted and secondary final stress ([` (…) ˜], [` (…) `] and the like), which frames an entire word, emphasizing its beginning and end: *làšẹnẽˑ* "*lašiniaĩ*" 'lard', *nèpamèstà* "*nepamestà*" 'not abandoned' (see in greater detail § 236).

Delimitative elements are not as important or universal as distinctive elements. Even in a language which makes relatively consistent use of them, they usually signal only certain especially "dangerous," or, more accurately, important boundaries of meaningful units. Often these signals are optional, more distinctly realized only in emphatically clear speech. There are also languages and dialects which lack more stable delimitative signals.[29]

§ 24. Let us summarize.

Every sound, sound sequence, or individual feature occurring in an act of speech performs either a representative or expressive (emotive or appellative) function; it conveys and distinguishes either referential (intellectual) or non-referential (emotional, expressive) meaning. The objects of phonological research are the phonological phenomena with representative function; these are called phonological units. Those phonological units which distinguish referential meaning (or, more precisely, the expression of signs with differing content),[30] perform a distinctive function, and are therefore called distinctive units. Those units which show how many meaningful elements there are in a concrete act of speech perform a culminative function and are called culminative units. Finally, phonological phenomena which signal the boundaries of meaningful units perform a delimitative function; these are called delimitative units or boundary signals (Ger. *Grenzsignale* [Trubetzkoy 1977: 242ff.], Ru. *пограничные сигналы* [Trubeckoj 1960: 301ff.]). The most universal (and absolutely necessary for every language) are the distinctive units.

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[29] Pulgram calls these *cursus languages* and opposes them to *nexus languages*, which have such signals [Pulgram 1970: 38, 85–90].

[30] This traditional formula, which goes back to Trubetzkoy's *Principles of Phonology* [Trubetzkoy 1977: 32–33 et passim = Trubeckoj 1960: 40 et passim] and the works of other Prague School phonologists, is not quite accurate, since phonological units directly differentiate only the expression of linguistic signs and not their content.

4. TYPES OF PHONOLOGICAL UNITS

§ 25. Every stretch of speech, excluding features which do not represent referential meaning (individual, expressive, and positional modifications: a speaker's voice quality, vocal strength, features arising under the influence of neighboring sounds or pauses, etc.; cf. § 16) must be considered a unit of linguistic expression, that is, a phonological unit (Ger. *Phonologische Einheit* [Trubetzkoy 1977: 22–33], Ru. *фонологическая единица* [Trubeckoj 1960: 41], Fr. *l'unité phonologique* [Vachek 1964: 59]).

§ 26. The largest and most concrete phonological linguistic unit, the basis for phonological research, is the utterance [Harris 1963: 14], Ru. *высказывание* [Chèmp 1964: 53]), a stretch of speech between two periods of silence. The utterance is an amorphous phenomenon, lacking a more stable structure. It can be a speech by a political figure lasting several hours or a reply of a single syllable, like Lat. *I!* 'go'. In the case of a dialog, each individual reply of an interlocutor is an independent utterance.

§ 27. Every utterance consists of one or more sentences, which always have content and expression. Content is reflected even in such unnatural sentences as Chomsky's *Colorless green ideas sleep furiously* [Chomskij 1962: 418] or Ščerba's *Глóкая кýздра штéко будланýла бокрá и курдя́чит бокрёнка* (cf. Ričardas Mironas's "Lithuanian translation" *Satóji káida vačiaĩ mýtelėjo áisą ir palìna aisiùką*): they have at least clear grammatical meaning, and this is also a meaningful unit.

The sound framework of a sentence is the phonological sentence (or phonological phrase). Every phonological sentence consists of one or more phonological words (see, for example, [Muchin 1976: 56; Bondarko 1981: 52ff.]; Pulgram uses for this concept the original term *nexus* [Pulgram 1970: 25ff.]).[31] If we replace, for example, the first

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[31] Russian linguists sometimes use the peculiar term *звуковая оболочка слова*, noted above (fn. 12), for the phonological word (cf. also [Zinder 1979: 33; Voronkova 1981: 32–33] and fn. 12 of this section), the expression of a concrete word form (together with its clitics). For a formal definition of the word, see [Bloomfield 1935: 180 = Blumfild 1968: 190–191; Kuznecov 1964], on the word as the main unit of language comprehension and the basis of syntagmatic relations (phonotactics), see [Linell 1979: 69, 193–194].

word of the sentence *Studeñtai dìrba* 'The students work' with the nouns *Pẽtras* 'Peter', *poètai* 'poets', *veȓslininkas* 'businessman', we get the new sentences *Pẽtras dìrba* 'Peter works', *Poètai dirba* 'The poets work', *Veȓslininkas dìrba* 'The businessman works', etc., with different meanings; and if we replace the second word with the verbs *tinginiáuja* 'is/are loafing', *džiū́gauja* 'rejoices/rejoice', *prekiáuja* 'engages/engage in commerce', we once again obtain sentences with different meanings: *Studeñtai tinginiáuja* 'The students are loafing', *Studeñtai džiū́gauja* 'The students rejoice', *Studeñtai prekiáuja* 'The students engage in commerce'. But unquestionably different sentences may have all the same words: *Studeñtai dìrba!* 'The students are working!' and *Studeñtai dìrba?* 'Are the students working?'. These sentences are distinguished by a specific unit characteristic only of the sentence—intonation. Thus a phonological sentence is a complex consisting of words and an accompanying intonation.

Every word form (i.e., what Russian linguists call *словофо́рма* 'word form'), rather than lexeme—the totality of word forms introduced in dictionaries as a so-called headword (nominative singular, infinitive, etc.), should be considered a phonological word. Thus *žmogùs* 'person-NOM.SG' and *žmogaũs* 'person-GEN.SG' are distinct phonological words, although they belong to the same lexeme. Every phonological word thus understood consists of one or more syllables [Bondarko 1981: 50–52, 180ff.];[32] if we replace the first syllable of the word *kãsos* 'braids' with *blù-*, *tiẽ-*, *vì-*, etc., or the second syllable with *-la*, *-pas*, *-tės*, we get words of different content and expression: *blùsos* 'fleas', *tiẽsos* 'truths', *vìsos* 'all-NOM.PL.F', *kãla* 'forge-3PRS', *kãpas* 'grave', *kãtės* 'cats'. In addition to the syllable, words of many languages have an additional unit, stress, with which words consisting of the same syllables may be distinguished: Lith. *nešì* 'carry-2SG.PRS' : *nèši* 'carry-2SG.FUT', *lùpa* 'peel-3PRS' : *lupà* 'magnifying glass', Ru. *за́мок* 'castle' : *замо́к* 'lock', *со́рок* '40' : *соро́к* 'magpie-GEN.PL'.

For the sake of simplicity, we leave aside units which occupy an intermediate place between sentence and word: syntagmas, breath groups, and the like; they lend little to an explanation of our concepts, and only make it more complicated.

[32] On the syllable as a significant unit of phonology and speech, see, for example, [Haugen 1956; Trachterov 1956: especially 32; Žinkin 1958: 83, 91, 101; Hála 1961; Achmanova 1966: 43; Hooper 1972; O'Connor, Trim 1973: 259; Muchin 1976: 55ff.; Stepanov, Èdel'man 1976: 215–216].

§ 28. Every syllable consists of one or more phonemes, since, for example, if we pronounce a [g], [b], [n], [m] in place of [k] in the first syllable of the word *kã-ras* 'war', or a short [u] in place of [aˑ], we get the new syllables (and words) *gã-(-ras)* 'steam', *bã-(-ras)* 'strip (of land); bar', *nã-(-ras)* 'diver', *mã-(-ras)* 'plague', *kù-(-ras)* 'fuel'. In some languages, a syllable can have, like a sentence, an element similar to intonation: pitch accent or tone; these can sometimes distinguish syllables consisting of the same phonemes arranged in the same order. In Lithuanian, stressed syllables of a certain type may have this additional unit (see § 241): *vir̃-siu* 'overturn, fall-1SG.FUT' : *vìr-siu* 'boil-1SG.FUT', *lõ-po* 'patch-GEN.SG' : *ló-po* 'patch-3PRS'. The initial syllables here have the same phonemes /v̂-i-r̂/, /l-oˑ/, but the words are nevertheless distinguished, since their pitch accents differ. In Chinese, this role is played by so-called tones:[33] *mā* 'mother': *má* 'hemp' : *mǎ* 'horse' : *mà* 'scold' (cf. [Zinder 1979: 258; Stepanov 1975b: 96]).

The phoneme is also not an indivisible monolith. Although it sometimes stands in opposition to a syllable or a word as an elementary unit to a complex (or constructive, cf. [Muchin 1976: 54ff.]) unit, it is in principle possible to break the phoneme down into distinct articulatory and acoustic properties called differential[34] or

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[33] The diacritics represent the following tones: [̄] high level, [́] abruptly rising, [̌] low falling-rising, [̀] falling.

[34] On the negative aspects of considering phonemes combinations of distinctive features, see [Voronkova, Steblin-Kamenskij 1970; Voronkova 1981: 63ff.]; there are also quite categorical views (see [Liberman 1993]). But the critics forget that in some languages these features by themselves can be the expression of morphemes. For example, palatalization of a consonant in Irish denotes a genitive morpheme [Gercenberg 1970: 81, 92, 102] and in Romanian a plural (cf. *lupi* [lup'] 'wolves' : *lup* [lup] 'wolf' [Širokov 1965: 94]); aspiration of a consonant in Burmese distinguishes causative verbs from corresponding non-causatives: *cha¹* 'throw-INF' : *ca¹* 'fall-INF', *phjɛ²* 'destroy-INF' : *pjɛ²* 'collapse-INF' (the raised numbers denote tones) [Maun Maun N'un et al. 1963: 65]. The adherents of glossematics rejected distinctive features on quite principled grounds (of course, within the framework of their theory); for them, both sounds and, for example, graphic signs are equivalent "representatives" of the same units of expression, cenemes (phonemes) (see, for example, [Hjelmslev 1959: 49ff.]), and therefore understandably cannot have features in common.

distinctive[35] features (Lat. *differo* 'I differ'; cf. Eng. *distinctive features* [Jakobson, Fant, Halle 1972: passim], Ru. *различительный признак* [Jakobson, Challe 1962: passim]). For example, if we replace the voiced weak articulation of the phoneme of the first syllable of the word *gã-ras* 'steam' with a voiceless strong articulation, identical in all other respects, we get another word, *kã-ras* 'war'; if we replace its dorsal articulation with a corresponding labial, we obtain *bã-ras* 'strip (of land); bar', etc. Voicing and voicelessness, dorsal and labial articulations, are distinctive features of the phonemes /g/, /k/, /b/.

§ 29. Sentences, words, and apparently also phrasal intonation (cf. [Solncev 1977: 190]) are units of a linguistic system, or signs (cf. § 6), existing on two planes (they are bilateral); they have both expression and content. Syllables, phonemes, distinctive features, stress, pitch accent, and tone belong to single-plane (unilateral) units of a linguistic system; they are non-signs,[36] since they have only expression (in other words, they only form the expression of units of content). There is usually no semantic or grammatical commonality between words which coincide in a syllable or phoneme or pitch accent: *atla-pa-šiřdė* 'straightforward, frank' : *pa-vãsaris* 'spring' : *teĩ̃-pa* 'fit, hold-3PRS'; (sharing a single phoneme:) *ožỹs* [o·žĩ·s] 'goat' : *padorùs* [pa-d˚o·-r˚ùs] 'decent' : *vaĩko* [vɑi̯.k˚o·] 'child-GEN.SG'; (sharing the pitch accent of a single syllable:) *laũkas* 'field', *nař̃siai* 'bravely', *peikeĩ* 'blame-2SG.PST'. Examples such as *àš* 'I', *tù* 'you', *trỹs* 'three' in no way show that syllables can have meaning; here we simply have words consisting of a single syllable. Nor is the above-mentioned Lat. *I!* [i·] 'go' a phoneme expressing going [Reformatskis 1963: 24; Žinkin 1958: 104–105]. In this case, the meaning is that of an utterance consisting of a single sentence, composed of a single word and a hortatory intonation; the word, in turn, consists of a single

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[35] The term *distinctive feature* would be more convenient, since it better accords with *distinctive function*, but *differential feature* [*diferencinis požymis*] has a long tradition of usage; it was suggested by the pioneer of Lithuanian phonology, Jonas Kazlauskas [1966; etc.]. The purely Lithuanian *skiriamasis požymis* 'distinguishing feature' would also not be bad, but it seems polysemous and therefore not suitable as a term.

[36] Such formulations as "Phonemes are signs…" (most often Ru. "фонемы – это знаки…") should simply be considered a *lapsus calami* (but cf. fn. 44).

syllable and a certain stress. Finally, the syllable is composed of a single phoneme with the corresponding distinctive features /"vocalic" & "front" & "high" & "long"/.

The latter example shows that even when explaining the structure of the expression of concrete utterances, the principle of immediate constituents[37] must be followed (Ru. *непосредственно-составляющие*) (on which, see [Bloomfield 1935: 161 = Blumfild 1968: 169; Glison 1959: 190f.; Arutjunova, Klimov, Kubrjakova 1964: 255f.; Stepanov 1966: 65–69; Hockett 1968: 17f.]; on the significance of this principle for phonology, see [Hockett 1955: 150ff.]): every complex linguistic unit must be successively broken down into the parts of which it is composed. Skipping levels distorts the true picture of the structure of these units and their relations (cf. [Klyčkov 1963: 3]).

As we have seen, we cannot imagine single-plane sentences, since even combinations of non-existing words, as long as they are formed according to grammatical rules, acquire at least grammatical meaning, and thus content. Single-plane words are easily imagined: they can even be evaluated as to the correctness of their structure. For example, *svel̃pstas* and the above-mentioned *spráikšla* are certainly possible Lithuanian words, while *mzìnga*, *ntòmbi*, *tlùnda* are non-Lithuanian,[38] although neither the former nor the latter in fact exist in Lithuanian (cf. also "Russian" *жмола*, *хмола* [Šaumjan 1962: 69]).[39]

§ 30. We should add here that words, as linguistic signs, can be broken down not just into syllables, but also into bilateral units: morphemes (more precisely, as already noted in fn. 6, morphs), the smallest linguistic signs. Morpheme boundaries within the word rarely

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[37] The felicitous Lithuanian term *tiesioginiai sandai* was suggested by Urbutis [1978: 130].

[38] These "words" are taken from a little-known work by Romualdas Granauskas, *Marių švytėjimas* 'The lagoon's glow', where they are used as exotic personal names.

[39] A survey of language informants shows that for North Žemaitic speakers *spráikšla* is just an unfamiliar word, while *mzìnga* is impossible and not even pronounceable (*tlùnda*, incidentally, seems more Lithuanian to informants than *mzìnga*).

On the importance of "potential" single-plane words (sometimes called logatoms) for phonological analysis, see [Lyons 1968: 119–120 = Lajonz 1978: 133–134].

coincide with syllable boundaries (an exception, for example, is Chinese, in which every syllable is a separate morpheme and every morpheme is a separate syllable; see § 116, cf.: [Klyčkov 1963: 4; Garde 1968: 26]). In some languages, morphemes play an important and relatively independent role in the phonological structure of the word, and therefore phonologists must take them into account [Trubetzkoy 1977: 225 = Trubeckoj 1960: 280]. In inflectional languages, however, morphemes usually lack a more stable structure; they dissolve, as it were, within syllables and phonemes, without influencing the phonological structure of words. In studying the phonological system of such languages, we need to refer to morphemes only in exceptional cases. Lithuanian is a language of this type, and therefore the study of its morphemes belongs to those disciplines concerned with units of the content plane.[40]

§ 31. A study of sentences purely from the standpoint of the expression plane would not be appropriate, since a sentence's phonological components, with the exception perhaps of intonation, are all quite inconstant: their expression (and content, except for grammatical content) rarely repeats. Even completely original sentences which no one has ever uttered before are possible. Therefore European phonologists, in contrast to most American descriptivists (with the exception perhaps only of Pike, who on this issue follows the Europeans, see [Pike 1972a; 1972b]), begin a linguistic analysis of the expression plane with the word, the smallest bilateral linguistic unit easily perceived and distinguished; this approach is especially appropriate for inflectional languages [Klyčkov 1962: 126] and thus also for Lithuanian. An exception is to be made, perhaps, only for those languages which are mostly of the polysynthetic type, in which the word is a problematic phenomenon lacking clearer structural features. The choice of the word as a starting point is appropriate, since words are more easily distinguished and identified not only on the basis of their

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[40] These issues are treated differently by the Moscow Phonological School, where phonemes are considered immediate constituents of the morpheme rather than the word or syllable [Kuznecov 1970a: 185 et passim]. Therefore, the approach to phonemes among adherents of the Moscow School is in many respects close to that of morphonology and generative phonology (cf. [Fischer-Jørgensen 1975: 334]).

expression, but also their content. It is also important that, in beginning a phonological analysis with the word, we can easily abstract ourselves from sound modulations belonging to the intonational component of a sentence and put these aside for later examination. Later, with certain rules, we can derive the properties of phonological sentences from the phonological structure of the words and intonation patterns which form them.[41]

For these reasons, phonemes and pitch accents are appropriately identified in words rather than syllables. This seemingly inconsistent approach allows us, if necessary, to refer to the content plane, which a syllable lacks. Moreover, because syllable boundaries rarely perform a distinctive function, they are for the most part not intuitively perceived and are therefore difficult to identify. We usually grasp them only when we already know, at least in a general way, the inventory of phonemes and the main structural rules for their combinations. In science, as in life, a roundabout approach is sometimes preferable to a direct one.

§ 32. Words can differ:

a) in number of syllables: *kavà* 'coffee' : *kakavà* 'cocoa', *sukaũ* 'twist-1SG.PRS' : *susukaũ* 'twist-1SG.PST', *tà* 'that-NOM.SG.F' : *tatà* (= *tètè*) 'daddy';

b) in syllable order: *kasù* 'dig-1SG.PRS' : *sùka* 'twist-3PRS', *lèkiaũ* 'fly-1SG.PST' : *kiaũlè* 'pig', *likìmas* 'fate' : *kìlimas* 'rug', *pakišaũ* 'shove under-1SG.PST' : *pašaũki* 'call-2SG.IMP', *sūrù* 'salty-N' : *rùsų* [rˈùsˣuˑ] 'Russian-GEN.PL';

c) in syllable quality (phonemes and sometimes pitch accent), cf.: *ã-ko* 'go blind-3PST' : *dỹ-ko* 'empty-GEN.SG.M' : *laũ-ko* 'field-GEN.SG', *aũ-šo* 'dawn-3PST' : *áu-šo* 'cool-3PST';

d) in stress: *apsùpti* 'surround-INF' : *apsuptì* 'surround-PPP.NOM.PL.M', *dõros* 'morals-NOM.PL' : *dorõs* 'morals-GEN.SG', *gìria* 'praise-3PRS' : *girià* 'woods-NOM.SG'.

Syllables can differ:

a) in number of phonemes: *krĩs* 'fall-3FUT' : *krìsk* 'fall-2SG.IMP', *tà* 'that-NOM.SG.F' : *tàt* 'this, that';

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[41] Descriptivists striving for methodological "purity" must at least theoretically look for intonation contours in utterances whose phonemic makeup is not yet known (see, for example, [Harris 1963: 45–58]). It is difficult to believe that it is really possible to follow such a methodology.

b) in phoneme order: *at-kùs* 'come off-3FUT' : *ta-kùs* 'path-ACC.PL', *kal-bé-ti* 'speak-INF' : *kla-bé-ti* 'rattle-INF', *lìps* 'climb-3FUT' : *plìs* 'spread-3FUT', *pa-krìs* 'fall (a bit)-3FUT' : *pa-rìsk* 'roll (a bit)-2SG.IMP', *tóks* 'such-NOM.SG.M' : *stók* 'stand-2SG.IMP';

c) in phoneme quality (distinctive features): *tàs* 'that-NOM.SG.M' (apical) : *kàs* 'who, what-NOM.SG' (dorsal), *tù* 'you' : *dù* 'two' (voiceless : voiced), *tà* 'that-NOM.SG.F' : *tą̃* [tã·] 'that-ACC.SG.M/F' (short : long);

d) in pitch accent (only in some cases): *gìnk* 'defend-2SG.IMP' : *giñk* 'drive (cattle)-2SG.IMP', *šaũk* 'call, shout-2SG.IMP' : *šáuk* 'shoot-2SG.IMP', *rũkti* [r°ũ·k͡ti] 'smoke-INF' : *rúgti* [r°ú·k͡ti] 'turn sour-INF'.

§ 33. Those phonological units the ordering of which can distinguish larger units and therefore have a distinctive function (words, syllables, phonemes) are linear, and those units whose order does not perform such a function (intonation, stress, pitch accent, distinctive features) are simultaneous, or non-linear [Vachek 1937]. Linear units are, as it were, segments of the speech flow and are therefore sometimes called segmental units (from Lat. *segmentum* 'piece, section'; the American phonologists are especially fond of this term, for example, [Hockett 1955: 74–75; Chėmp 1964: 187]). Simultaneous units do not exist independently; they are realized only together with linear, or segmental, elements (whence their name, cf. Lat. *simul* 'together', Fr. *simultané* 'simultaneous'). Intonation is formed by certain modifications of words; pitch accent or tone is a modulation of the syllable, especially the melody, quantity, and dynamics of its nucleus.

§ 34. Those simultaneous (non-linear) units which characterize units larger than a single phoneme—syllables, words, sentences or other sequences—form the class of suprasegmental units (Lat. *super*, *supra* 'on top, above')[42] [Lehiste 1970: 1; Chėmp 1964: 215 and references; Panov 1979: 16–18]. The suprasegmental units of a syllable, word, or sentence (pitch accent or tone, stress, intonation, etc.) are usually called prosodic elements or prosodemes (Gk. προσῳδία 'stress, accent' ← πρόσ 'at, through', ᾠδή 'singing'; Lat. *accentus* ←

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[42] Cf. Eng. *suprasegmental(s)* [Lehiste 1970]. More suitable for Lithuanian is the productive prefix *super-*, rather than the almost unknown *supra-*: *superarbitras* 'umpire', *supergigantas* 'supergiant (star)', *superlaidumas* 'super-conductivity'.

ad + cantus and Lith. *priegaidė* 'pitch accent' are translations of this [Martine 1963: 432f.; Hammarström 1966: 33f.]). The subcategory of phonology which studies prosodic units is prosody.[43]

Unfortunately, the term *prosodic* has a purely phonetic, as well as phonological, meaning. It is often used for such non-qualitative sound phenomena and features as duration, pitch, and articulatory strength (in other words, fundamental frequency and intensity), whether they function as suprasegmental units or not [Jakobson, Halle 1962: 478–482 = Jakobson, Challe 1962: 247–252; Jakobson, Fant, Halle 1972: 13–14]. On the other hand, the role of phonological prosodic (i.e., suprasegmental) units can sometimes be assumed by qualitative (spectral) sound phenomena (i.e., certain articulatory and timbre properties of sounds; see, for example § 218–221 and [Lyons 1968: 127–131 = Lajonz 1978: 141–144]). Therefore, in encountering the terms *prosodic feature* or *prosodic phenomenon*, we first need to establish what is meant: a suprasegmental phonological unit or a phonetic property.

§ 35. We can now define the most important phonological unit, the phoneme. A phoneme (Gk. *φώνημα* 'voice, sound') is the smallest linear unit of the expression plane of a linguistic system (cf. [Trubetzkoy 1977: 34 = Trubeckoj 1960: 42–43; Vachek 1967b; Novak 1967]; on the development of the Prague School's approach, see [Bulygina 1964: 59–61]). Distinctive features are smaller still, but they are not linear elements, since their ordering does not have a distinctive function.

This definition of the phoneme, stemming from the works of Trubetzkoy (and in part Ščerba), is by no means the only correct or possible one. There are numerous definitions of all sorts emphasizing various aspects of this concept[44] (see also [Matusevič 1948: 11; Ščerba 1955: 19; 1974: 116, 121; Zinder 1979: 42]; for an analysis of various treatments, see [Reformatskij 1960: 342–344 and references; Klimov 1967: 25f.; Steponavičius 1978]). Some descriptivists avoid

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[43] The formerly used Lithuanian terms *prosodinis* 'prosodic', *prosodija* 'prosody' are anomalous spellings [for *prozodinis*, *prozodija*—TRANS.] (see [Girdenis 1977a]).

[44] The least successful are those which attempt to define the phoneme as a sign (see § 29, fn. 36) or speech sound. That phonemes cannot be signs is clear from what has been said above, while the relations between phonemes and speech sounds are extremely complex and contradictory (see, for example, [Žinkin 1958: 108; Bondarko 1981: 45–50 et passim]).

any definition; they content themselves with simple operational characterizations.[45]

The great variety of definitions is explained by the fact that linguists focus attention on differing aspects of this concept. The phoneme is no exception in this respect. Other basic concepts in linguistics are also variously defined: morpheme, word, sentence.[46] However, the profusion and even contradictory nature of these definitions[47] does not at all prevent us from using these definitions productively (and, most importantly, almost unambiguously, see [Žinkin 1958: 107–108]). Apparently, such basic elements and units are postulated and accepted as sorts of axioms, which are checked (and confirmed or rejected) by the entire structure and development of the science; the meaning of the definitions here (if they mean anything at all) is quite negligible.

§ 36. In addition to phonemes and prosodemes, there can occur in sentences and words a particular element called open juncture [Trager, Bloch 1972: 73ff.; Moulton 1947; Pike 1947: 161ff.; Hockett 1955: 51–53, 59f., 167–172; Lehiste 1960; Harris 1963: 79–89], Ru. *открытый переход* or *стык* [Glison 1959: 80–81; Matveeva 1966], sometimes *диэрема* [Panov 1967: 167ff.). It more or less corresponds in Prague School works to Trubetzkoy's *non-phonemic boundary signals* (Ger. *aphonematische Grenzsignale* [Trubetzkoy 1977: 244], Ru. *афонематические пограничные сигналы* [Trubeckoj 1960: 302–306]). Open juncture occurs in those positions in which adjacent phonemes are pronounced as if they were non-adjacent. In North

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[45] For example, instead of defining the phoneme, Pike, one of the most unorthodox representatives of this school, shows only the procedures used to identify phonemes [Pike 1947: 57–58, 63] (cf.: [Glison 1959: 41, 60, 237; Swadesh 1972]).

[46] By 1936, some 140 different definitions of the sentence were known [Bjuler 1960a: 27–28]. It is interesting that the oldest definition, that of Dionysius Thrax (170–90 B.C.), has remained to this day in our schoolbooks.

[47] The contradictory nature of various definitions and conceptions of the phoneme has been especially subtly handled by Voronkova [1981: 5–40]. Unfortunately, it must be said that this book sometimes does not make a clear enough distinction between logical and dialectic (in the Hegelian sense) contradiction: phenomena can themselves be contradictory, as well as the concepts defining them.

Žemaitic dialects, for example, before soft consonants and /j/ all consonants are soft (palatalized), but on rare occasions hard consonants may appear in this position: *bâlt-m̂išk̂is* "*Báltmiškis* [surname],"* *sẽ.ł.k-ĵied̂is* "*siłkèdis*" 'herring eater, one who is fond of herring'. The open juncture /+/ between the consonant clusters *-łt-*, *-łk-* and *-m̂-*, *-j-* prevents consonant softening (cf. [Strimaitienė, Girdenis 1978: 61 (= Girdenis 2000c: 122)]). The opposite of open juncture is closed juncture, the normal pronunciation of phoneme sequences under similar conditions.

Open and closed juncture determines the distinction between words such as NŽem. *nebê̦rs* (= /neb+ér̦s/) "*nebeir̃s*" 'will no longer rip, come apart' : *n̂ebê̦rs* (= /nebér̦s/) "*nebir̃s*" 'will not pour', *nebr̂ieš* (= /neb+ríeš/) "*neberẽš*" 'will no longer cut' : *n̂ebr̂ieš* (= /nebríeš/) "*nebrẽš*" 'will not draw' [Kliukienė 1983]. Juncture types also differentiate Ger. *Kuhchen* ['kuːçən] 'cow (dim.)' (= /'kuː+xən/) and *Kuchen* ['kuːxən] 'cake' (= /'kuːxən/) [Ungeheuer 1969: 38–39; Pulgram 1970: 123–124; Philipp 1974: 36–37; Meinhold, Stock 1982: 133–134], Ru. *к Ѝре* [kɯ́ɪrʲiᵉ] = /k+ír'e/ 'to Ira's (place)' and *Кѝре* [kʲír'iᵉ] = /kír'e/ 'Kira-DAT' and others (Reformatskij's examples [1957];[48] see also [Linell 1979: 98]). In Hungarian, an open juncture between two elements of a compound breaks the chain of vowel harmony (cf. § 23): *nyak(-)kendő* 'necktie = *neckscarf', *török(-)búza* 'corn = *Turkish wheat' [Majtinskaja 1955: 64]. In the North Žemaitic Telšiai dialects, the "wave" of regressive vowel assimilation is sometimes similarly broken: *pòsprûot̂s* "*pùsprotis*" (Mosėdis; but cf. *pùsprûot̂s* Tirkšliai) 'half-wit', *šõ.n.šû·d̂is* "*šuñšūdis*" (Mosėdis, Tirkšliai) 'dog excrement' [Girdenis 1968c: 143 (= Girdenis 2000b: 335)]. As we see, in all cases open juncture changes the position of phonemes, which may therefore be pronounced differently than when they are side-by-side (cf. § 62–67).

In standard Lithuanian open juncture is quite clearly signalled by the longer duration of certain consonant sequences. For example, in the word *at-riñkti* 'select-INF', [t+r̃] is much longer than in the word

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* A compound of *balt-* 'white' and *mišk-* 'forest'—TRANS.

[48] Reformatskij himself does not find any open juncture here; he wanted to show with these examples that phonemes can have variants which are determined by morphological, rather than phonetic, position.

pa-triñkti 'wash one's hair-INF',[*] since in the former an additional phonological unit, open juncture, intervenes between the consonants, and the sounds representing the phonemes do not blend together as smoothly (for example, the [t] is not alveolar like the [t̂], but dental) [Strimaitienė, Girdenis 1978 (= Girdenis 2000c: 121ff.)]. Similar phenomena have also been observed in cases of open juncture between words (external open juncture) [Strimaitienė 1983].

Open juncture always coincides with certain morphological boundaries; it helps distinguish words from other words, prefixes from roots, components of compound words, etc. The main function of open juncture is undoubtedly delimitative, but it can indirectly perform a secondary distinctive role. But this function is neither very strong nor stable: open juncture—and this has been shown by the observations of Lithuanian linguists—is realized only optionally[49] (mostly in utterances pronounced in a clear, *lento* style: [Pulgram 1970: 112–124; Strimaitienė, Girdenis 1978: 68 (= Girdenis 2000c: 128)]).

It is not possible to identify open juncture with syllable boundaries, as Pulgram proposes [Pulgram 1970: 111ff.], since, for example, the sequences [kы], [kɛ] (with hard [k]) of the Russian forms *к Йре* 'to Ira's (place)', *к э́той* 'to this', etc., belong to the same syllable.

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[*] Prefixes have been set off by hyphens—TRANS.

[49] As, incidentally, are many other more subtle phonological phenomena (cf. § 66). It is quite odd that many present-day linguists have forgotten the programmatic ideas of Prague Linguistic Circle pioneer and founder V. Mathesius on the potentiality (i.e., optional nature) of linguistic phenomena. [Mathesius 1912 = Matezius 1967].

II. METHODS FOR ESTABLISHING PHONEMES

1. INTRODUCTORY REMARKS

§ 37. Neither phonemes nor other phonological units can be established with the aid of a device. Nor would a clipped recording of connected speech help in discovering them: even accurate and clean speech snippets cannot represent elements of a linguistic system (see, for example, [Dukel'skij 1962: especially 136ff.]). First, such mechanically-isolated sounds would include not only those features which are meaningful and common to an entire speech community, but also various individual characteristics of a particular speaker and act of speech. Second, concealed within these sounds are several properties which functionally belong not to to the sound itself but to neighboring sounds, or to simultaneously articulated phonological units: adjacent junctures and phonemes, stretches of suprasegmental elements (stress or its absence, phrasal intonation) occurring in corresponding places of the utterance; they may also belong to the general expressive register of an utterance. The sound "representatives" of phonological units are always influenced by neighboring or simultaneously-articulated phonological units; in speech, they smoothly transition into one another. The flow of speech is a nearly continuous, non-discrete phenomenon, quite unlike printed or even handwritten text (see, for example, [Saussure 1967: 145–146 = Sossjur 1977: 136; Bloomfield 1935: 76–78 = Blumfild 1968: 74–76; Harris 1963: 25; Klimov 1967: 35–36; Lyons 1968: 100, 103 = Lajonz 1978: 115, 118; Voronkova 1981: 43 and references]).[1] A certain asymmetric nature of

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[1] For another (hardly convincing) view, see [Fant 1964: 23 (but cf. 199); Grigor'ev 1965: 125]. Proponents of this view refer to the fact that in spectrograms there are often quite clear segments. Serious objections can be raised

the human speech organs has a significant modifying effect on phonological units (both individual phonemes and entire utterances). When repeated, even the shortest utterance or its smallest element will sound different every time, even on the lips of the same speaker. This lack of uniformity is easily shown instrumentally. With training, or simply by focusing attention, it can also be heard by the naked ear. Thus every act of speech, as a physical phenomenon, is a wholly unique event, never repeating, and unrepeatable by human speech organs.[2] Following the ancient Greek dialecticians, we could say that it is impossible to utter exactly the same word or sound twice.

§ 38. If people were to react equally to all physical sound distinctions and features perceptible to the ear and recordable by instruments, language would be unable to function as a system of arbitrary signs, since it would not have constant units of expression enabling one to represent content and convey it to other members of a speech community. Language exists only because people react to certain physically distinct sounds and sound sequences as if they were fully identical (see [Bloomfield 1935: 78 = Blumfild 1968: 76; Hockett 1955: 144–145]). For example, all Lithuanian speakers understand the sentence *Už ùpės pasiródė kalvà* 'Beyond the river there appeared a hill' in the same way, whether it is pronounced by a child, a woman speaking in a high voice, or a man in a low voice, although their speech differs in a number of salient features; and speakers not only understand, but consider the utterances the same sentence. Any Lithuanian speaker would also react in the same way to the final word of the sentence, *kalvà* 'hill', pronounced separately by various speakers. For all speakers it will be the same word, although it will sound

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here. First, the discrete nature of the image seen in spectrograms is in part created by the instruments themselves, since they all (even appropriately adapted computers) analyze speech signals only within certain strict time intervals (0.004, 0.02 sec, etc.). Secondly (and this is key), even in the clearest cases, the segments seen in spectrograms correspond not to "pure" phonemes, but to sounds containing information not just about themselves, but also about "neighbors" articulated before, after, or simultaneously (cf. [Bondarko 1981: 45], also [Podlužnyj 1980: 8ff.]).

[2] Cf. "Es gibt keine zwei Laute, die völlig identisch sind." ('There are no two sounds which are fully identical.') [Meinhold, Stock 1982: 23] (cf. [Muljačić 1973: 31]).

different. But just a small change of a single consonant would suffice to give a new utterance, *Už ùpės pasiródė galvà* 'Beyond the river there appeared a head', which no speaker with normal hearing would consider a repetition of the first sentence, however much we may try to imitate its previous pronunciation accurately. Nor would one's reaction change if, after recording the pronunciation of the first sentence on tape, we were to carefully insert the word *galvà*, articulated by the same person at the same pitch and rate of speech, in place of the word *kalvà* (or even insert the syllable [kał-] in place of [gał-]).[3] The resulting utterance will still be perceived and judged as a different sentence, rather than a repetition of the first sentence (of course, if an actual context does not conflict with this, cf. [Meinhold, Stock 1982: 19]).

Thus, it often seems as though speakers are deaf to quite salient sound distinctions and features, but at the same time are sensitive to slight changes in sound. And this reaction does not change gradually, but in certain discrete leaps, utterly disproportionate to the size and salience of a phonetic difference. If we could somehow manage to articulate a sound equally similar to both [k] and [g], we would not obtain a word which would be intermediate in content between the words *kalvà* 'hill' and *galvà* 'head' or *kãras* 'war' and *gãras* 'steam', that is, which would mean that which the semantics of both would share. Each such pronunciation would be perceived either as the same word, or as some other intelligible or unintelligible word; here, as in classical bivalent logic, *tertium non datur*.

This unique human reaction to various sound differences in speech is one of the most striking properties of any language. This property should also be considered a basic precondition for phonological study (cf.: [Sapir 1949: 45–46 = Sepir 1993: 59–60; Martine 1960: 206–207; Harris 1963: 27]). In the infinite variety of speech sounds, phonology seeks out just those discrete elements of sound used to distinguish utterances and words which speakers react to as differing in both expression and content.

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[3] We can now do this even more nicely and smoothly with a specially adapted computer.

2. PARADIGMATIC IDENTIFICATION OF PHONEMES

§ 39. The first and basic task of the phonologist is to establish, or identify, the inventory of phonemes of the language or dialect in question: a list of the smallest linear units of sound which, in replacing one another, change the content of the words or utterances.[4]

We distinguish paradigmatic and syntagmatic identification of phonemes. The aim of paradigmatic identification is to establish which speech sounds, taken individually, represent individual phonemes, and which are variants of the same phoneme. A syntagmatic identification ascertains in which cases certain sounds or sound sequences should be considered separate, independent phonemes and in which cases sequences of phonemes.

a) SUBSTITUTION AND COMMUTATION

§ 40. The paradigmatic identification of phonemes begins with a so-called substitution test (from Lat. *substituo* 'I substitute'; see [Harris 1963: 29ff.; Heike 1972: 29; Meinhold, Stock 1982: 67]; on the acceptability of this method, see [Voronkova 1981: 87–89]).

The essence of this test is as follows. The sounds in question are substituted for one another in the same phonetic context[5] and it is ascertained how language informants—people who know the language or dialect in question well—react to this change. If informants perceive the word thus remade as a repetition of the same word, the sounds in question are considered optional or free variants of the same phoneme (or sequence of phonemes) [Trubetzkoy 1977: 42–44 = Trubeckoj 1960: 53–55; Glison 1959: 229–230; Harris 1963: 29ff.].

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[4] Saussure had already discussed the connection between phonological differences and differences in content [Saussure 1967: 145, 163–164 = Sossjur 1977: 136, 151]. Bloomfield maintained the same, and on this issue differed greatly from his followers [Bloomfield 1935: 78 et passim = Blumfild 1968: 75 et passim]. Sapir was convinced of the psychological reality of phonological units, and therefore believed that speakers could discover them by themselves, relying only on their linguistic intuition [Sapir 1949: 54–56 = Sepir 1993: 66–67].

[5] The identity of context and position, or absence thereof, may not be absolute. In the final analysis, this decision is made by speakers of the language in question; theirs is the deciding view.

For example, if in the above-mentioned Lithuanian word *kalvà* 'hill' we pronounce the first consonant [k] with a very retracted tongue, we would get the sound sequence [ka̱lvà], characterized by an unusually low timbre of the first syllable. There is no question that [k̠] is a different sound from the "normal" [k], but Lithuanian informants will judge the pronunciation as the same word *kalvà* (although perhaps they will note the unusual pronunciation). From this we must conclude that a retracted [k̠] pronunciation and a [k] pronounced naturally are optional variants of the same phoneme, i.e., from a phonological standpoint, [k̠] = [k]. Informants would react in quite the same way if, for example, we were to replace the pronunciation [s] at the beginning of the *sãko* 'say-3PRS' with a much longer consonant pronounced in the same way: we would get the pronunciation [s.ã·k°o·] or [s·ã·k°o·], which informants would also judge to be the same word. Therefore, [s] = [s.] = [s·] are optional variants of the same phoneme.

    § 41. It may appear that optional variants are distinguished only by quite subtle phonetic nuances. This view, however, is just an acoustic illusion resulting from the fact that from an early age speakers are accustomed not to respond to features which distinguish phoneme variants, rather than phonemes. It is another matter in cases where a speaker uses an optional variant which deviates significantly from the norms of the language—a so-called phoneme surrogate (Ger. *Lautersatz* [Trubetzkoy 1977: 23], Ru. *звуковой суррогат* [Trubeckoj 1960: 29]). Lithuanian speakers easily distinguish the use of a uvular [ʀ] by some from the apical [r] used by most Lithuanian speakers, since the pronunciations [kʀã·pɑi] (*krãpai*) 'dill', [ʀã·štas] (*rãštas*) 'writing' violate Lithuanian rules of pronunciation. But in German, [ʀ] and [r] are essentially fully equivalent optional variants; the present-day norm of the language allows the words *grün* 'green', *Kranich* 'crane', *Rabe* 'raven', etc., to be pronounced [gryːn], ['kraːnɪç], ['raːbə], and [gʀyːn], ['kʀaːnɪç], ['ʀaːbə] (see, for example, [Siebs 1969: 84–86]). The sounds [r] and [ʀ] are quite dissimilar, but for speakers of the language they are the same phonological unit. The situation is similar in French, only here the apical [r] is seen as a kind of phonetic provincialism. The norm of an elegant Parisian pronunciation gives preference to the uvular [ʀ], i.e, to the pronunciation [ʀɔmɛ̃ʀɔ'lã] *Romain Rolland*, [tʀavajə'ʀɔ̃] *travaillerons* 'we will work' [Ščerba 1955: 257].

Quite striking optional variants also occur in Lithuanian dialects. Thus in the South Aukštaitic border dialects (the so-called Dzūkish dialects of the Varėna region, etc.), [k̂], [ķ], [t̂] and [ĝ], [ġ], [d̂] can freely replace one another in any word [Savičiūtė, Vitkauskas 1976; Dovydaitis 1978 and references]. Older speakers of the dialect do not react to this substitution; they may pronounce the same word either *k̂áˑuras* "*kiáuras*" 'full of holes', *k̂ìtas* "*kìtas*" 'other', *k̂ìkras* "*tìkras*" 'true, certain', *ĝíˑvas* "*gývas*" 'alive', *ĝíˑĝåu* "*gýdžiau*" 'treat (medically)-1SG.PST', and *t̂áˑuras*, *t̂ìtas*, *t̂ìkras*, *d̂íˑvas*, *d̂iˑd̂åu*. Thus, in these dialects, [k̂], [ķ], [t̂] and [ĝ], [ġ], [d̂] are optional variants of the same two phonemes (which can be denoted /Ķ/ and /Ģ/), rather than four or six separate phonemes (cf. [Girdenis 1979b (= Girdenis 2000c: 130ff.) and references]).[6] There is a similar situation in the northern part of the West Aukštaitic Šiauliai dialect. There, in certain localities in the Žagarė region, speakers indiscriminately use hissing and hushing sibilants and certain "lisped" retroflex sounds of the type [ṡ ż], together with the corresponding affricates: *sȧ.sas* "*šãšas*" 'scab', *šȧ.šaš*, and *sȧ.šaṡ* (the latter pronunciation is perhaps the most common; see [Girdenis, Pabrėža 1978 (= Girdenis 2000c: 117ff.)]). On similar phenomena in other languages, see [Jakobson 1962b: 410; Malmberg 1971: 349–352]; on the typology of the "lisped" articulation, see [Serebrennikov 1974: 285]). Other Lithuanian speakers view this variability as an undisciplined use, a confusion, of sounds, but in fact what we have here are optional variants of phonemes for which a hissing or hushing sibilant is a non-essential feature: [ṡ] = [š] = [s], [ż] = [ž] = [z]. Only a substitution test allows us to establish precisely the place occupied by these differently-articulated sounds in the dialectal system; since informants do not distinguish the pronunciation [àṡ] "*àš*" 'I' from [às] and [àš], [v̂ìṡt̂] "*vìsti*" 'breed' from [v̂ìst̂] and [v̂ìšt̂], [żóˑl̂ė̇ˑ] "*žolė̃*" 'grass' from [zóˑl̂ė̇ˑ] and [žóˑl̂ė̇ˑ], we have in these words only three phonemes, rather than six or nine.[7]

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[6] In addition to the works noted in the article (for example, [Čekman 1970: 25, 29, 105, 139ff.; Kalnyn' 1961: 66; Kasatkin 1968: 6]); see also [Kolsrud 1974: 102 (on the merger of *kj* : *tj* and *gj* : *dj* in Norwegian dialects); Kruszewski 1967: 89]. Especially noteworthy is Kruszewski's work, first published in 1883; it appears that such changes as Ru. dial. *кисть* → *тисть* 'wrist', *гúря* → *дúря* 'weight' were known to linguists over a hundred years ago! See also [Girdenis 1998a (= Girdenis 2001: 401f.)]. It should be added that this multiplicity of variants may result in part from inaccurate observation; it is quite likely that in all of the above-mentioned cases, the pronunciations are simply palatalized [ţ ḓ], variously heard by the observers.

[7] This was observed by Juozas Pabrėža, Bonifacas Stundžia, and myself in the Žagarė region during an interdisciplinary expedition with the Vilnius University *Ramuva* ethnography club in 1975.

§ 42. A substitution test performed with only a few words is not sufficient for a conclusive determination; it only allows us to advance a working hypothesis that certain sounds, which are pronounced differently and sound dissimilar, may be optional variants of the same phoneme. Such a hypothesis must be checked with various examples. There may occur in a language a few pairs of words whose expression differs in some phoneme, but the referential content is completely the same [Harris 1963: 39; Zinder 1979: 46]: Lith. *kūbrỹs = gūbrỹs* 'ridge', *klérti = glérti*[8] 'become loose, rickety-INF', Ru. *калóша* 'galosh' = *галóша*. On the basis of such examples, we might draw the hasty conclusion that Lithuanian [k˚] = [g˚], and likewise that Lithuanian and Russian [k] = [g], i.e., that the sounds in question are optional variants of the same phonemes. However, an analysis of more numerous facts would show that such a conclusion is unjustified. If we change the initial consonant of the Lithuanian words *gùrti* 'crumble-INF', *glóstyti* 'stroke-INF' to [k˚] and [k], we get the words of a different meaning *kùrti* 'make (a fire); to create-INF', *klóstyti* 'spread, cover (with)-INF'; if we perform this operation with the Russian word *год* [gɔt] 'year', we get the sound sequence [kɔt], meaning 'cat' (*кот*) or 'code' (*код*), rather than 'year'. Thus only those sounds which can freely replace one another in all words can be considered optional variants.

§ 43. If in replacing one sound of a word with another we get a sound sequence which language informants perceive as a word of a different meaning, the sounds in question are not optional variants, but representatives of different phonemes [Trubetzkoy 1977: 44 = Trubeckoj 1960: 55; Fant 1964: 21; Stepanov 1975b: 73ff.] (cf. [Hockett 1955: 144–145; Harris 1963: 32–33]).[9] For example, if we replace the consonant [k] in the words *kalvà* 'hill', *kãras* 'war', *kaléti* 'be imprisoned-INF' with [g], we get the words *galvà* 'head', *gãras*

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[8] Such words as *glėbỹs : klėbỹs* 'embrace' do not belong here, since they are not syntopic language facts (*klėbỹs* is a Žemaitic dialectal word, and not Standard Lithuanian).

[9] Attempts by some descriptivists to establish phonemes without any reference to content seem simply hopeless (see also [Pike 1947: 81 et passim], cf. [Glison 1959: 49]). For a critical analysis of such attempts, see [Fischer-Jørgensen 1956: 143–145; 1975: 81; Arutjunova, Klimov, Kubrjakova 1964: 217ff.].

'steam', *galéti* 'be able-INF', which have a completely different meaning. This shows that [k] and [g] in Lithuanian have a distinctive function and represent two independent phonemes. We get the same result if we substitute labialized [k˚] and [g˚] in contexts such as [—úr̂t̨i], [—ùŝt̨i]; the words *kùrti* 'make (a fire); create-INF' and *gùrti* 'crumble-INF', *kùsti* 'recover, grow stronger-INF' and *gùsti* 'get used to-INF' have different meanings, and therefore, from a phonological standpoint, [k˚] ≠ [g˚]. We can similarly show that [š] ≠ [ž] (cf. *šalià* 'alongside' : *žalià* 'green-NOM.SG.F'), [š˚] ≠ [ž˚] (*šuõlis* 'jump, leap' : *žuõlis* 'railroad tie'), [s] ≠ [š] (*sãkė* 'say-3PST' : *šãkė* 'pitchfork', *svarùs* 'weighty' : *švarùs* 'clean'), [s˚] ≠ [š˚] (*susùkti* 'twist-INF' : *sušùkti* 'cry out-INF'), [t] ≠ [d] (*tãrė* 'pronounce-3PST' : *dãrė* 'do-3PST', *tarnùs* 'servant-ACC.PL' : *darnùs* 'harmonious', *tvarùs* 'stable, steady' : *dvarùs* 'estate-ACC.PL'), [t˚] ≠ [d˚] (*tù* 'you' : *dù* 'two', *tũris* 'volume' : *dũris* 'prick, stitch'), [t̂] ≠ [d̂] (*tiek* 'so much' : *díek* 'plant-2SG.IMP', *tìlti* 'grow quiet-INF' : *dìlti* 'be effaced, smoothed out-INF').

In all of these cases, in replacing one sound with another, we get a word which differs from the previous word by only a single sound, but has a completely different meaning. Such minimally distinguished words of dissimilar lexical or grammatical meaning are called quasi-homonyms (Lat. *quasi* 'as if'; Ru. *квазиомонимы* [Ščerba 1955: 56, fn. 3; Zinder 1979: 69]) or minimal pairs ([Hockett 1955: 212–213; Glison 1959: 49]; cf. [Stepanov 1975b: 73]). In addition to those mentioned above, we can cite more such minimal pairs: *pylà* 'dam' : *bylà* '(court) case', *plãkė* 'flog-3PST' : *blãkė* 'bedbug', *pókštas* 'prank' : *bókštas* 'tower' ([p̂] ≠ [b̂], [p] ≠ [b], [b˚] ≠ [p˚]), *kàs* 'who/what' : *tàs* 'that-NOM.SG.M', *kuriù* 'make (a fire); create-1SG.PRS' : *turiù* 'have-1SG.PRS', *kẽpalas* 'loaf' : *tẽpalas* 'grease, ointment', *jók* [jóˑkʲ] 'ride (on horseback)-2SG.IMP' : *jót* [jóˑtʲ] 'ride (on horseback)-SHORT-INF' ([k] ≠ [t], [k˚] ≠ [t˚], [k̂] ≠ [t̂] [kʲ] ≠ [tʲ]), *laikýti* 'keep-INF' : *raikýti* 'slice-INF', *lū̃šis* 'lynx' : *rū̃šis* 'sort', *lẽkti* 'fly-INF' : *rẽkti* 'cry, shout-INF' ([ł] ≠ [r], [łˤ] ≠ [r˚], [l̂] ≠ [r̂]).

§ 44. Some schools of linguistics (for example, glossematics) devote particular attention to minimal pairs,[10] and use the special term commutation for the substitution test on which they are based [El'mslev 1960a: 55; 1960b: 331; Fischer-Jørgensen 1956: 141;

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[10] There have been attempts to base a model and concept of the phoneme on minimal pairs alone (for example, [Uspenskij 1964]).

Koefoed 1967: 73ff.] (cf.: [Meinhold, Stock 1982: 67ff.; Murat 1964: 142]). Sometimes there is simply mention of the minimal pairs method [Perebyjnis 1970: 10]. Commutation (from the Latin *commuto* 'I exchange') is a substitution which changes both content and expression together; in the case of [sã·k°o·] "*sãko*" = [s·ã·k°o·] we have simple substitution, while [kałvà] "*kalvà*" ≠ [gałvà] "*galvà*" is a case of commutation. Sounds which undergo mutual commutation can be called commutable sounds (cf. [Pilch 1964: 5]).

Minimal pairs are without a doubt the simplest and most direct way of demonstrating that certain sounds or phonetic features belong to separate phonological units (cf. [Glison 1959: 251]). But in languages of more complex syllable and morpheme structure, it is not always easy to find such pairs, especially if we wish to identify extremely rare sound units, for example Lithuanian [z] or [ẑ]. In such cases, we must content ourselves with negative results of a substitution test. If, in substituting one sound for another, we obtain a nonexistent word, incomprehensible to language informants, then the sounds in question should not be considered optional variants, but representatives of separate phonemes [Trubetzkoy 1977: 44 = Trubeckoj 1960: 55] (see also § 59 of this book): *sùkti* 'twist-INF' : **zùkti* '?', *zýlė* 'titmouse' : **sýlė* '?', *gùčas* 'clever person' : **gùdžas* '?'.[11] Of course, before undertaking such a radical (and unfortunately not particularly reliable, see [Fischer-Jørgensen 1956: 147]) operation, we must consider whether the sounds in question can be used in the same positions at all. For example, we cannot replace the initial sound of *kàs* 'who/what' with an aspirated [kʿ] or [tʿ], found only before a pause: if we do, we get not only the non-existent, but in fact impossible words *[kʿàs], *[tʿàs] (cf. Ru. *кот* 'cat' and **кħот* [Achmanova 1954: 14]), which more astute informants might well regard as imitations of a foreign accent.[12]

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[11] These examples have not been chosen at random; reliable minimal pairs with, for example, [s] and [z] or [ŝ] and [ẑ] are very few: *sykiù* 'together' : *zykiù* 'whimper-1SG.PRS', *sir̃gti* 'be ill-INF' : *zir̃gti* 'snivel-INF', *svem̃bti* 'ache-INF' : *zvem̃bti* 'buzz, drone-INF', *saũkti* 'sing (with prolonged voice)-INF' : *zaũkti* 'sob-INF', but there are hardly any speakers of the standard language who would actively use all members of these pairs. Most of these forms cannot even be considered syntopic linguistic facts.

[12] This renders impossible the "experimental" (it would be more accurate to say mechanical) commutation proposed by Hjelmslev, the essence of which is

b) EXPERIMENTAL COMMUTATION[13]

§ 45. Minimal pairs are highly desirable, but not absolutely necessary. They are only necessary when we encounter very subtle phonological or phonetic phenomena which various investigators or informants perceive differently. Such problems mostly arise with disappearing or newly emerging phonological units which are not characteristic for all speakers of a language community. In identifying such unstable problematic phenomena, the reaction and opinions of a single informant are not enough; a more elaborate phonological experiment must be undertaken with a group of listeners.[14]

§ 46. A phonological listening experiment is usually performed as follows. First, suspect pairs of words (or their word forms, cf. § 27) are selected and used to create a number of simple sentences which clearly illustrate the meaning of the words in question. The sentences are shuffled in random order and written down on sheets of paper. The order can be established in various ways (for example by flipping a coin), but it is best to use random number tables (see, for example, [Urbach 1975: 279], and also Appendix 1; a computer can also generate random numbers). If we find an even number in the table (for example 3740, 3146), we write the second member of the minimal pair first on the questionnaire; if there is an odd number, we write the first member of the pair. The next pair of sentences is written according to the second number in the table, the third pair according to the third number, etc. This ensures complete randomness in the order of the sentences.

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the "transplanting" of sound segments (snippets of a tape recording or computer signal) into the position of other segments (see fn. 27, and also [Fischer-Jørgensen 1956: 150; 1975: 130] and references).

[13] This term is used here in a different sense than in Hjelmslev's works (cf. fn. 12).

[14] Here we briefly describe the methodology for listening experiments developed at Vilnius University's Experimental Phonetics Laboratory (since September 1994 the Department of Experimental Linguistics [now part of the Department of Baltic Studies—TRANS.]). This methodology has been put into practice many times (see, for example, [Eidukaitienė 1977; Garšva 1977c; Bukantis 1979; 1983; Kosienė 1979; 1982; Kosienė, Girdenis 1979 (= Girdenis 2000c: 141ff.); Kačiuškienė 1983; Girdenis, Kačjuškene 1987 (= Girdenis 2000c: 327ff.); Remenytė 1992], etc.). At present, many preliminary and statistical data-processing operations can be performed on personal computers.

During the experiment, the announcer, a speaker[15] of the language or dialect in question, having in front of him the prepared sentences and relying on their meaning, pronounces the words in question clearly several times in the order in which they appear on the page. The goal of the listeners is to determine which of the sentences the words belong to. If nearly 100% of the words are identified correctly, then there is no doubt that they are distinguished by at least a single phonological unit. If the number of correct and incorrect responses fluctuates around 50%, we may assume that the listeners do not hear any distinctive properties and are only guessing (cf. [Harris 1963: 32–33]).

It is especially convenient to experiment in this way with tape recordings, since one can then make several copies of the same pronunciation and change the word order when the tape is edited, rather than when the text is spoken. Moreover, proceeding in this way, the same person can be both announcer and listener. This is especially important when we have only a single reliable informant. In this way, we ensure the greatest uniformity of experimental conditions, avoiding unwanted non-verbal contact between the announcer and listeners. So if conditions permit, it is best to conduct the experiment using tape recordings. But in evaluating the results of such experiments, we need to keep in mind that even the best recording of a stationary tape recorder somewhat distorts the sound signal, and therefore cannot be equated with natural speech. Distortions from a portable tape recorder can be quite significant.

§ 47. The results of listening experiments are almost never completely unambiguous, even when analyzing quite obvious sound phenomena.[16] Therefore, in order to avoid subjectivity, the results need to

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[15] It is best to take male speakers as announcers (if, of course, there is a choice), since the ear perceives and distinguishes sounds pronounced with a high voice less well. Male voices are especially desirable when the same data is intended for spectral analysis: high female voices are poorly suited for such studies, since they have few harmonics (see [Lindblom 1962: 192; Ladefoged 1967: 81–82; Iivonen 1970: 9, 30]).

[16] Nevertheless, Harris speaks of 100% and 50% thresholds, never considering how to evaluate an intermediate result [Harris 1963: 32–33]. Most researchers establish significance thresholds (almost always unrealistically high) by eyeballing, as they say (cf. [Magner, Matejka 1971: 95ff.]).

be evaluated statistically; we need to establish whether the number of correct responses differs significantly from what we would obtain if the listeners were simply guessing, that is, 50%. Usually for this purpose we use the so-called *u*-criterion, calculated according to the formula [Urbach 1975: 156]

$$u = |\varphi - \varphi_0| \cdot \sqrt{n}$$

The symbol *n* here denotes the total number of replies, φ defines the function $\varphi = 2 \arcsin \sqrt{p}$, calculated or found in special tables according to the percentage of correct responses (see [Urbach 1975: 285–287]; see in somewhat abbreviated form Appendix 2 [Girdenis 1981a: 210–211]). φ_0 is the same function corresponding to a threshold of 50% (i.e., random guesswork).

The resulting value of the *u*-criterion is compared with the critical values[17] $u_{0.05} = 1.96$, $u_{0.01} = 2.58$, $u_{0.001} = 3.29$. If it is greater than $u_{0.01}$, we can confidently state that the words in question differ in a phonologically significant feature, since the probability of the absence of a distinction is in this case less than 0.01 (one in 100). We can reach an even firmer conclusion if the *u* obtained $> u_{0.001}$. In this case, the probability of the absence of a distinction would reach 0.001 (that is, one in 1000). If, in repeating the experiment, we keep obtaining $u < u_{0.05}$, we would have to adopt the so-called null hypothesis (H_0), indicating the identity of the samples in question, that is, the absence of a phonological distinction. If we get $u_{0.05} < u < u_{0.01}$, the experiment is continued until the results are clearer (i.e., $u > u_{0.01}$ or $u < u_{0.05}$).

In order to obtain evidence which does not raise any doubt, it is sometimes expedient to choose a 67%, rather than 50%, critical threshold (that is, to find φ_0 using 67%; cf.: [Jensen 1961: 159–161;[18]

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[17] When working with a computer, it is not difficult to calculate a far more certain probability for a distinction, and therefore these critical values may not be needed.

[18] Jensen discusses three thresholds for distinguishing sounds: 100–85% correct responses: a clear opposition; 65–60%: no opposition; 85–65%: a weak ("semi-phonological") opposition [Jensen 1961: 155–166] (see also [Makaev 1964: 131]). Experience shows that even these requirements (seemingly milder than those mentioned in fn. 16) are too stringent; in many cases they can be satisfied only by ideal listeners, who have excellent hearing and attention spans, and are working under superb acoustic conditions. Moreover, this overlooks

Piotrovskij 1966: 37 and fn. 45]), hence to take the view that only an experiment which gives more than two-thirds correct responses has probative value. In general, such a stringent requirement has, we might say, only psychological value. It should be considered only when conditions do not allow for experimenting with a larger number of listeners or when performing a so-called *experimentum crucis*: a pivotal study which would finally resolve a long-standing contentious issue.

§ 48. An evaluation of the results of listener experiments is facilitated by computer-generated tables based on the above-mentioned formula (see Appendix 3). Choosing the 50% or 67% critical threshold, we find the column corresponding to the total number of responses n and we compare the number of correct responses n_1 with the critical values shown in this column. If we get $n_1 \geq Z_{0.01}$, the experiment is statistically significant; if $n_1 < Z_{0.05}$, the result is statistically insignificant (u will undoubtedly be smaller than $u_{0.05}$). If $Z_{0.05} < n_1 < Z_{0.01}$, we continue the experiment. As we have seen, we do not need to calculate either the percent or the u-criterion here, and therefore it is quite convenient to use tables when investigating various dialectal phonological phenomena in the field (cf. [Bukantis 1983]). For example, if we get 129 correct responses (n_1) out of 220, we learn from the table column corresponding to $n = 220$ that this number is greater than $Z_{0.05} = 125$, but somewhat smaller than $Z_{0.01} = 130$. This shows right away that the experiment needs to be continued, i.e., that more responses need to be collected. If, in experimenting further, we collect, for example, 205 correct responses out of 350, we can terminate the experiment, since $205 > Z_{0.01} = 200$, and this shows a statistically significant difference.[19]

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stylistic and sociolinguistic variation in linguistic expression, and also the simple fact that phonological distinctions are embodied in acoustic features of differing salience: the distinction between, say, [š] and [n] is one thing; that between [w] and [v] or [ę] and [ẹ] is quite another.

[19] It should be noted that negative listening experiments do not always show the absence of a sound distinction (phonetic or perhaps even phonological). As the subtle work of William Labov has shown [Labov, Yaeger, Steiner 1972: 229; Labov 1978; Labovas 1994: 105ff.] (for discussion, see [Linell 1979: 41–42, 222 and references]), language informants may not always perceive phonetic distinctions, although they consistently realize them in their own speech. A more reliable phonological interpretation of this phenomenon has thus far not been suggested, if, of course, we overlook the "genetic" hypothesis, which claims that such distinctions can be passed on from generation to generation in childhood, when phonetic hearing is particularly sensitive (cf. [Linell 1979: 42]).

c) DISTRIBUTION

§ 49. Every phonological unit, established either by a simple or experimental test, is associated with a certain sound context, called its position. For example, we find labialized [k˚], [g˚], [š˚], [ž˚], [t˚], [d˚] only before vowels of the type [u·], [u] and [o·]; non-labialized [k], [g], [š], [ž], [t], [d] only before [a·] and [a]; palatalized (soft) [d̂], [t̂] only before the vowels [i·], [i], [e·], [e], [ę·], and other soft consonants; and aspirated [k‘] and [t‘] can only be heard word-finally (especially before a pause).[20]

All the positions which can be occupied by a sound or phonological unit form its distribution (Lat. *distribuo* 'I distribute') [Harris 1963: 15–16; Pilch 1964: 28; Chèmp 1964: 66 and references; Stepanov 1966: 42–43; Heike 1972: 41; Steponavičius 1976; Meinhold, Stock 1982: 36]. The distribution of labialized [k˚], [g˚] consists of the positions [—u·], [—u], [—o·] (the dash in these formulas indicates the place of the unit in question);[21] the distribution of soft [t̂], [d̂] consists of the positions [—i·], [—i], [—e·], [—e], [—ę·] (abbreviated [—Vⁱ]) and [—Ĉ]; the distribution of aspirated [k‘], [t‘] is [—#], and that of velar [ŋ] is [—k], [—g] (abbreviated [—^k_g]). We can represent a distribution even more concisely by using a slash mark as a "logogram" meaning "occupies the position," "in the position," "has the distribution."[22] We read the notations [g˚] / [—u·], [ŋ] / [—^k_g] as "a labialized [g˚] is found before [u·]," "a velar [ŋ] is found before [k] and [g]."

This abbreviation is especially convenient in describing various synchronic or diachronic processes, for example $s \rightarrow \hat{s}$ / [—$\hat{c}$] = s

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[20] Martinet's term virtual (or potential) pause would be somewhat more accurate [Martine 1963: 411–413], since the places where pauses occur rarely lack an acoustic signal.

[21] The notation [—u·] is read "before the vowel [u·]"; [u—u·] "between short [u] and long [u·]." The following symbols are conventional in these formulas: V: vowel, Vⁱ: front vowel, Vᵘ: back vowel, C: consonant in general or hard consonant, Ĉ (C′): soft consonant, R: resonant (sonorant; [l, m, n, r]-type sounds), S: fricative ([s, š]-type sounds), T: plosive consonant. The symbol # marks the beginning or end of a word (a pause): [#—#] means "between pauses," [#—] "after a pause," [—#] "before a pause" (cf. [Harris 1963: 61–75 et passim]).

[22] This notation of distribution has been universally adopted by the adherents of generative phonology (for example, [Chomsky, Halle 1968: 14ff.; Harms 1968: 43ff.; Schane, Bendixen 1978: 60ff.]).

becomes $\hat{\check{s}}$ (a palatalized hushing fricative) before $\hat{\check{c}}$ (a palatalized hushing affricate).

§ 50. The distribution of two or several phonological (and in general linguistic) units can be of three types: contrastive (or oppositional), complementary, and cross distribution.[23]

§ 51. Contrastive or oppositional distribution (most often simply *contrast* or *opposition*, from Fr. *contraste* 'contrast', Lat. *oppono* 'I place in front of, opposite') exists between units which are used in the same position.[24] Examples of this distribution would be all the above-mentioned minimal pairs, since the initial sounds distinguishing the members of these pairs are in the same position: *kalvà* 'hill' : *galvà* 'head', *kùrti* 'make (a fire); to create-INF' : *gùrti* 'crumble-INF', *šalià* 'alongside' : *žalià* 'green-NOM.SG.F'. To show the identity of position more clearly, we can write these words [^k_gałvà], [$^{k^\circ}_{g}$ùŝt̂ị], [$^{\check{s}}_{\check{z}}$aɪ̂æ] (see, for example, [Harris 1963: 74]). Optional variants are similarly used, but at this stage of investigation they can be eliminated (or simply disregarded), since they do not have a distinctive function. Hence it is reasonable to speak of a contrastive distribution, or opposition,[25] only of phonological units, that is, sound elements capable of distinguishing referential meaning.

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[23] More types of distribution are sometimes distinguished (cf. [Stepanov 1975a: 203–204; Steponavičius 1976: 66]), but for actual phonological analysis they are not important.

[24] In American linguistics, the term *contrast*, *contrastive distribution* has generally become established [Hockett 1955: 155, 212ff.; Harris 1963: 65 et passim; Chèmp 1964: 95–96]; Europeans usually use *opposition* (Ger. *Gegensatz* [Trubetzkoy 1977: 30 et passim] or *Opposition* [Meinhold, Stock 1982: 29 et passim]; Ru. *оппозиция*, *противоположение* [Trubeckoj 1960: 38 et passim], the term *противопоставление* is also frequent; cf. also Fr. *opposition* [Vachek 1964: 142]; It. *opposizione* [Muljačić 1973: 177 et passim]; Sp. *oposición* [Alarcos Llorach 1975: 39 et passim]). Martinet adopts both terms: *contrast* for syntagmatic relations (especially of stressed/unstressed syllables), and *opposition* for paradigmatic relations (on these concepts, see also § 87ff.) [Martine 1960: 41]. For Lithuanian, *kontrastas* 'contrast' is more convenient than *opozicija* 'opposition', since alongside of it the verb *kontrastuoti* 'contrast-INF' is possible (for example, "Garsai [a] ir [e] kontrastuoja tik žodžio pradžioje." 'The sounds [a] and [e] contrast only word-initially'; cf. [Girdenis 1976]).

[25] In the linguistic literature this term is understood in precisely this way (cf. [Stepanov 1975a: 204]).

§ 52. Complementary distribution (Ru. *дополнительная дис-трибуция*) is a relation between those linguistic units which are used only in different positions (in terms of logic, a relation of exclusion) [Pike 1947: 93; Hockett 1955: 155; Harris 1963: 61ff.; Glison 1959: 231–232; Pilch 1964: 10; Stepanov 1966: 105; Koefoed 1967: 76; Heike 1972: 41; Lyons 1968: 112–113 = Lajonz 1978: 126–127; Meinhold, Stock 1982: 129–130].[26] A relation of complementary distribution exists, for example, between the sounds [t], [t˚], [t̂] and [tˈ], since they are found only in the positions [—ä̧a], [—ü̥o], [—Ç̧v̧] and [—#], respectively: [tã·r̂e·] "*tãrė*" 'pronounce-3PST', [t˚ũ·r̂i̯s] "*tũris*" 'volume-NOM.SG', [t̂i̯l̂t̂i̯] "*tìlti*" 'grow quiet-INF', [jó·tˈ] "*jót*" 'ride [on horseback]-SHORT-INF'); between [n], found before [a·] and [d], and [ŋ], found only before [k] and [g]: [nã·mas] "*nãmas*" 'house-NOM.SG', [bandà] "*bandà*" 'herd, flock-NOM.SG' and [bá.ŋkas] "*bánkas*" 'bank-NOM.SG', [baŋgà] "*bangà*" 'wave-NOM.SG'; between open [æ·] and close [e·], whose positions are [—C] and [—Ĉ], respectively: [n̂æ·ša] "*nẽša*" 'carry-3PRS' : [n̂ẽ·š̂e·] "*nẽšė*" 'carry-3PST', [ĝæ·ras] "*gẽras*" 'good-NOM.SG.M' : [ĝẽ·r̂æ] "*gẽria*" 'drink-3PRS'. A good example of complementary distribution in Russian and some Lithuanian dialects is "hard" [ы] and "soft" [i]. The first is found only after hard consonants, and the second only after soft consonants or after a pause: Ru. *сыгра́л* [sыgrál] '(he) played' : *игра́ть* [igrátʹ] 'play-INF', *быть* [bытʹ] 'be-INF' : *бить* [bʹitʹ] 'hit-INF', SAukšt. Lith. *dẑìd̂æʼbɪ.* "*dìdelę*" 'big-ACC.SG.F' : *dẑìd̂æĵi.* "*dìdeli̧*" 'big-ACC.SG.M'.

Sounds which occur in complementary distribution cannot replace one another in the same context, and therefore the properties which distinguish them do not have a distinctive function. For example, if we contrive to pronounce a velar [ŋ] in place of [n] at the beginning of the word *namõ* 'homeward', we would get the impossible Lithuanian sound sequence *[ŋam˚õ·], which of course cannot convey or distinguish any meaning (cf. § 44).[27] In other cases, the

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[26] Zawadowski has persuasively criticized the term *complementary distribution*; he suggests *exclusion* as a more accurate substitute [Zawadowski 1966: 217]. But a term's stability (as for language in general) is unquestionably more important than its formal accuracy.

[27] Exploratory experiments have shown that *[ŋã·ras], *[ŋašùs] (with [ŋ] inserted with a specially adapted computer into [—ã·ras], [—ašùs], clipped from the words *nãras* 'diver', *našùs* 'productive; fruitful') are perceived as strange-

result may not be as drastic, but we would nevertheless not hear normal Lithuanian words, at least not words which would differ in meaning from the previous words: *[gˀałvà] 'head' (with the [gˀ] of *gùsti* 'get used to-INF'), *[sˀã̂k̂ẹ̇] 'say-3PST' (with the [sˀ] of *sū̃ris* 'cheese'), *[kˀã·ras] 'war' (with the [kˀ] of [jó·kˀ] 'ride [on horseback]-2SG.IMP') would just sound like "exotic" versions of the words *galvà*, *sãkė*, *kãras*.

§ 53. Not all phonologists distinguish cross distribution, since it is a sort of combination of contrastive and complementary distribution. The term denotes a relationship among linguistic units used in some cases in the same position, and in other cases only in different positions [Steponavičius 1976: 66 and references]. For example, at the beginning of a Lithuanian word after a pause, many speakers use both [a] and [e]: *avìs̀* 'sheep' : *ežỹs* 'hedgehog', *asiliùkas* 'donkey (dim.)' : *eglyniùkas* 'fir grove (dim.)', but in other cases they are in complementary distribution: after hard consonants only [a] can occur, and after soft consonants only [e] (see § 59, table 5). The same distribution is found for Lithuanian hard and soft consonants (see § 137 table 14); both can occur before back vowels, but elsewhere they exhibit complementary distribution: before hard consonants and a pause only hard consonants occur, and before front vowels and soft consonants, only soft. In establishing phonemes, we focus attention on those positions in which the distribution of the units in question is contrastive. Therefore, cross distribution is almost always considered a particular case (and moreover, the most frequent case) of the first (contrastive) type of distribution.

d) PHONEMES AND ALLOPHONES

§ 54. Having examined the distribution of sound units (or, put more simply, sounds), we can proceed to the identification of phonemes.

In surveying at a glance all the "diagnostic" positions which certain sounds occupy, we are aided by *distributional charts*; see [Pike 1947: 81; Harris 1963: 63 (fn. 12), 69, 74; Schane, Bendixen 1978: 24–25]). The rows in the chart show symbols for the sounds in ques-

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sounding *gãras* 'steam', *gašùs* 'well-dressed' and are never considered varieties of the words *nãras*, *našùs*. This once again confirms the baselessness of the above-mentioned method of "mechanical" commutation (fn. 12).

tion, while the columns show the positions occupied. A plus sign (or some other symbol) at the intersection of a row and column indicates that the sound is used in the corresponding position; the absence of a symbol means that the sound is not used in that position. For example, the distribution of the Lithuanian consonants [ɫ], [n] and [ŋ] can be represented as follows (table 1).

Table 1. Distribution of the consonants [ɫ], [n] and [ŋ] in Lithuanian[28]

Sounds	Positions			
	[—ã]	[—^t_d]	[—^k_g]	[—#]
	1	2	3	4
[ɫ]	+	+	+	+
[n]	+	+		+
[ŋ]			+	

The following word pairs illustrate this distribution: *lašùs* 'drop-ACC.PL' : *našùs* 'productive; fruitful-NOM.SG.M' [—a], *lãmą* 'llama-ACC.SG' : *nãmą* 'house-ACC.SG' [—a·], *piltà* 'poured-NOM.SG.F' : *pintà* 'braided-NOM.SG.F' [—t], *pìldavo* 'pour-3PST.FREQ' : *pìndavo* 'braid-3PST.FREQ' [—d], *talkà* 'collective assistance' : *ra*[ŋ]*kà* 'hand' [—k], *algà* 'wages' : *a*[ŋ]*gà* 'opening, hole' [—g], *gál* 'perhaps' : *mán* 'to me', *tõl* 'until' : *tõn* 'that-ILL.SG.F' [—#].

In comparing the table and the examples, we see that two pluses in a single column indicates a contrastive distribution, in other words, a phonological opposition or contrast. Thus [ɫ] and [n] form a phonological opposition, contrasting with one another in positions 1, 2, and 4; [ɫ] and [ŋ] contrast in position 3 (that is, before [k] and [g]). Sounds capable of contrasting in a single position perform a distinctive function, and must be considered distinct phonemes, or (more pedantically) manifestations (Lat. *manifesto* 'I show, I reveal') [El'mslev 1960b: 361; Koefoed 1967: 66] or realizations [Trubetzkoy 1977: 36 = Trubeckoj 1960: 45] of distinct phonemes.[29] Thus, there is no doubt that Lithuanian [ɫ] and [n], as well as [ɫ] and [ŋ] are realizations of

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[28] For the sake of clarity, here and elsewhere the representation of the distribution of sounds is highly simplified. In examining these examples, one needs to imagine that the sounds in question can only occupy those positions indicated in the table, although the real situation is often far more complicated.

[29] The term *į(si)kūnijimas* 'embodiment' (Ru. *воплощение*, cf. [Šaumjan 1962: passim]) is also used.

separate phonemes. Leaving position 3 aside for now, we can say that in positions 1, 2, and 4, we have the independent phonemes /l/ and /n/ (here and elsewhere, slanted lines represent phonological transcriptions).[30]

The relationship between [n] and [ŋ] is different. We find no single column in the table which would have pluses in the both the [n] and [ŋ] rows; where [n] is used (positions 1, 2, 4) [ŋ] does not occur, and where [ŋ] is used (position 3) we do not find [n]. Only taken together do [n] and [ŋ] fill all the positions in which we find [ł]. Thus [n] and [ŋ] complement one another, as it were; they are in complementary distribution.

§ 55. It is only such sounds whose distribution is complementary which cannot distinguish words. If, for example, two words differ in that one has an [n] after the sound sequence [ba] and the other an [ŋ], then they must necessarily differ in those sounds which condition the non-identity of [n] and [ŋ]. After [n] we will not find either [k] or [g], and no other sound except [k] or [g] will follow [ŋ]. Thus, sounds in complementary distribution do not perform a distinctive function; their lack of sameness is conditioned by other sounds or sound features, rather than by different word meaning. Such sounds can therefore be considered variants of the same phoneme, as long as they have features in common, that is, if their acoustic and articulatory properties are similar (cf. Trubetzkoy's third rule [Trubetzkoy 1977: 44–45 = Trubeckoj 1960: 56–57]; see also [Pike 1947: 69–70; Glison 1959: 229; Harris 1963: 64–65; Hockett 1968: 129; Koefoed 1967: 19, 77; Meinhold, Stock 1982: 51, 71ff.]).[31] Lithuanian [n] and [ŋ] fully

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[30] In works of the Moscow Phonological School, another type of bracket is generally adopted: " < > " (see, for example, [Reformatskij 1961: 114]). In the present work, these are reserved for optional realizations (see fn. 68) and for "foreign" (marginal) phonemes, such as <f>, <h>, <ɔ> (for example in the word *chòras* 'chorus').

[31] In establishing phonetic similarity, we can use charts of phonetic "natural classes" (for example, [Pike 1947: 70; Glison 1959: 294; Shane, Bendixen 1978: 24–25]). Additionally, in uniting sounds into a single phoneme, we must observe phonetic realism; we must ensure that specific distinctions flow naturally and simply from the phonetic context [Hockett 1955: 156].

It should be emphasized that in this case there are no differences, aside from terminology, between the Praguians and the descriptivists (cf. [Fischer-Jørgensen 1975: 85]).

satisfy this condition: both of these sounds are nasal sonorants, both are articulated with the tongue (cf. the labial [m]), both are pronounced with vibration of the vocal cords. Therefore [n] and [ŋ] are variants of the single phoneme /n/.

Variants of this type are not optional. We cannot freely choose what to pronounce in the words *nãmas* 'house' or *angà* 'opening'; the norms of Lithuanian do not permit us to say either *[ŋã·mas] (with a velar [ŋ]) or *[angà] (with an apical [n]). Similar sounds of this sort, belonging to a single phoneme and showing complementary distribution, are called combinatory variants of a phoneme (Ger. *kombinatorische Variante* [Trubetzkoy 1977: 44], Ru. *комбинаторные варианты* [Trubeckoj 1960: 56]) or allophones (Gk. ἄλλος 'other', φωνή 'sound') [Chèmp 1964: 35–36 and references]. Often used in the same meaning is the term positional or contextual variant.[32]

Some linguists (especially representatives of the Petersburg (Leningrad) School or "pure" phoneticians) are inclined to use the term positional variant only for those allophones which are conditioned not by adjacent phonemes, but by prosodic elements such as stress, pitch accent, and intonation. Combinatory variants are only those which occur alongside other linear elements (for example, [Zinder 1979: 47; Bondarko 1981: 68–74; Pakerys 1986: 41–43]). In general, *combinatory variant*, *positional variant*, and *allophone* are synonymous terms (cf. [Muljačić 1973: 165]),[33] and do not need to be distinguished artificially, especially since this needlessly narrows the

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[32] Cf. also Lith. *atspalvis* 'nuance' (Ru. *оттенок* [Ščerba 1955: 19]), *variacija* 'variation' [Reformatskij 1970: 98], *varietetas* 'variety' (Dan. *varietet* is translated into Russian rather strangely as *вариат* [El'mslev 1960b: 338ff.]; *varieties* are opposed to *variations*—optional variants). Over the past decades, this motley terminology has generally been superseded by *allophone* (see, for example, [Vachek 1966: 51; Steblin-Kamenskij 1966: 69ff.; Stepanov 1966: 19ff.; 1975b: 77ff.; Zinder 1979: 35ff.; Bondarko 1981: 68ff.]). This tide was not resisted even by the conservative Petersburg (Leningrad) School: its eminent representative Zinder speaks only of *nuances* in the first edition of his *General Phonetics* (1960); in the second edition (1979), the term *allophone* is already fully established (cf. [Zinder 1979: 45–49 et passim]).

[33] Hammarström considers the term *positional variant* more convenient, since *combinatory variant* implies coarticulation (shared articulatory features of neighboring sounds), which is not always necessary for such variants [Hammarström 1966: 19].

concept of position and seemingly overlooks the important fact that combinations of phonological units can be simultaneous as well as linear (see § 93). The most convenient term is undoubtedly *allophone*, but the other two, quite typical of the classical Prague School and often found in the literature, should not be forgotten.

§ 56. Having examined terminology, we may return to our examples and draw a final conclusion: Lithuanian [n] and [ŋ] are allophones, or combinatory variants, of a single phoneme /n/. Thus the three sounds in question, [ł], [n], and [ŋ], can be reduced to two phonemes: /l/ and /n/. The phoneme /l/ is realized in all the above positions as an [ł]-type sound, while the phoneme /n/ is represented by two different allophones:

$$/n/ \begin{cases} \text{[n]} / [\!- \left\{ \begin{matrix} \text{ă} \\ \text{t} \\ \text{d} \\ \# \end{matrix} \right\}] \\ \\ \text{[ŋ]} / [\!- \left\{ \begin{matrix} \text{k} \\ \text{g} \end{matrix} \right\}] \end{cases}$$
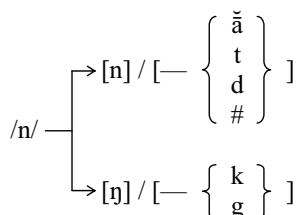
We can see from table 1 that the allophone [n] occupies more positions and has a broader and freer distribution than [ŋ]. An allophone with a freer distribution is called the basic variant of the phoneme [Ščerba 1955: 19; 1974: 200; Hammarström 1966: 21; Stepanov 1975b: 77–78; Zinder 1979: 49; Meinhold, Stock 1982: 35], or the norm of the phoneme [Pike 1947: 62], or the phoneme standard (for example, [Vinogradov 1976: 298–299]). There are linguists (for example, [Polivanov 1968: 138; Klimov 1967: 44]) who regard the basic allophone with suspicion and doubt the advisability of distinguishing it; some linguists hold that not all phonemes have such a variant (for example, [Sokolova 1948]).[34]

Most often in Lithuanian the role of basic variant, or norm, falls to the consonantal allophone used in word-initial position before [a]

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[34] Formerly, the basic allophone (variant, nuance) was sometimes unjustifiably identified with the phoneme (for example, [Ščerba 1974: 119]; cf. [Zinder, Maslov 1982: 43]). This identification is already present in embryonic form in the works of Baudouin de Courtenay (for example, [Boduėn de Kurtenė 1963: vol. 1, 278]). This allophone is also confused with the so-called metaphoneme (cf. [Zinder 1979: 49–50] and § 64, fn. 45, of the present work).

(that is, positions of the type [—a]).[35] Basic variants of vowels are found in absolute word-initial position before [Ca]-type syllables, and especially in positions of isolation (of the type [#—#]).

If there are no technical obstacles, a phoneme is transcribed with the phonetic symbol for its basic allophone; thus we write /n/, and not /ŋ/.

§ 57. Once the basic variants of phonemes have been established, a description of their realization becomes much easier. For example, we can now substitute this simple formula for the above-mentioned rule describing the allophones of the phoneme /n/:

$$/n/ \rightarrow [\eta] \: / \: [—^{k}_{g}]$$

We can omit the part of the rule showing the distribution of the apical allophone [n], since only the velar [ŋ] is a deviation from the "norm," the basic variant of the phoneme /n/.

§ 58. The relationship between phonemes and allophones can be represented in the same distributional charts; we just need to add a column showing the phonological interpretation of the sounds in question (see table 2).

Table 2. Distribution of allophones of the phonemes /l/, /n/ in Lithuanian

Allophones	Positions				Phonemes
	[—ă]	[—$^{t}_{d}$]	[—$^{k}_{g}$]	[—#]	
	1	2	3	4	
[ł]	+	+	+	+	/l/
[n]	+	+		+	/n/
[ŋ]			+		

Using the table, we can always correctly read such words as /bangà/ "*bangà*" 'wave', /atã·tranka/ "*atãtranka*" 'recoil', /bandà/ "*bandà*" 'herd; flock', /nã·mas/ "*nãmas*" 'house', etc., written in phonemic transcription, since the precise allophone of the phoneme /n/ is shown by its position. In the first two words, we have position 3 [—$^{k}_{g}$] and therefore the allophone [ŋ]; in the fourth word, /n/ is used in position 1 [—ă], where only the allophone [n] is possible. The same

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[35] This can be explained by the relatively "neutral" articulation of this sound and the very high frequency of [a] in connected texts (this is the most frequent sound in both standard Lithuanian and in the dialects, see [Svecevičjus 1966; Girdenis 1981b (= Girdenis 2000c: 205ff.); 1981c (= Girdenis 2000c: 225ff.); Jasiūnaitė 1993: 146f.; Karosienė, Girdenis 1993 (= Girdenis 2001: 64ff.)]).

allophone is pronounced in the third word as well, where /n/ is in position 2 [—ᵗᵈ]. Thus, a phonological interpretation and phonological transcription eliminates (disregards, ignores) those differences and features of sounds which depend on position, and can therefore be restored, as needed, according to general rules. A transcription of this sort provides the same essential information as a detailed phonetic transcription, using far fewer symbols.

e) CONCRETE EXAMPLES

§ 59. Let us examine a few more examples.

1. Recall the sounds [t] ≠ [d], [t°] ≠ [d°], [t̂] ≠ [d̂], [t̪̂] ≠ [d̪̂] examined in § 43. Restricting ourselves to the above-mentioned examples ([tã·r̥ė·] "*tãrė*" 'pronounce-3PST' : [dã·r̥ė·] "*dãrė*" 'do, make-3PST', [tvar°ùs] "*tvarùs*" stable, steady-NOM.SG.M' : [dvar°ùs] "*dvarùs*" 'estate-ACC.PL', [t°ù] "*tù*" 'you' : [d°ù] "*dù*" two', [t°ũ·r̥i̯s] "*tū̃ris*" 'volume-NOM.SG' : [d°ũ·r̥i̯s] "*dū̃ris*" 'prick, stitch-NOM.SG', [t̂íek˙] "*tíek*" 'so much' : [d̂íek˙] "*díek*" 'plant-2SG.IMP', [t̪̂r̃ĩ̯s] "*trỹs*" 'three' : [d̪̂r̃ĩ̯s] "*drỹs*" 'dare-3FUT'), we can construct the following distributional chart (table 3).

Table 3. The phonemes /t/, /d/ and their most salient allophones in Lithuanian[36]

Allophones	Positions					Phonemes
	[—ẵ]	[—v]	[—ŭ]	[—Ĉ]	[—r̂]	
	1	2	3	4	5	
[t]	+	+				/t/
[t°]			+			
[t̂]				+		
[t̪̂]					+	
[d]	+	+				/d/
[d°]			+			
[d̂]				+		
[d̪̂]					+	

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[36] Not shown in the table are such allophones as the lateral plosives [tᴸ], [dᴸ] (in the position [—ł], for example: *atlakìnti* 'come running-INF', *gõdlapiai* 'bugloss leaves'), the nasal (or faucal) plosives [tᴺ], [dᴺ] (/[—n]: *Putnà* [surname], *liũdnas* 'sad'), alveolar plosives [ṭ], [ḍ] (/[—r]: *tratéti* 'crack, crackle-INF', *drãpanos* 'clothes'), and the aspirated plosives [t˙] (/[—#]: *jót* [jó·t˙]; see also § 164).

Each column contains two plus signs. This shows at the outset that the eight sounds in question need to be combined into two phonemes. The following sounds are in complementary distribution: a) [t] (positions 1 and 2), [t°] (position 3), [t̂] (position 4), [t̯̂] (position 5); b) [d], [d°], [d̂], [d̯̂]; c) [t], [d°], [d̂], [t̯̂]; d) [d], [t°], [t̯̂], [d̯̂]; e) [t], [d°], [t̂], [t̯̂]; f) [t], [t°], [d̂], [t̯̂]; g) [d], [d°], [t̂], [t̯̂]; … . Of these possible combinations, the criterion of phonetic similarity allows us to select only the two first variants (*a* and *b*): [t], [t°], [t̂] and [t̯̂] are allophones of the phoneme /t/, and [d], [d°], [d̂] and [d̯̂] are allophones of the phoneme /d/. [t] and [d] are undoubtedly to be considered the basic variants, used in the most neutral position, [—ă].

2. On the basis of the words [kàs] "*kàs*" 'who/what-NOM' : [tàs] "*tàs*" 'that-NOM.SG.M', [k°uȓ̃.tš°ùs] "*kuȓčius*" 'deaf person-NOM.SG' : [t°uȓ̃.tš°ùs] "*turčius*" 'rich person-NOM.SG', [k°ó·ks] "*kóks*" 'what (sort of)-NOM.SG.M' : [t°ó·ks] "*tóks*" 'such (a)-NOM.SG.M', [krã·nas] "*krãnas*" 'crane-NOM.SG' : [țrã·nas] "*trãnas*" 'drone-NOM.SG' ([ț] is an alveolar articulation of [t]), [jó·kˈ] "*jók*" 'ride (on horseback)-2SG.IMP' : [jó·tˈ] "*jót*" 'ride (on horseback)-SHORT-INF', we can construct the following distributional chart of the sounds [k], [t], [k°], [t°], [ț], [kˈ] and [tˈ] (table 4).

Table 4. The phonemes /k/, /t/ and their allophones in Lithuanian

Allophones	Positions				Phonemes
	[—ă]	[—ŭ]	[—r]	[—#]	
	1	2	3	4	
[k]	+		+		/k/
[k°]		+			
[kˈ]				+	
[t]	+				/t/
[t°]		+			
[ț]			+		
[tˈ]				+	

This time, perhaps without further analysis, it is clear that [k], [k°] and [kˈ] are allophones of the phoneme /k/, and [t], [t°], [ț] and [tˈ] are allophones of the phoneme /t/. [k] and [t] must be considered the basic variants. More interesting here are the aspirated allophones [kˈ] and [tˈ], appearing in word-final position, and the alveolar [ț], which appears under the influence of the alveolar trill [r].

If we were to abandon the criterion of phonetic similarity and combine into phonemes [k] and [t˚], rather than [k] and [k˚], and [t] and [k˚], rather than [t] and [t˚], we would not disturb the identity of the words, but we would artificially complicate not just the description of the relationship of phonemes and sounds, but also certain grammatical rules. Let us assume that [k] and [t˚] = /χ/, and [t] and [k˚] = /θ/ and transcribe several word forms each of the words *kàs*, *tàs*: a) /χàs/ = [kàs] "*kàs*" 'who/what-NOM', /θõ/ = [k˚õ·] "*kõ*" 'who/what-GEN', /χám/ = [ká.m] "*kám*" 'who/what-DAT', /θuõ/ = [k˚uõ] "*kuõ*" 'who/what-INS'; b) /θàs/ = [tàs] "*tàs*" 'that-NOM.SG.M', /χõ/ = [t˚õ·] "*tõ*" 'that-GEN.SG.M', /θám/ = [tá.m] "*tám*" 'that-DAT.SG.M', /χuõ/ = [t˚uõ] "*tuõ*" 'that-INS.SG.M'. As we see, the word forms of each of these pronouns remain distinct after this operation, but the strange consonantal alternation /χ/ : /θ/, /θ/ : /χ/ appears, which is not explained on any more reasonable grounds. We can avoid this complication if we observe the criterion of phonetic similarity and combine the sounds in question into phonemes as shown in table 4.

In thus observing phonetic similarity, we also satisfy the criterion of grammatical expediency, which is sometimes worth special consideration. This criterion requires sounds which are not used in a single position to be grouped into phonemes in such a way that we can more easily and simply formulate the grammatical rules of a language or dialect (see [Harris 1963: 76–78; Stepanov 1966: 225–228; Bulygina 1977: 96–97; Panov 1979: 118–119]).[37] Of course, this

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[37] Phonologists of the Petersburg (Leningrad) School even maintain that only the grammatical criterion allows us to distinguish phonemes, since, in their view, only those minimal units of expression, which by themselves can be the expression of some individual morpheme, can be considered phonemes (cf. [Zinder 1979: 37]). For this reason, they are inclined to believe that analytic languages (like Chinese or Vietnamese) do not have true phonemes; their minimal linear unit of expression is the syllable, or the so-called *syllabophoneme*; they argue that the analytic languages of Europe are also approaching such a syllable structure [Kuz'menko 1991]. There is no question that inflectional language structure in the distant past had encouraged an intuitive phonological analysis and the discovery of alphabetic writing, but this in no way shows that scientific phonological studies would also need to stop at this artificially set boundary.

It should be said that in certain individual cases, even the criterion of grammatical expediency is not all-powerful. For example, if Russian [ы] is considered a separate phoneme, paradigms and rules of declension become easier and

criterion is not the most important and should be considered only in special circumstances (that is, when distribution and the criterion of phonetic similarity permit several equivalent interpretations).

3. It is well-known that in standard Lithuanian, short (lax) vowels have the following allophones in these positions (if we disregard words of non-Lithuanian origin); see table 5.

Table 5. The distribution of short vowels and their allophones in standard Lithuanian

Allophones	Positions			Phonemes
	[#—]	[C—]	[Ĉ—]	
	1	2	3	
[a]	+	+		/a/
[e]	+		+	/e/
[i]	+		+	/i/
[u]	+	+		/u/
[u̇]			+	

As we see, there is a relationship of cross distribution between the vowels [a] and [e] here: an opposition in position 1 (after a pause), and complementary distribution in positions 2 and 3 (that is, after a consonant). Since these vowels contrast in at least one position, they must be considered separate phonemes /a/ and /e/. Of the allophones [u] and [u̇] (a fronted [u], for example: [gaî˚ù] "*galiù*" 'be able-1SG. PRS', [k̂˚ùr˚oˑ] "*kiùro*" 'get holes, wear through-3PST') of the phoneme /u/, the basic variant is undoubtedly [u]. The distribution of the phoneme /i/ appears not to be quite consistent, since [i] is lacking in position 2 (that is, after a hard consonant), but this lack of consistency is quite frequent in natural languages and should be considered normal.

The phonemic opposition /a/ and /e/ is very weak in the standard language [Kazlauskas 1967: 238; 1968c: 325; Girdenis, Žulys 1973: 207 (= Girdenis 2000b: 376)]. No single reliable minimal pair can be found, if we do not count the foreign borrowings *afèktas* 'fit of passion-NOM.SG' : *efèktas* 'effect-NOM.SG' and refrain for now from

more consistent [Bulygina 1977: 96–97], but, on the other hand, the identity of roots beginning with the vowel [i] breaks down: *игра́л* 'played (impf.)' : *сыгра́л* 'played (pf.)', *иска́ть* 'look for (impf.)-INF' : *сыска́ть* 'find (pf.)-INF', *иду́щий* 'going' : *предыду́щий* 'previous'. All linguistic logic would indicate that in these forms [ы] is an allophone of the phoneme /i/ which occurs after an open juncture (*сыгра́л* = /s+igrál/; cf. § 36).

breaking down diphthongs (cf.: *áibė* 'a lot of-NOM.SG' : *éibė* 'damage-NOM.SG', *al̃kis* 'hunger-NOM.SG': *el̃kis* 'behave-2SG.IMP').[38] Nevertheless, we cannot consider [a] and [e] allophones of a single phoneme, since they are not in complementary distribution; hence, there is no positional basis for explaining their lack of sameness.

The situation is quite different in South Aukštaitic (West Dzūkish), which has the same short vowels [a], [e], [i], [u], [ù], as well as the central (sometimes back) vowel [ы], which occurs in such forms as (*su*) *k̊åułъ̀* "(*su*) kiaulė̀" '(with) a pig', *žɔ·łъ̀* "*žolè*" '(with) grass'. The distribution of these vowels is found in table 6.

Table 6. The distribution of short vowels and their allophones in the South Aukštaitic dialect

Allophones	Positions			Phonemes
	[#—]	[C—]	[Ĉ—]	
	1	2	3	
[a]	+	+		/a/
[e]			+	
[i]	+		+	/i/
[ы]		+		
[u]	+	+		/u/
[ù]			+	

There are only three sounds in each position here. This indicates that in this dialect there should be just three vowel phonemes. On the basis of phonetic similarity, [u] is linked with [ù], [i] with [ы] (cf. also *su̯ k̊á·uki* "*su kiáuke*" 'with a jackdaw' : *su̯ varłъ̀* "*su varlè*" '(with) a frog', so that only [a] and [e] remain, which do not share a position in this dialect, and therefore must be considered allophones of a single phoneme /a/. Thus in the standard language, the same sounds [a] and [e] reflect two independent phonemes, while in the South Aukštaitic dialect (and in many others, especially East Aukštaitic dialects and subdialects) they are allophones of a single phoneme (see [Schmalstieg 1964; Venckutė 1964; Girdenis 1971a: 203–204 (= Girdenis 2000b: 347f.); Kosienė 1978: 38; Girdenis 1983a (= Girdenis 2000c: 290ff.)]).

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[38] The second pair was noted by St. Petersburg University student Aleksej Andronov, who spent 1993–1994 at Vilnius University. Cf. also *asù* 'ace (experienced person)-INS.SG' : *esù* 'I am'; this pair emerged in a dispute between Polish linguists Michał Hasiuk and Wojciech Smoczyński during the Third Conference of Baltists (1975).

This fundamental difference results from only a slightly different distribution among these sounds; the standard language has a position in which their contrast is possible, while the dialect no longer has such a position.[39]

§ 60. Sometimes sounds which have almost no phonetic properties in common are in complementary distribution. For example, the English glottal (laryngeal) [h], reminiscent of a breathy vowel, is found only in absolute word-initial position (or after an internal open juncture), for example *he* [hiː], *high* [haɪ], while the velar [ŋ] is possible only in word-final position (or before an internal open juncture; for details, see [Strimajtene 1976: 8–11 and references]): *sing* [sɪŋ] (cf. *sin* [sɪn]), *stocking* ['stɔkɪŋ] (there is a similar relationship between German [h] and [ŋ] [Meinhold, Stock 1982: 129]). Thus, [h] and [ŋ] are related as follows (table 7):

Table 7. Positions for the English consonants [h] and [ŋ]

Sounds	Positions		Phonemes
	[#—]	[—#]	
	1	2	
[h]	+		/h/
[ŋ]		+	/g/

Although there is no doubt that these consonants are in complementary distribution, we nevertheless cannot consider them allophones of a single phoneme; such a phoneme would have no common features linking its allophones and distinguishing them from all other consonantal phonemes [Bulygina 1980: 140]. Following Trubetzkoy [Trubetzkoy 1977: 32 = Trubeckoj 1960: 40–41], we could call the peculiar /h/ and /ŋ/ relationship an indirect phonological opposition (see also [Koefoed 1967: 76–77; Kuz'menko 1969: 47–48]).[40]

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[39] A quite peculiar and apparently more archaic distribution of the vowels in question is found in the East Aukštaitic Rimšė dialect of the Vilnius region; here [t], [d], [n] remain unpalatalized before [e] and [e.], and therefore such minimal pairs as *tɛkù* "*tekù*" 'flow; marry-1SG.PRS': *takù* "*takù*" 'path-INS.SG' (cf. also: *dɛ́.ga* "*dẽga*" 'burn-3PRS', *nɛ̊̃åu̯* "*nešiaũ*" 'carry-1SG.PST') are possible.

[40] In principle, a biphonemic interpretation [ŋ] = /n/ + /g/ is also possible (see [Koefoed 1967: 121 and references; Strimajtene 1976: 8–11 and references]; cf. [Meinhold, Stock 1982: 130–131 and references]). It seems that only Morciniec categorically objects to this treatment (see [Morciniec 1968: 76ff.; 1971: 120ff.]).

f) SUMMARY REMARKS

§ 61. Having considered several typical cases, let us recall the main principles of the paradigmatic identification of phonemes.

1. Two or more sounds are considered separate phonemes if, in substituting one for the other in at least one position, the meaning of the words changes (or disappears completely).

2. Two or more sounds are optional (free) variants of the same phoneme if, in substituting one for the other in the same position, the meaning of the word does not change.

3. Two or more sounds are considered allophones, or combinatory variants, of the same phoneme if they are acoustically similar to one another and are in complementary distribution (in other words, if they are used only in separate positions).

4. Sounds which are in complementary distribution are considered separate phonemes if they have no phonetic features in common which would unite them and at the same time distinguish them from other phonemes.

Thus phonemes are established on the basis of distinctive function, distribution, and phonetic properties. In certain cases we also observe the criterion of grammatical expediency; of several possible phonological interpretations, we choose the one which allows for a better and simpler formulation of the grammatical (especially morphological) rules of the language or dialect in question.

3. THE ROLE OF PHONEMES AND THEIR VARIANTS

§ 62. As the procedure for paradigmatic identification shows, phonemes are abstract, rather than concrete, units of a linguistic system, since in establishing phonemes we disregard properties of sounds which distinguish optional variants (or concrete sounds) among themselves, as well as those features which depend on position and distinguish combinatory variants or allophones. Thus a phoneme consists of phonetic features common to all of its allophones,[41] and an

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[41] Solncev has quite ingeniously called the phoneme the "printing plate" (Ru. *печатная форма*) of concrete sounds: [Solncev 1977: 239]. This collocation is

allophone consists of phonetic features common to all of its optional variants; in other words, phonemes are the invariants "concealed" within concrete variations [Jakobson 1962: 315]. In this conceptual system, the phoneme is the most abstract concept, and the optional variant is the most concrete—a wholly individual sound pronounced by a certain person at a certain time and place. Allophones are also abstract elements, but they are more concrete than phonemes, since they have properties which are conditioned by their environment (cf. [Avram 1958: 48–52]).

Allophones of a single phoneme can be quite different. For example, in the language of the Papua Asmats, the phonemes /m/, /n/ in the position [#—] (after a pause) are pronounced [b], [d], and in the position [V—V] (intervocalically) as [ᵐb], [ⁿd]. In other Papua languages (for example Wahgi), the phoneme /t/ in the position [V—V] is realized by the optionally-used sounds [r] or [l], etc. Indonesian /k/ before a pause or a consonant (in the positions [—#] and [—C]) appears as a glottal stop allophone [ʔ]: *bapak* = [bapaʔ] 'father', *maktjik* = [maʔɟiʔ] 'aunt'. The vocalic allophones of Arabic are quite varied (see § 189). Even in thoroughly non-exotic Spanish, the phonemes /b d g/ between vowels are realized by quite striking nonplosive allophones: /b/ → [β] / [V—V] (*bobos* 'stupid.PL.M' ≈ ['boβos]), /d/ → [ð] / [V—V] (*deda* 'finger' ≈ ['deða]), /g/ → [ɣ] / [V—V] (*gago* 'stutterer' ≈ ['gaɣo]) [Glison 1959: 248–251; Alarcos Llorach 1975: 161–162].

§ 63. In every language there are a great many allophones; generally speaking, there can be as many as there are distinct positions [Hammarström 1966: 18; Hoenigswald 1966: 76]. In our native language we almost never notice this, since we are used to reacting only to those phonetic properties which distinguish referential meaning (see, for example, [Achmanova 1966: 41–42]).[42] But let us compare

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indirectly reminiscent of *form of expression* among adherents of glossematics, as opposed to *substance*: the sounds or letters with which elements of form (taxemes, or cenemes of expression [≈ phonemes]) are realized (cf. [Hjelmslev 1959: 40ff.]).

[42] But those allophones (and variants of phonemes in general) which have sociolinguistic value can be observed and checked even better than some distinctive oppositions [Fischer-Jørgensen 1956: 144; Weinreich, Labov, Herzog 1968: 131; Labov 1966: 103] (cf. [Lekomcev 1980: 175]).

these random word pairs: Lith. *kàstų* 'dig-3SBJV' : *kàsti* 'dig-INF', *šlàptų* 'become wet-3SBJV' : *šlàpti* 'become wet-INF'. If we listen closely, we can note quite easily that the [a] sounds different in all of these words. In the first word, it is darker and lower in pitch than in the second, and at its end is somewhat reminiscent of [ɔ]. The [a] of the third and fourth words is related in a way similar to that of the first and second, but is somewhat lower and pronounced with the lips somewhat protruding.[43] We also pronounce a different [a] in the individual syllables [àk], [àp], [àt]. We can transcribe these more narrowly as [ak] [åp] [å̟t]. In the second example, the vowel is significantly lower than in the first and third, and there is considerable labialization in the direction of [ɔ]. The [a] of the first and third examples also differs. A similar relationship can be observed in the syllables [kà], [pà], [tà]; here also the [a] of the second example is somewhat reminiscent of [ɔ], while the [a] of the third example approaches [ə] or even [æ]. We can easily satisfy ourselves that other vowels vary in similar ways by comparing other sequences: *rìšo* [r̂ì̃š°oˑ] 'tie-3PST' : *rìši* [r̂ì̃ši̠] 'tie-2SG.FUT', *pìktas* [p̂ì̃ktas] 'angry-NOM.SG.M' : *tìkti* [t̂ìkt̂i̠] 'be suited for-INF', *nèštų* [n̂èš°t°uˑ] 'carry-3SBJV' : *nèšti* [n̂èš̃t̂i̠] 'carry-INF'). Even more such variation could be shown by experimental phonetic devices (see for example, [Iivonen 1970]), but as mentioned above, only those phonetic properties which can be perceived by the unaided ear are important for phonology [Hammarström 1966: 18]. It is necessary to distinguish at least perceptual (perceived by hearing) and "instrumental" (physical) allophones; only the former have linguistic significance. In reconstructing a language's past, we reconstruct only those allophones which have a different later development, neither more nor less.

§ 64. Thus, phonemes exist only in allophones; they are simply feature complexes common to certain allophones. There are no phonemes which are not realized as allophones. Even in interjections such as *ã*, *õ*, *ẽ*, formed from single sounds, we do not have the pure phonemes /aˑ/, /oˑ/, /ẹˑ/, but rather quite intricate complexes made up of word stress, pitch accent, and allophones of the phonemes in question, conditioned by adjacent pauses (the position [#—#]), stress, and circumflex pitch accent. It is true that we sometimes refer to phonemes

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[43] This has been demonstrated experimentally (admittedly, on North Žemaitic data) in the article [Girdenis, Kubiliūtė-Kliukienė 1982 (= Girdenis 2000c: 258ff.)].

in isolation by name, but these are not, of course, units of the language in question (cf. [Stepanov 1975b: 77–78] and [Kuznecov 1970a: 179; Zinder 1979: 46]). The names of phonemes spoken and written separately are considered metaphonemes [Pilch 1964: 115];[44] they perform a metalinguistic function and therefore belong to metalanguage, rather than to language (cf. § 19). When we say that the expression of the word *kalbà* 'speech, language' is composed of the phonemes /k/, /a/, /l/, /b/ and /a/, we are pronouncing metaphonemes, rather than the corresponding phonemes. We could similarly refer to meta-allophones, meta-variants, and meta-sounds [Pilch, loc. cit.]; a separately pronounced labialized [r°] (taken, for example, from the word *rū́šis* 'sort') would be a corresponding meta-allophone or meta-variant.[45]

§ 65. Language is a highly organized functional system, and so the existence of various seemingly unnecessary variants appears at first glance to contradict the very nature of language. But this is not in fact the case; both optional variants and allophones are necessary for normal communication.

§ 66. Optional variants are necessary, if only so that all people might use the same language: children and adults, women and men, fast and slow speakers, speakers with high and low voices. Secondly, if there were no optional variants, we would not be able to recognize people, their moods, their social and geographic affiliation, from their speech. Thirdly, as mentioned above (§ 17–18), certain generally-used optional sound variants can have an expressive function; they can indicate a speaker's relationship to the message and the interlocutor. For example, in very proper standard Lithuanian or in the West

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[44] It is not clear why Voronkova [1981: 10] believes that Pilch uses this term as a synonym of *phoneme*.

[45] The confusion of the concepts of metaphoneme and phoneme, or meta-variant and variant, sometimes leads to serious errors. For example, some linguists argue that Russian [i] and [ы] are realizations of different phonemes, based on the fact that the names of these sounds (or their corresponding letters) can appear in the same position (that is, between pauses, for example, [Zinder 1979: 65–66]). But such examples do not prove anything, since they belong not to the Russian language itself, but to the corresponding metalanguage ([i] and [ы] are only different meta-variants, rather than words). With little effort, a good phonetician can separately pronounce, for example, Lithuanian [ŋ] and [k°], or English "clear" [l] and "dark" [ł], but that assuredly does not make them independent phonemes.

Aukštaitic Kaunas (Suvalkija) dialect, a stressed [i] can in some cases be replaced by a half-long [ẹ.]: the pronunciation [v̂ệ.sas], [ž̂ệ.nˊo.ma] is found instead of the neutral "Suvalkija" [v̂ìsas] "*vìsas*" 'all-NOM.SG.M', [ž̂ìnˊo.ma] "*žìnoma*" 'of course'. This pronunciation often reflects a speaker's absolute certainty regarding his or her own message or that of the interlocutor. A similar function is seen in the lowering and lengthening of a vowel in a pretonic syllable, accompanied by corresponding intonational modulations: [v̂ẹ.↗sà↘ !] "*visà!*" 'all-NOM.SG.F', [ž̂ẹ.↗nåũ.↘ !] "*žinaũ!*" 'know-1SG.PRS'. In all these cases, the referential meaning remains the same, but the speaker's attitude differs (cf. also Ru. *хорошó* [xərašó] 'good' and [xərašó::!] 'Good!', Ger. *schön* [šøːn] 'beautiful' and [šːøː:n!] 'Fine!' [Trubetzkoy 1977: 25 = Trubeckoj 1960: 31]). Optional variants of this sort, with expressive function, can be found in every language and dialect. They are sometimes referred to as emphatics (§ 17; Gk. *ἐμφατικός* 'expressive') [Laziczius 1936: 58], and are thus distinguished from less meaningful variants.[46] The term emphatics can also be used to refer to special sounds which have only expressive function, for example the above-mentioned Žemaitic [ə], used in cases like *dôuk-ə* (*duok gi*) 'Give!', or Even *-ē* (cf. *эмръм'-ē* 'I have arrived!', see § 17–18). Emphatics, as expressive elements, most likely do not belong to a linguistic system (cf. § 17 and references).

There are also quite a few optional variants which serve as so-called sociolinguistic variables (see § 67), and are therefore optional only from the standpoint of a pure linguistic system (Hjelmslev's schema), rather than language use or language norm.

It is generally held that only allophonic variants can alternate optionally. But in fact there are "double-faced" phonemes (so-called "Janus" phonemes, Ru. *Janus-фонемы*, *двуликие фонемы* [Steblin-Kamenskij 1966: 70]) and other phonological units which can occur in free variation. A "Janus" phoneme is in some cases (for example, in certain styles, contexts, sociolects) opposed to another phoneme close to it in realization, while in other cases it fully coincides with another phoneme.

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[46] Following Hammarström [1966: 9], we might call the meanings of these variants *expressemes*. But they definitely do not belong to the (systemic, invariant) "-*emic*" plane of language (cf. § 17 and references), and therefore a term with the suffix *-eme* does not seem appropriate here.

It is quite likely that the Old Prussian phonemes /ᵉī/, /ᵒū/ (for example *geīwans* 'alive-ACC.PL.M', *ioūs* 'you-NOM.PL', cf. [Mažiulis 1981: 251]) were "Janus" phonemes. The "disputed" South Žemaitic diphthongoids [ī̯ⁱ], [ū̯ᵘ] = standard Lith. *ie, uo* (for example *sví.ʲsts* "*svíestas*" 'butter', *dú.ᵘnà* "*dúona*" 'bread', cf. [Bukantis 1979 and references]) most likely belong here, as does the <e/ę> (§ 171) of the standard language in foreign borrowings (if we acknowledge the increasingly apparent *status quo*). The pitch accents of monophthongs for many eastern speakers are gradually becoming "Janus" phonemes (cf. [Garšva 1982: 74]).

As previously noted (see, for example, [Girdenis 1981a: 126]), we cannot consider all these phenomena optional variants of corresponding "stable" phonemes, since under certain conditions they contrast with these phonemes.

§ 67. Allophones[47] are determined by their position, and therefore cannot have either distinctive or expressive function; they are noticed only in those rare cases when they are perceived as a sort of sociolinguistic indicator (Hammarström's *socioleme* or *dialeme* [Hammarström 1966: 11–12]). But their role is quite important and significant.

Those allophones which occur in initial or final position of a word (or other meaningful unit) perform a delimitative function; in certain cases they indicate a word boundary (or boundary of another meaningful unit) [Trubetzkoy 1977: 244ff. = Trubeckoj 1960: 302ff.]. For example, if in Lithuanian we hear a sequence of aspirated consonant plus vowel …[tˤa]… , we can be sure that the first sound ([tˤ]) belongs to one word, and the second ([a]) to another word; we intuitively know that [tˤ] is possible only at the end of a word. If in the flow of Russian speech we hear the syllable [kы], it is immediately clear that there is a morpheme boundary after the /k/, since within the

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[47] Certain writing systems are also characterized by allographs—similar variants of letters (or more precisely graphemes; on the concept, see [Hammarström 1966: 59 and fn. 134]), cf. Gk. *σπάσις* 'pressure', *σχισμός* 'a splitting' (*σ* = *ς*). Used in a similar way in Old Lithuanian texts are non-final "long" ʃ and final ordinary *s*: *ʃeʃeris* ZCh [*Ziwatas Pona yr Diewa musu Jezusa Christusa…*. Vilnius, 1759—TRANS.] 46₁₃ "*sẽserys*" 'sister-NOM.PL', *wyʃas* ZCh IV₁₈ "*visàs*" 'all-ACC.PL.F'. Allographs are especially abundant in the Arabic and Hebrew writing systems.

It should be noted that capital letters are not variants of lower-case letters, since they can directly distinguish meaning (cf. the Lithuanian proper name *Ẽglė* and the common noun *ẽglė* 'fir tree' and the German noun [*das*] *Denken* 'thinking' and verbal infinitive *denken* 'think-INF').

boundaries of a single morpheme, a combination of these allophones of /k/ and /i/ is impossible (cf. *Кире* [kʹírʹiᵉ] 'Kira-DAT', *к Ире* [kɨrʹiᵉ] 'to Ira's (place)'; see § 36).

  Those allophones which arise due to the effects of other phonological units have a secondary distinctive function; they highlight those units which condition their appearance (see [Kuryłowicz 1960: 31 = Kurilovič 1962: 43]; cf. [Trubetzkoy 1977: 254f. = Trubeckoj 1960: 316]). If in the flow of [Lithuanian] speech we hear the syllable [baŋ…], we expect to hear further only [g] or [k], since [t], [d] or any another sound is impossible after [ŋ]. If we hear the syllable [n̂æ·], we expect to hear only a hard, rather than soft, consonant. Even if we do not clearly hear what follows a strongly labialized [d˚], we can be almost certain that it was [u·], rather then [a] or [a·]. Thus allophones increase the redundancy of language; they make it more resistant to noise and to interference of a psychological nature.[48] If, for example,

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[48] That a lack of language redundancy can seriously impede communication is illustrated by this excerpt from Book IV of Adam Mickiewicz's *Pan Tadeusz*:

> *Domeyki i Doweyki wszystkie sprzeciwieństwa*
> *Pochodziły, rzecz dziwna, z nazwisk podobieństwa*
> *Bardzo niewygodnego. Bo gdy w czas sejmików*
> *Przyjaciele Doweyki skarbili stronników,*
> *Szepnął ktoś do szlachcica: "Daj kreskę Doweyce!"*
> *A ten nie dosłyszawszy dał kreskę Domeyce.*
> *Gdy na uczcie wniósł zdrowie marszałek Rupeyko:*
> *"Wiwat Doweyko!" – drudzy krzyknęli: "Domeyko!"*
> *A kto siedział w pośrodku, nie trafił do ładu,*
> *Zwłaszcza przy niewyraźnej mowie w czas obiadu.*

(Mickiewicz A. Pan Tadeusz. Warszawa: Czytelnik, 1979. P. 129).

"All the animosities of Domejko and Dowejko proceeded, strange to say, from the very unfortunate similarity of their names. For when, at the time of the district diets, the friends of Dowejko were recruiting partisans, some one would whisper to a gentleman, 'Give your vote to Dowejko'; but he, not hearing quite correctly, would give his vote to Domejko. Once when, at a banquet, the Marshal Rupejko proposed a toast, 'Vivat Dowejko', others shouted 'Domejko'; and the guests sitting in the middle did not know what to do, especially considering one's indistinct speech at dinner time" [Mickiewicz, A., Pan Tadeusz; or The last foray in Lithuania; a story of life among Polish gentlefolk in the years 1811 and 1812 / Translated by George Rapall Noyes. London, Toronto: J. M. Dent & Sons, Ltd.; New York: E. P. Dutton & Co, 1917. P. 118; the English translation replaces the Lithuanian one in the original text—TRANS.]

due to noise or distraction, we were to hear only the incomplete sound sequences [baŋ…à], [d˚…r̂ę·], we would still understand that the words *bangà* 'wave' and *dŭ̃rė* 'stab-3PST' had been uttered: the missing phonemes are "suggested" by the allophones [ŋ], [d˚] and by prior experience, which would rule out the words **bankà* or *dõrė* 'dory'. Therefore, in speaking rapidly (so-called *allegro* speech style), phonemes are sometimes realized only by certain allophones of other phonemes. Compare the North Žemaitic words in their "normal" pronunciation *mǫndrǫ̂.ms* "*mandrùmas*" 'cunning, slyness', *dę̃.ŋ.gdâ.ms* "*deñgdamas*" 'while covering' and their allegro variants *mǫ·drǫ̂.ms*, *dę̃.ŋ.dâ.ms*: the phonemes /n/ and /g/ in the second case are suggested only by the nasalized vowels [ǫ·], [ę̃] and the velar [ŋ] (cf. [Trubetzkoy 1977: 56 = Trubeckoj 1960: 70]). In rapid speech in standard Lithuanian as well, we sometimes say [p̂æŋ̃.tas] "*peñktas*" 'five', [d̂iŋ̃.dawo·] "*diñgdavo*" 'disappear-3PST.FREQ'; the phonemes /k/, /g/ are in this case indicated by the velar articulation of [ŋ].

Such phenomena are frequent in the word collocations of certain dialects. Thus in more rapid and casual speech, speakers of North Žemaitic often omit the syllables in parentheses in utterances such as *ǫns_mȧ.(tᵃ) tàv̂ì* "*anàs mãto tavè*" 'he sees you' and *ǫns_mȧ.(tᵉ) tàv̂ì* "*anàs mãtė tavè*" 'he saw you', but the sentences nevertheless do not become homonymic: the *mȧ.-* of the first sentence preserves the lower timbre which it has before *-ta*, while the *mȧ.-* of the second sentence preserves the higher, rising timbre which it has before the high-pitch syllable *-tę*; these are heard as if *ǫns_mȧ.ᵃ tàv̂⁽ⁱ⁾ : ǫns_mȧ.ᵉ tàv̂⁽ⁱ⁾* [Girdenis, Kubiliūtė-Kliukienė 1982: 37 (= Girdenis 2000c: 265f.)]. Thus, in certain cases, allophones can even stand in for phonemes which are not pronounced as separate sounds (cf. also § 81). Russian linguists, for example, have quite conclusively demonstrated that the softness of many Russian consonants is shown by the raised ("sharped") allophones of adjacent vowels (for example, [Bondarko, Verbickaja 1965; Bondarko, Zinder 1966; Bondarko 1966; 1977: 85–86; 1981: 30]). Preliminary experiments would show that a similar situation also exists in Lithuanian.[49]

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[49] Some linguists are even inclined to use the special term *quasi-phoneme* for allophones which often perform the role of phoneme substitutes or boundary signals (for example, [Linell 1979: 98, 172 and references]).

It should also be noted that allophones play an especially important role in diachronic processes, since they are often the prime agents in these processes. It is always allophones which change first; phonemic changes only generalize the results of allophonic developments (see [Steblin-Kamenskij 1966; Hoenigswald 1966: 73ff.; Kuz'menko 1969; Anttila 1972: 58–59; Bynon 1979: 20ff.; Voronkova 1981: 72]).

§ 68. Units of the content plane—morphemes—sometimes also have variants similar to allophones. They are given the similar term allomorph (Gk. ἄλλος 'other', μορφή 'shape') [Glison 1959: 103; Hammarström 1966: 38; Hockett 1968: 314–315; Matthews 1974: 83; Švedova 1980: 125–126]. For example, the present and past tenses of the verbs *drěksti* 'scratch, tear-INF', *võgti* 'steal-INF' differ not only in their endings, but also in having dissimilar root allomorphs: *drěsk-ia* : *drěsk-ė*, *vãg-ia* : *võg-ė*. Here the basic marker of the past tense, the ending -*ė*, implies the vowel alternation $e \rightarrow ė$, $a \rightarrow o$. The root allomorphs with -*ė*-, -*o*- thus reinforce the ending -*ė*, the morpheme which triggers the alternation in question. There is a similar relationship between the German forms *Buch* 'book' : *Bücher* 'books', *Plan* 'plane' : *Pläne* 'planes', in which the plural markers -*er*, -*e* are reinforced by a vowel alternation (more precisely, they are distinguished by allomorphs of the morphemes {bu:x-}, {pla:n-}). Thus allomorphs occupy more or less the same place in grammar as allophones do in a phonological system, and their functions are analogous [Kuryłowicz 1960: 27ff. = Kurilovič 1962: 37ff.].

Also reminiscent of the positional variation of phonemes is the syntactic phenomenon of agreement, as a result of which, for example, Lithuanian adjectives necessarily acquire certain grammatical features of the corresponding nouns. Agreement (for example, *gerų vaikìnų* 'good-boys-GEN.PL') can be illustrated by the quite "phonological" formula:

$$\{+\text{ adjective}\} \rightarrow \left\{ \begin{array}{l} -\text{ feminine} \\ +\text{ plural} \\ +\text{ genitive} \end{array} \right\} \Big/ - \left\{ \begin{array}{l} +\text{ noun} \\ -\text{ feminine} \\ +\text{ plural} \\ +\text{ genitive} \end{array} \right\}$$

Using the symbols α and β for alternative expressions, we get this somewhat more flexible version of the formula:

$$\{+\text{ adjective}\} \rightarrow \left\{ \begin{array}{l} \alpha \text{ feminine} \\ \alpha \text{ plural} \\ \beta \text{ genitive} \end{array} \right\} \Big/ - \left\{ \begin{array}{l} +\text{ noun} \\ \alpha \text{ feminine} \\ \alpha \text{ plural} \\ \beta \text{ genitive} \end{array} \right\}$$

Cf.: *liñksm-as vaĩk-as* 'cheerful-child-NOM.SG.M', but *ger-à mergáit-ė* 'good-girl-NOM.SG.F', *linksm-íems vaik-áms* 'happy-child-DAT.PL.M', but *ger-óms*

*mergáit-**èms*** 'good-girl-DAT.PL.F'. The inflectional properties of the adjectives shown in the formula depend just as slavishly on the corresponding properties of the noun as a dorsal articulation of /n/ does on a following /k/ or /g/. The basic function of agreement is likewise similar to that of positional variation; agreement also increases the redundancy of language and reinforces those grammatical phenomena which trigger it.

4. SYNTAGMATIC IDENTIFICATION OF PHONEMES

a) GENERAL REMARKS

§ 69. In investigating the principles of the paradigmatic identification of phonemes, we did not pose or discuss the question of segmenting a text—breaking it down into individual sounds. We tentatively assumed that the boundaries between sounds were self-evident. We were able to do this because all languages have many sound sequences in which decomposition raises no doubts. Typological observations show that in all known languages and dialects, heterosyllabic (Gk. ἕτερος 'other', συλλαβή 'syllable') sound sequences function only as phoneme sequences; likewise for sequences consisting of clear vocalic and consonantal segments ([ap], [at], [ak], [us] and others) or consonantal and stressed vocalic segments ([pà], [tà]), fricative and plosive consonantal components ([st], [sk], [xt]…), sequences of various hetero-organic consonants (those with different places of articulation: ([kt], [pt], [ks], [ps], [mt], [br], [sx]…); diphthongal sequences with an emphasized ("stressed") more close component ([aí], [aú]… , see [Pike 1947: 132]).

Our own linguistic intuition (also called Sprachgefühl or feel for language, cf. fn. 4), or that of an informant, also helps in singling out sound segments corresponding to the phonemes of a language in question. Speakers can often intuit which sounds or sound sequences in their native language or dialect are realizations of distinct phonemes, and which represent sequences of phonemes. Intuition, however, only allows us to formulate certain working hypotheses, which require a more objective verification. Special care must be taken with the linguistic feel of literate individuals, since it can be influenced by

the corresponding writing system; there is a tendency to consider as distinct sounds those stretches of speech which are represented in writing by a single character (cf. [Lüdtke 1970; O'Connor, Trim 1973: 258; Linell 1979: 197, fn. 41]; cf. also [Mol 1965], where the influence of writing is greatly exaggerated).[50] Therefore, even if we have reliable informants, we almost always encounter problems with the segmentation and syntagmatic identification of certain stretches of speech. In some cases they will be more complicated, in other cases simpler, but one rarely succeeds in avoiding them.[51]

b) TYPOLOGICAL PRELIMINARIES

§ 70. Among vowel sequences, problems of segmentation most often involve diphthongs, that is, tautosyllabic syllabic sounds with an appreciable change in articulation ([ai], [au], [ei], [iɛ], [uᵒ], [iᵒ], etc.), as well as long, nasalized, and glottalized vowels, that is, sounds of the type [aː], [iː] (= [ā], [ī]), [ą], [ę] (= [ã], [ẽ]), [a'], [e']. In some phonological systems, diphthongs function as independent vocalic (or diphthongal) phonemes, in others as sequences of the corresponding phonemes (for example, [au] = /a/ + /w/ or /a/ + /u/, cf. the change in views regarding German diphthongs: a) [Trubetzkoy 1977: 51 = Trubeckoj 1960: 63]; b) [Morciniec 1958; 1968: 34ff.; Heike 1972: 43–44; Meinhold, Stock 1982: 43–44]; c) [Glušak 1966: 379–382; Trost 1966; Philipp 1974: 20]). Long vowels may be either sequences of the same two phonemes (for example, [aː] = /a/ + /a/), or realizations of independent long or tense vowel phonemes (for example, [aː] = /ā/), or the simultaneous combination of a "neutral" vowel and a length prosodeme ([aː] = /a/ + /ˉ/). Glottalized vowels (pronounced more or less like Žemaitic or Latvian long vowels with broken tone: Žem. *dâ·kts* "*dáiktas*" 'thing', *pû·s* "*pùs*" 'will rot', Latv. *âzis* 'goat',

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[50] But the intuition of semi-literate people and children just learning to read and write can be very interesting (see § 72 below).

[51] In Harris's *Structural Linguistics*, segmentation (that is, syntagmatic identification) is set forth as the first procedure of phonological analysis [Harris 1963: 25ff.], but adhering to such a method is hardly possible in practice. Harris indirectly demonstrates this himself, since in the book's final paragraphs devoted to phonology [Harris 1963: 90ff.] he has to return to syntagmatic identification, adopting the additional procedure of *rephonemicization*.

bûs 'will be') may be sequences of a vowel and glottalic consonant (a phoneme or allophone) ([a'] = /a/ + /'/, [a'] = /a/ + /k/, cf. § 63), a simultaneous combination of a vowel and a certain prosodic unit (cf. Latvian broken tone and Danish *stød* in cases like *hus* [huː's] 'house', see § 251), or an independent vowel phoneme with the distinctive feature of glottalization ([a'] = /a'/ or /â/) (creaky voice, as in Chukchi, see [Mel'nikov 1948: 208ff.]). Nasalized vowels may be independent nasal phonemes or sequences of the corresponding simple vowel phoneme and a nasal consonant phoneme (that is, [ą] = /ą/ or /ã/, or [a] = /a/ + /n/ or /a/ + /ŋ/, see, for example, [Pike 1947: 140; Glison 1959: 256; Morciniec 1968: 77]). Hence, there are cases where a vocalic sequence may be the realization of a single phoneme, and cases where a single vocalic segment may represent a sequence of phonemes or a combination of a vocalic phoneme and a prosodic unit.

§ 71. Among consonant sequences, most problematic are various affricates (complex sounds of the type [ts], [tš], [pf], [kx], cf. [Pike 1947: 131; Glison[52] 1959: 254 and 256]), geminates (sequences of the type [rr], [ll] or [rː], [lː]), syllabic sonorants (sounds of the type [l̩], [r̩], cf. Cz. *prst* 'finger', *krk* 'neck', Ger. *Vogel* ['foːgl̩] ‖ ['foːgəl] 'bird', cf. [Trager 1942; Wells 1965] and [Morciniec 1968: 83ff.; 1971]), glottalized, aspirated, and preaspirated segments (sounds of the type [ˀt], [tˀ], [tʰ], [ʰt] or [t'], ['t] [Pike 1947: 131]), consonants with supplementary timbre characteristics (i.e., palatalized and palatal, labialized, in part also hushing sibilants, for example, [t̂], [ŝ], [ṭ], [ḳ], [t°], [k°], [š], [ž] and others [Glison 1959: 254; Harris 1963: 95–96; Stepanov 1974]), velar nasals ([ŋ]-type sounds; [Strimajtene 1976: 8–11 and references]), nasalized (faucal) and lateral [b^M], [d^N], [d^L]-type affricates [Pike 1947: 131; Glison 1959: 254], and retroflex consonants ([t], [ḍ] and others; cf. the issue of Norwegian cacuminals [Steblin-Kamenskij 1981] and [Fretheim 1981]). For example, the affricate [tš] may be either an independent phoneme, or a realization of sequences of the type /t/ + /š/ or even /t/ + /j/ [Hockett 1955: 161; Harris 1963:

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[52] Gleason [Glison 1959: 256] even somewhat dogmatically claims that it would be more correct on the whole to interpret affricates as sequences of phonemes. If this were in fact the case, the never-ending discussion on German affricates would be incomprehensible; cf. [Karosienė 1983 and references] (for more arguments, see § 79, 120).

96, fn. 14]. The following can function either as separate phonemes or as phoneme sequences: syllabic sonorants (for example, [r̥] = /r/ or /ə/ + /r/), aspirates ([tʿ] = /t/, /tʿ/ or /t/ + /h/), palatals, soft and hushing sibilants ([š] = /š/ or /s/ + /j/, [l̂] = /l/ + /j/ or /l̂/). Velar [ŋ] can be either an allophone of the phoneme /n/, or a realization of the sequence /n/ + /g/ (cf. fn. 40), or an independent phoneme /ŋ/. Retroflex consonants can represent sequences of the type /rt/ or separate phonemes (as in many Indic languages, for example, [Toporov 1967: 185ff.]). In some exotic languages, even the syntagmatic identification of sequences of the type [mb], [ŋg] or [kp], [gb] can be problematic, since there are phonological systems in which such combinations function as independent prenasalized or labiovelar consonantal phonemes, rather than as sequences [Pike 1947: 131].

§ 72. Of course, this list by no means includes all cases for which a twofold syntagmatic interpretation is in principle possible. It only mentions more typical, frequent, and striking examples taken from previous works, and only illustrates the kinds of problematic situations that can arise. In studying concrete languages and dialects, we can always encounter previously unnoticed, suspect sound sequences. In such cases, we undoubtedly need to be guided not so much by a dogmatically memorized list of precedents, as by general principles of phonology.

c) PHONETIC PRELIMINARIES

§ 73. The following are phonetic properties on the basis of which we may hypothesize that a certain sound or sound combination represents a sequence of phonemes [Trubetzkoy 1977: 50–53 = Trubeckoj 1960: 62–66]):

a) an unusually great articulatory duration, appreciably exceeding the duration of undisputed single-phoneme segments;

b) a non-uniform articulation, or a non-fluent change of position of the speech organs;

c) the belonging of individual parts of a segment to more than one syllable (heterosyllabic articulation).

§ 74. Of these properties, only the third (c) is sufficient grounds for considering a suspect sound or sound combination a phoneme

sequence (but cf. [Gordina 1966: 174]): parts of a single phoneme cannot belong to different syllables.[53] Based on this criterion, or, more precisely, on typological near-universals (on this concept, see [Serebrennikov 1974: 54]), the Finnish affricate [ts], for example, must be considered a phoneme sequence, since its components always belong to separate syllables: *itse* ['it-se] 'oneself', *metsä* ['met-sɛ] 'woods'. The fact of individual components belonging to different syllables forces us to divide into separate phonemes the Lithuanian heterosyllabic sequences [iị], [uụ], [aụ], often heard in such forms as *gijimas* [ĝi-iìmas] 'healing (of a wound)', *bùvo* [bˑù-ụoˑ] 'be-3PST', *gãvo* [gã̃-ụoˑ] 'get-3PST' (cf. [Vaitkevičiūtė 1957: 57–58; Mikalauskaitė 1975: 42]), and also heterosyllabic sequences of the type [t-s], arising at morpheme boundaries, for example: *atšóvė* [at-šˇóˑv̂ệˑ] 'retort-3PST', *àtzyzė* [àd-ẑi·ẑệ·] 'come buzzing-3PST'[54] (cf. [Ekblom 1925: 60; Mikalauskaitė 1962; Vaitkevičiūtė 1964: 9; Strimaitienė 1974a], with Žemaitic dialectal data: [Kubiliūtė, Girdenis 1977 (= Girdenis 2000c: 69ff.)]).

We can claim with a high degree of probability that every heterosyllabic sound sequence represents a phoneme sequence. However, the opposite claim would not be true. Far from every tautosyllabic sequence of sounds is the realization of a single phoneme, cf. Lith. ***skrãbalas*** 'wooden bell', ***sučir̃kš*** 'chirp-3FUT', where the characters in bold represent tautosyllabic sequences of three phonemes. In terms of modern logic (see, for example, [Kondakov 1975: 193]), we can say that the proposition "*x* is a single phoneme" implies the proposition "*x* belongs to a single syllable." Denoting the first proposition as *p* and

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[53] But cf. standard Latvian, where voiceless obstruents are pronounced as geminates in positions of the type [V̆—V̆#]: *mati* ['mat-tⁱ] 'hair', *upe* ['up-pᵉ] 'river' [Laua 1980: 52ff.]. But firstly, geminates here are already eliminated by paradigmatic identification, since they are in complementary distribution with corresponding simple consonants; cf. the dative plurals *matiem* ['matiẽm], *upēm* ['upẽːm]. Secondly, this is a rare, geographically limited phenomenon [Lekomceva 1974: 232–233].

[54] It is true that in some dialects and in varieties of the standard language associated with these, "pure" affricates are also pronounced in such cases: *ačˇóˑv̂ệˑ*, *àẑiẑệ·* (see, for example, [Pupkis 1966: 107]). In *allegro*-style speech, this is apparently a universal phenomenon: in this style, even Polish *trzy* 'three' can merge with *czy* 'whether' (Michał Hasiuk, personal communication; cf. § 78).

the second as *s*, we get $p \supset s$ (here " $\supset$ " indicates a material implication).[55] Applying the law of contraposition (or tautology), we can derive from this proposition a new one: $(p \supset s) \equiv (\neg s \supset \neg p)$, that is, "if *s* does not belong to a single syllable, it is not a single phoneme." Since from $p \supset s$ we cannot derive either $s \supset p$ or $\neg p \supset \neg s$, it is clear that the fact that sounds belong to a single syllable does not demonstrate that they represent a single phoneme. It is also clear that a sequence of phonemes is not necessarily heterosyllabic. But the fact of not belonging to a single syllable quite convincingly indicates that a certain sound sequence is represented by a sequence of phonemes, rather than by a single phoneme.

It is precisely in this way, it seems, that we need to understand the first rule of syntagmatic identification formulated by Trubetzkoy [Trubetzkoy 1977: 50–51 = Trubeckoj 1960: 63].

Special attention should be given to these issues, since even leading phoneticians are sometimes confused here. There have been occasional attempts to demonstrate that diphthongs in a given language are single phonemes, based on the fact that their components always belong to the same syllable (among the works of Lithuanianists, cf. [Vaitkevičiūtė 1961: 39; Ulvydas 1965: 57]; for critical remarks, see [Girdenis, Žulys 1973: 207 (= Girdenis 2000b: 375f.)]). But this cannot be demonstrated in this way, since, as we have just made clear, tautosyllabicity is a necessary but *insufficient* condition for considering a sound sequence a single phoneme.[56]

§ 75. The other two premises (*a* and *b*) have only a heuristic, rather than probative, value (for example, [Glušak 1966: 382–383; Gordina 1966: 174; Martinet 1970: 355]). Like the lists in § 70–71, they only allow us to suspect, to guess, that certain sounds or sound sequences represent phoneme combinations. Such suspicions are most often confirmed, but by far not always.[57] Thus in Polish, the duration

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[55] This symbol is more appropriate in a linguistics text, since the usual arrow (" $\rightarrow$ ") has an entirely different meaning in linguistics. The symbol " $\equiv$ " denotes equivalence, the symbol " $\neg$ " negation.

[56] Behind this fallacious reasoning is the impossible "law" of logic $*(p \supset s) \equiv (s \supset p)$.

[57] These arguments have also been used to demonstrate that Lithuanian diphthongs are single phonemes [Ulvydas 1965: 57]).

In this case, we must agree with Trubetzkoy's critics, since he was convinced that these phonetic properties also have sufficient probative force [Trubetzkoy 1977: 51–53 = Trubeckoj 1960: 64–66].

of the voiceless affricates [ts], [tš], [tś] is considerably greater than that of other consonants pronounced under the same conditions [Richter 1976: 222–223],[58] but more serious phonological arguments show that in the system of that language, they play the role of independent phonemes /c/, /č/, /ć/, rather than sequences of the type /t/ + /s/ (see in greater detail § 78).

The same can be said regarding the criterion of uniform vs. non-uniform articulation. If the articulation of a sequence of sounds noticeably lacks fluency and uniformity, the suspicion that it represents a phoneme sequence always arises, and justifiably so. But this suspicion must be substantiated by more weighty phonological arguments. The opposite property—fluency and continuity in a change of articulation—has of course even less probative or even heuristic value: a phoneme sequence is also often realized with a smoothly changing articulation; if it were otherwise, approximately "the same" sounds could not be single phonemes in some languages and biphonemic units in others (see § 70–71 and references).

§ 76. Thus, the fact that a sound or complex of sounds belongs to two syllables reliably shows that it represents a phoneme sequence. An unusually great duration of a sound or sound sequence, or a discontinuous, non-fluent change in articulation suggests that segments in question may represent phoneme sequences, but does not have greater probative force. Nevertheless, the value of these phonetic premises is not insignificant, since they allow us to formulate important working hypotheses for further investigation.[59]

Stretches of sound which satisfy these premises are further treated as suspected segments and are carefully checked and evaluated using phonological criteria of syntagmatic identification. In checking,

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[58] The same is more or less true of Lithuanian (see [Tankevičiūtė 1981: 114 et passim], only the question of the phonemic composition of the affricates is more complicated here (cf. § 79).

[59] In addition to the above-mentioned phonetic criteria, a sort of "mechanical permutation" was once proposed: to treat as single phonemes only those segments which, when heard in reverse on mechanical or tape recordings, also sound like a single sound [Tanakadate 1937: 359]. Phonologists have not bothered to consider this "method," since it is quite clear that in applying it, we could establish only the phonetic composition of concrete acts of speech, rather than phonological units (cf. § 12).

we usually follow two general preliminary assumptions, which we could call (a) the principle of minimal inventory, and (b) the principle of maximally regular relations. In observing principle (a), we try to break down as many suspect segments as possible, and in this way obtain the smallest list, or inventory, of phonemes. The second principle, (b), requires us to interpret the suspect segments in such a way that a description of phoneme combinations and their relations would be as simple and elegant as possible. Since the structural (and therefore also phonological) study of language is first and foremost an investigation of its characteristic relations, in critical cases preference is given to the second principle (see [Bulygina 1980: 140]).[60] Of course, only those phonological solutions which consider both inventory and relations would be optimal. Therefore, both a syntagmatic and paradigmatic identification of phonemes can and should be verified after phoneme relations (and those of other phonological units) have been examined. Unwieldy, inelegant, or contradictory rules for the structure of phoneme sequences most often indicate an imperfect identification of phonemes, which needs to be refined.

d) PHONOLOGICAL PRINCIPLES

§ 77. The most general rule of syntagmatic identification, which logically follows from the above-mentioned first principle (§ 76, (a)), is that suspect segments are considered phoneme sequences whenever possible. We refrain from dividing them further only when this allows us to describe the phonological system in question more logically, consistently, and systematically. In so doing, we satisfy the principle of minimal inventory.

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[60] Therefore, adherents of glossematics behave quite inconsistently in treating language as a system of pure relations but, in establishing phonemes, follow, as it were, only the principle of minimal inventory and therefore often obtain unbelievably complicated syntagmatic "taxeme" relations (see, for example, [Hjelmslev 1936–1937]; cf. [Murat 1964: 171–172; Fischer-Jørgensen 1975: 133–135 and references]). A similar (but not as clear or principled) position is taken by a few descriptivists (for example, [Harris 1963: 90ff.]). Most adherents of this school give priority to pattern congruity and in general to functional considerations (see [Pike 1947: 131ff.; Hockett 1955: 159ff.]; cf. also [Swadesh 1937: 10]).

§ 78. There are quite a few cases where suspect segments cannot in principle be further broken down, that is, they cannot be considered realizations of phoneme sequences.

1. We do not break down a suspect segment if there is a phonological opposition between that segment and a similar undisputed sequence (hence, if replacing the suspect segment with a clearer sequence changes the meaning of the word): Pol. *czy* [čы] 'whether' : *trzy* [tšы] 'three', *Czech* [čex] 'Czech' : *trzech* [tšex] 'three-GEN', *oczyma* [očыma] 'eye-INS.PL' : *otrzyma* [otšыma] 'obtain-3SG.FUT', *paczy* [pačы] 'warp-3SG.PRS' : *patrzy* [patšы] 'look-3SG.PRS', where [č] ≠ [tš], and therefore /č/ is unquestionably a separate phoneme [El'mslev 1960b: 326–327; Šaumjan 1962: 106; Martinet 1970: 352], or Fr. *bon* [bɔ̃] 'good-M' : *bonne* [bɔn] 'good.F', *grain* [gʀɛ̃] 'grain' : *graine* [gʀɛn] 'seed', *chien* [šjɛ̃] 'dog' : *chienne* [šjɛn] 'bitch', where the nasals /ɔ̃/, /ɛ̃/ must be considered independent phonemes, contrasting with the clear sequences /ɔ/ + /n/, /ɛ/ + /n/ (cf. [Ščerba 1955: 50ff.; Trubetzkoy 1977: 111 = Trubeckoj 1960: 138; Jakobson, Fant, Halle 1972: 39, 52; Hyman 1975: 15]).[61]

2. Nor can a suspect segment be broken down if, in so doing, we would get at least one component which cannot be considered an allophone of a phoneme used outside of this sequence. For example, in word-initial position in Polish dialects, there occur sequences such as [b′γ′], [p′x′] (for example, [b′γ′åły] = standard *biały* 'white', [p′x′ivo] = standard *piwo* 'beer', see [Urbańczyk 1968: 34]), which from the standpoint of articulation are undisputed sound sequences, but must be considered realizations of the phonemes /b′/, /p′/, since in these dialects there are no independently occurring phonemes */γ′/, */x′/. The Spanish affricate [tš] is also treated as a single phoneme /č/ (for example: *chacha* ['tšatša] 'nanny', *mucho* ['mutšo] 'much'); the alveolar [t̬] articulated in this sequence could be considered an allophone of the phoneme /t/, but the second component, [š], would have no clear counterpart in usage, since the language lacks the phoneme /š/ [Trubetzkoy 1977: 54 = Trubeckoj 1960: 67; Achmanova 1966: 32, 41; Martinet 1970: 350–351]. It would be meaningless to

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[61] There are alternative interpretations, for example: *bon* [bɔ̃] = /bɔn/, *bonne* [bɔn] = /bɔnə/ [Koefoed 1967: 50; Ruhlen 1974; Fischer-Jørgensen 1975: 88], but in fact these are not phonological, but morphological (or generative) solutions.

break down the Lithuanian sound sequences [ər], [rə], often pro-
nounced in words of the type *draũgas* 'friend', *var̃das* 'name' (i.e.,
[dəråũ.gas], [var̃ədas]);[62] the component [ə] is used only in these
"combinations," and therefore cannot be considered an independent
phoneme /ə/. Hence [ər] = [rə] = /r/. This interpretation is also
supported by the intuition of Lithuanian speakers; the intervening [ə]
can only be heard after long phonetic training.[63]

3. Nor is a suspect segment broken down if doing so would
result in phoneme sequences which are not characteristic of the
language in question, and are realized only in the segments being
analyzed. For example, we cannot consider as sequences of the type
/t/ + /s/ the affricates of standard Chinese, written in the Latin alphabet
z, *c*, *zh*, *ch* (≈ [tz], [tsʿ], [tž], [tšʿ]): *zài* [tzài] 'again' : *cài* [tsʿài] 'food',
zǐ [tzǐ] 'son' : *cǐ* [tsʿǐ] 'this', *zhǎng* [tžǎŋ] 'palm (of hand)' : *chǎng*
[tšʿǎŋ] 'workshop', *zhái* [tžái] 'residence' : *chá* [tšʿá] 'tea'),[64] since
this language lacks other consonant sequences except for those of the
type *C* + *i̯*, *C* + *u̯*. The sounds in question clearly represent independent

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[62] An especially salient [rə] = /r/ has been observed in certain word positions
in northern Panevėžys dialects (for example: *p̂ör̥ʾəštᵇs* "*pirštùs*" 'finger-ACC.PL',
var̥ʾədᵇs "*vardùs*" 'name-ACC.PL.' [Kačiuškienė, Girdenis 1982 (= Girdenis
2000c: 268ff.)]. But this can perhaps be found in all dialects which concentrate
circumflex pitch accent on the second element of a diphthong: *łabã.i̯. bṳwoˑ
war̥ᵒgas* "*Labaĩ bùvo var̃gas*" 'There was great hardship' (Alvitas), *ŝker̃ᵉẑuş
bṳwoˑ i̯ir̯t̃r̃i̯s p̂íeṃeṇi.ş bứdawṵ* "*Sker̃džius bùvo ir trỹs p̂íemenys bứdavo*"
'There was a herdsman and three shepherds' (Daukšiai), *ir̃˘ver̃ˣšuˑ i̯.ká.r̃v̥uˑ bṳoˑ
m̃elẑemũˑ k̥.l̥oˑs* "*Ir veršiũ, i(r) kárviũ bùvo melžiamũ kẽlios*" 'There were calves
and several dairy cows' (Gižai), *jæu̯ pamĩr̃ᵒšus b̥e(t)˘dá˘v̥iska. supra.n.tṳ* "*Jaũ
pamiršus, bet dá(r) viska suprantù*" 'I've forgotten, but I still understand every-
thing' (Vižainys), and even *v̥iskaˑ dal̃ᵉg̥eis p̂jé˘udao*. "*Viska dal̃giais pjáudavo*"
'They would mow everything with scythes' (Gižai), *pat̥i̯l̃ᵉp̂ŝi̯t* "*patilpsit*" 'You
will fit' (Kazlų Rūda) [Girdenis, Židonytė 1994: 136 (= Girdenis 2001: 149), fn.
37].

[63] In light of what has been said in this section, the attempts of some Polish
linguists to interpret the nasalized vowels of that language as combinations of
the type *V* + /w/ or *V* + /ŋ/ seem quite unsuccessful (even implausible), since the
"phonemes" */w/ and */ŋ/ are used only in these sequences (see [Biedrzycki
1963; Łobacz 1973: 56–57]).

[64] The transcriptions [tz], [tž] (like Russian notations of the type *цз*, *чж*) are
approximate. In fact these affricates are "semi-voiced," that is, lenis voiceless
sounds.

phonemes /ʒ/, /cʽ/, /ǯ/, /čʽ/. The Japanese affricates [ts], [dz] = /c/, /ʒ/, etc., also function as single-phoneme units (monophonemes): *chijimu* [tśidźimu] 'shrink-INF', *chōchō* [tśoːtśoː] 'butterfly', *hitsuji* [çitsudźi] 'ram', *jūjika* [dźuːdźika] 'cross'. Consonant sequences are completely alien to this language; they are broken up even in borrowings from European languages: *hirumu* 'film', *kurabu* 'club' (← Eng. *club* [klʌb]), *madorōsu* 'sailor' (← Du. *matroos*), *purofesionaru* 'professional', *puroguramu* 'program' (see [Polivanov 1968: 237–242; Trubetzkoy 1977: 57 = Trubeckoj 1960: 71]).[65]

§ 79. Lithuanian has various consonant sequences, but its affricates [tš̂], [dž̂], etc., are also difficult to break down into sequences of the type /t/ + /š̂/ (see [Pupkis 1966a: 116–117]; cf. the unsuccessful attempts at alternative interpretations: [Girdenis 1971b: 28 (= Girdenis 2000b: 219; Garšva 1982: 66]). Such an operation would yield *C* + *š*-type sequences, which are not characteristic word-initially (see § 107ff.), and would very much complicate medial consonant clusters (cf. words such as *pur̃kščiau* 'spray-1SG.SBJV', where, if we break down [tš̂] into /t̂/ + /š̂/, we would have the abnormally complex cluster /r̃kš̂t̂š̂/, quite contrary in its structure to the typical structural model of medial clusters (see § 119–120). Also preventing a decomposition of the affricate is the fact that the second component of [tš̂], [dž̂] (the most frequent and regular sounds of this type) cannot be excluded in a key position, before a back vowel: alongside *gūdžių̃* 'dreary-GEN.PL' we have *gūžių̃* 'crop (of a bird)-GEN.PL', alongside *tačiaũ* 'nevertheless', *tašiaũ* 'hew (wood)-1SG.PST', but **gūdių̃* or **tatiaũ* are impossible (cf. [Šaumjan 1962: 105]).

It should also be noted that if we disregard onomatopoeia and words of foreign origin, the affricates [tš̂], [dž̂] of standard Lithuanian and many dialects can almost be considered realizations of the soft phonemes /t̂/, /d̂/, since affricates and soft [t̂], [d̂] are in complementary distribution (see table 8): [tš̂], [dž̂] are used only before back vowels (position 1) and [t̂], [d̂] before front vowels and soft consonants (positions 2 and 3).

This interpretation would be quite convenient in that it eliminates a gap in the system of plosives (see § 134); if we interpret affricates in some other way, the phonemes /p/, /b/ and /k/, /g/ will have soft correspondents /p̂/, /b̂/ and /k̂/, /ĝ/,

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[65] Cf. also the remaking of similar borrowings in Yoruba, also characterized by the lack of consonant sequences: *bíríkì* (← Eng. *brick*), *fíríì* (← Eng. *free*), *gíláàsì* (← Eng. *glass*), *kóbù* (← Eng. *cup*).

Table 8. Distribution of the Lithuanian affricates [tŝ], [dẑ] and soft [t̂], [d̂]
in non-borrowed words

Sounds	Positions			Interpretation
	[Vᵘ—]	[Vⁱ—]	[—Ĉ]	
	1	2	3	
[tŝ]	+			/t̂/ (?)
[t̂]		+	+	
[dẑ]	+			/d̂/ (?)
[d̂]		+	+	

while /t/, /d/ lack them. However, this solution forces us to reject a large number
of words widely used in the present-day language (with affricates before front
vowels and consonants: *Čekỹs* [surname], *dìčkis* 'large, stocky person',
plãčkelnės 'wide trousers', cf. also *tiùlis* 'tulle', *Matiùkas* [proper name], etc.),
and therefore it in fact points to a somewhat earlier, rather than present-day,
picture of the Lithuanian phonological system (cf. [Girdenis 1972a: 187–190
(= Girdenis 2000b: 253–256); 1979–1980: 120–123 (= Girdenis 2000c: 165–
168)]). This is also shown by such forms as *svečiaĩ* 'guest-NOM.PL', *mẽdžiai*
'tree-NOM.PL', now pronounced with [tŝ], [dẑ] before a front vowel: [ŝvetŝẹ̃ĩ.],
[m̃ẽ·dẑẹi]. Thus the alternation [tŝ] : [t̂], [dẑ] : [d̂] now belongs to morphonology
(or directly to morphology), rather than to phonology; cf. [Girdenis 1979–1980:
122 (= Girdenis 2000c: 167); Ambrazas 1985: 33, 60f.; 1997: 28, 48f. (=
Girdenis 2001: 215, 236f.)]).

§ 80. Strictly speaking, a suspect segment should be considered
the realization of a phoneme sequence only if, in replacing its individ-
ual parts with other sounds or deleting them completely, we obtain
words differing in meaning, or, in Martinet's terms, if those parts are
commutable with other sounds or with zero (i.e., the absence of sound,
see [Martinet 1939; 1970: 347ff.]; among the small number of works
which adopt this method uncritically, cf. [Perebyjnis 1970: 17;
Muljačić 1973: 172–173 and references].

We could illustrate an ideal case of this sort with the sequences
[pr] and [kł] in Lithuanian. In replacing their individual components
with one another, we get words differing in meaning, such as *Prãnas*
[personal name] : *krãnas* 'crane' : *plãnas* 'plan' : *klãnas* 'puddle', and
in deleting one of the components we get words of differing meaning,
such as *prašýti* 'request-INF' : *rašýti* 'write-INF' : *pašýti* 'pull (at)-INF'
and *klója* 'spread-3PRS' : *lója* 'bark-3PRS' : *kója* 'foot, leg-NOM.SG'.
Thus [pr] = /p/ + /r/ and [kł] = /k/ + /l/. In performing a similar
operation with the English aspirates [kʻ], [pʻ], we would find that the

second element [ʻ] ≈ [h] cannot be deleted; there are no words in English pronounced *[kɪk], *[pɪk] and the like, and differing in meaning from normal [kʻɪk⁽ʻ⁾] = *kick*, [pʻɪk⁽ʻ⁾] = *pick*. In the best case, they would be perceived as examples of a foreign accent. This shows that English [kʻ], [pʻ] must be considered as phonemes /k/, /p/, rather than sequences.

In many cases, this criterion raises no doubts, but we cannot blindly rely on it. It is especially difficult to follow the first part consistently, which requires that both components of a suspect segment be commutable with other sounds. If we strictly observe this requirement, we would have to consider as separate phonemes, for example, German [šp], [št]: *Spaß* [špaːs] 'fun', *stehen* [ˈšteːən] 'stand', and English [sp], [st], [sk]: *speak* [spiːk], *stand* [stænd], *skate* [skeɪt], since their first component [š], [s] cannot be replaced by other consonants.[66] But such a conclusion would be at odds with the intuition of native speakers, reflected in the writing system, and would force one to ignore obvious rules governing consonant sequences. Commutation with zero can always be consistently applied; it does not lead to similar unacceptable conclusions, cf. Ger. *Stahl* [štaːl] 'steel' : *schal* [šaːl] 'insipid' : *Tal* [taːl] 'valley', Eng. *speak* [spiːk] : *seek* [siːk] : *peak* [piːk].

§ 81. Unquestionably representing biphonemic sequences are those suspect segments which are either optional or combinatory variants of similar phoneme sequences (see Trubetzkoy's seventh rule).[67] In these cases the biphonemic nature of the suspect sounds is established according to the same principles which lead us to consider different sounds as variants of a single phoneme.

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[66] Although it may be hard to believe, such "consistent" conclusions have in fact been made; see, for example, [Vogt 1981b: 216], where the Norwegian initial clusters [sp-], [st-], [sk-] are treated as composite phonemes, rather than sequences.

[67] It is interesting that neither Martinet (for example, [Martinet 1970: 347ff.]) nor Muljačić, who follows him completely (cf. [Muljačić 1973: 170]), says anything about this obvious case; Muljačić even directly states that Trubetzkoy's rules are outdated. In fact, we can say this only about some of the rules, but certainly not about all (ultimately, even "outdated" rules still have an undeniable heuristic value; see § 73–75 and [Glušak 1966: 383]).

1. We have already examined several examples (see § 67) which show that under certain conditions a single sound can be the realization of a phoneme sequence.

Let us compare in addition these North Žemaitic examples: *skǫndę̂.n* → <skǫ·dę̂.n>[68] = /skǫndę́n/ "*skandìna*" 'drown, sink-3PRS', *žǫ̂.nsłas* → <žǫ̂·słas> = /žǫ́nslas/ "*žą́slai*" '(horse) bit'. Their optional variants must be considered realizations of the same phonological unit, since they are acoustically similar and do not perform a distinctive function (they do not distinguish words). Of the two possible interpretations, [ǫ·] = [ǫn] = /ǫ·/ and [ǫ·] = [ǫn] = /ǫ/ + /n/, the second is more acceptable, since it satisfies the principle of minimal inventory and extends and normalizes phoneme distribution. Now /ǫ/ is possible also before tautosyllabic /n/, and /n/ in turn can occupy roughly the same positions as the related /m/, /l/, and /r/. Based on similar considerations, English and German syllabic [l̩], etc., often used alongside optional [əl]-type complexes, are considered sequences of the type /ə/ + /l/; cf. Eng. [ˈbɔtl̩] = [ˈbɔtəl] *bottle*, Ger. [ˈfoːgl̩] = [ˈfoːgəl] *Vogel* 'bird' (see [O'Connor, Trim 1973: 260, fn. 7; Wells 1965; Philipp 1974: 14, 35, 67 et passim; Meinhold, Stock 1982: 92–93]. For an interpretation of this sort for Norwegian sonorants, see [Borgstrøm 1981: 176]; for a radically opposite but hardly convincing view, see [Morciniec 1968: 77–78; 1971: 123ff.]).

2. Often suspect segments and similar clear sequences are in complementary distribution.

The Portuguese nasalized vowels (on possible interpretations, see [Pike 1947: 196ff.; Morais-Barbosa 1962; Katagoščina 1970: 56–71 and references])[69] are a classic example. These vowels contrast with non-nasals and perform a distinctive function in two instances: a) word-finally: *lã* [ła̧] 'wool' : *la* [ła] 'there', *dom* [dǫ] 'mister' : *dou* [do] 'I give', and b) before a non-plosive consonant, cf. *lanço* [ˈła̧su] 'a throw' : *laço* [ˈłasu] 'lasso'. Before the nasal consonants [n], [ŋ], [m], only nasalized vowels are possible: *campo* [ˈka̧mpu] 'field,

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[68] In formulas of this type, as already noted in fn. 30, the brackets "< >" mark optional variants (cf. [Labov 1972: 112]).

[69] We have availed ourselves here of consultations with Mafalda Tupė, who is proficient in Brazilian Portuguese. Nasalized vowels are transcribed with the symbols [a̧], [ǫ], more familiar to Baltists, rather than with the ambiguous [ã], [õ].

camp', *conto* ['kǫntu] 'tale', *longo* ['łǫ ŋgu] 'long'. In external juncture (so-called *sandhi*, Skt. *saṇdhi*), final nasals are replaced by corresponding [ą] + [n]-type sequences when the following word begins with a plosive: *lã tinta* [łąn 'tįntə] 'dyed wool', *lã cardada* [łąŋ kar'daðə] 'combed wool'. Sequences of the type [a] + [n], [ą] + [t], [ą] + [p], [ą] + [k] are quite impossible. The situation here is thus quite different from that of French, where such sequences exist. The sequences [ąn], [ąŋ], etc., are undoubtedly biphonemic /a/ + /n/-type clusters, since the /n/ occupies the same position as [r] and [ł], and the nasalization of the vowel is readily explained by the influence of the adjacent nasal consonant. These clear sequences and the related nasalized vowels are in complementary distribution (see table 9), which is especially nicely revealed in the alternation of [ą] : [ąn], etc., in external juncture (on the importance of juncture or external sandhi for phonology, see § 86 and references). In these circumstances, we must undoubtedly consider nasalized vowels combinatory variants of /ą/ + /n/-type sequences: [ą] = [ąn] = [ąŋ] = /a/ + /n/; [ǫ] = [ǫn] = [ǫŋ] = /o/ + /n/ ([dǫ] = /don/, [łą] = /lan/, [łąsu] = /lansu/).

Table 9. Distribution of Portuguese nasalized vowels and [an]-type sequences

Sounds	Positions					Interpretation
	[—#]	[—s]	[—$_d^t$]	[—$_g^k$]	[—$_b^p$]	
	1	2	3	4	5	
[a]	+	+	+	+	+	/a/
[ą]	+	+				/a/ + /n/
[ąn]			+			
[ąŋ]				+		
[ąm]					+	

It is easy to see that this interpretation satisfies both the principle of minimal inventory and the principle of maximally regular relations: in breaking down the nasalized vowels, phonemes of a very narrow distribution disappear; all vowels and /n/ become possible in all positions. This alone makes other interpretations of Portuguese vocalism unconvincing (for example, [Katagoščina 1970: 88]); pure phonetic considerations always yield to functional ones.

§ 82. A similar distribution is also characteristic of the "mixed" and "pure" diphthongs of Lithuanian and its dialects (see [Girdenis 1966a (= Girdenis 2000b: 309f.); 1971b: 25 (= Girdenis 2000b: 215f.);

Kosienė 1978: 33; Ambrazas 1985: 20f.; 1997: 22 (= Girdenis 2001: 208)]). Both are used only word-finally and before consonants: *gál* 'perhaps', *kuř* 'where', *sakaũ* 'say-1SG.PRS', *tuř̃gui* 'market-DAT.SG' (= *tuř̃guj* 'market-LOC.SG'), *káltas* 'chisel', *įkùrtas* 'founded', *draugáuti* 'be friends with-INF', *gùiti* 'drive-INF'. Before vowels, we find in their place similar heterosyllabic and therefore unquestionably biphonemic sequences of the type [a] + [ł], [a] + [v] (optionally also [a] + [u̯]), [u] + [j]): *gã-li* 'can-3PRS', *kù-ras* 'fuel', *drau-gãvo* 'be friends with-3PST' (also pronounced [drau-gã·-u̯o·]), *tuř̃-gu-je* 'market-LOC.SG', *gù-ja* 'drive-3PRS'.[70]

    Hence [ał] and [a-ł], [ur] and [u-r], [au] and [a-v] ([a-u̯]), [ui] and [u-j], etc., are in complementary distribution, as is easily observed and understood from the automatic alternation in question. As a result, no one to date has questioned that Lithuanian mixed diphthongs are combinations of the type /a/ + R (see table 10).

Table 10. Distribution of Lithuanian mixed diphthongs and corresponding heterosyllabic sequences

Sounds	Positions			Interpretation
	[—#]	[—C]	[—V]	
	1	2	3	
[ał]	+	+		/a/ + /l/
[a-ł]			+	
[ur]	+	+		/u/ + /r/
[u-r]			+	

    There is a broader range of views on pure diphthongs. First, it has been claimed on more than one occasion that they should all be considered separate phonemes [Vaitkevičiūtė 1961: 39 et passim; Ulvydas 1965: 57 et passim]; second, some proponents of a biphonemic interpretation of these sounds interpret their second component

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[70] In North Žemaitic, diphthongs in a final syllable split further into sequences of the type V + [j v] before an optional emphatic vowel (see § 17 and 66) and before the initial vowel of a following word: *matâ.u → matâ.-va* "*mataũ*" 'see-1SG.PRS', *tẽ·i → tẽ·-jə* "*tiẽ*" 'those', *ja-v͡atejê·* "*jau atėjaĩ*" 'You've already come', *anẽ·-j͡išvažô̭.-v͡į m͡ı̃est^a* "*Jiẽ išvažiúoja į miẽstą*" 'They are leaving for town'. It is interesting that this phenomenon was noticed as early as the beginning of the nineteenth century (see [Čiulda 1993: 265; Subačius 1993: 40]); it is also not completely alien to Southwest Aukštaitic speakers (cf. [Girdenis 1992a (= Girdenis 2001: 378]).

differently (cf. [Schmalstieg 1958; Kazlauskas 1966; Girdenis 1966a (= Girdenis 2000b: 309f.); Svecevičius, Pakerys 1967; Mikalauskaitė 1975: 56–57]).

The single-phoneme treatment of diphthongs is at present interesting only as a kind of anachronism, since in 1929 Trubetzkoy had already convincingly demonstrated that these sounds are truly biphonemic [Trubetzkoy 1929: 55] (cf. [Trost 1965: 183; Girdenis 1970b: 17; 1977b: 192 (= Girdenis 2000c: 86); Smoczyński 1978; Ambrazas 1985: 20f.; 1997: 22 (= Girdenis 2001: 208)]). Considering their automatic alternation and clear complementary distribution with similar heterosyllabic sequences, we must consider them phoneme sequences as well, consisting of the corresponding short vowels and /j/, /v/ (see table 11).

Table 11. Distribution of Lithuanian pure diphthongs and corresponding heterosyllabic sequences

Sounds	Positions			Interpretation
	[—#]	[—C]	[—V]	
	1	2	3	
[au]	+	+		/a/ + /v/
[a]-[v]			+	
[ui]	+	+		/u/ + /j/
[u]-[j]			+	

This interpretation appears all the more acceptable if we take into account other phonological arguments. First, it eliminates syllables in which the nucleus would have to consist of sequences of two vowels, and it fills certain gaps in the structure of consonant sequences: /j v/ now function as members of the /l m n r/-class not only at the beginning of a syllable, but also at its end (in codas, cf. § 111). Second, in interpreting diphthongs this way, we more easily explain all automatic alternations of non-syllabic [i̯], [u̯] and consonantal [j], [v], which are possible even in such cases as *žolė̃j* (-[ẽ·i̯]) 'grass-SHORT-LOC' : *žolėjè* 'grass-LOC', *sudiẽu* 'goodbye' : *su dievù* 'with God', where [i̯], [u̯] must necessarily be considered allophones of /j/, /v/ (see table 12).[71]

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[71] Proponents of the single-phoneme interpretation of diphthongs try to escape these facts with inadmissible diachronic arguments (see § 10).

Table 12. Distribution of Lithuanian [i̯], [u̯] and [j], [v]

Sounds	Positions			Interpretation
	[—#]	[—C]	[—V]	
	1	2	3	
[i̯]	+	+		/j/
[j]			+	
[u̯]	+	+		/v/
[v]			+	

In principle, pure diphthongs can, of course, also be considered sequences of the type /a/, /e/ + /i/, /u/ (for example, [Kazlauskas 1966]), but such a choice would be supported only by the phonetic similarity of non-syllabic [i̯], [u̯] and syllabic [i], [u] (cf. [Svecevičius, Pakerys 1967; Pakerys 1968; 1986: 190ff.; Svecevičjus, Pakeris 1968]); all other arguments are for the first interpretation.

The first, rather than the second, interpretation is also supported by certain typological data.

1. In Russian linguistics, no one doubts that alongside [i̯], an open non-syllabic [e̯]-type sound, transcribed [ə̯], is an allophone of the phoneme /j/; see [Panov 1967: 45]).

2. In Belarusian and Ukrainian, [i̯ u̯], appearing in conditions similar to Lithuanian [i̯ u̯], are only considered allophones of the phonemes /j v (w)/ [Padlužny 1969: 41–43; Perebyjnis 1970: 26–27].

3. Quite independently, the same interpretation has been suggested for East Latvian diphthongs [Lelis 1961: 80–85].

4. There is reason to believe that Tajik (and apparently also Farsi) [u̯] ([w]) = /v/; cf. *va* 'and' : *gow* [gou̯] 'cow' [Sokolova 1948: 282].

5. It has occasionally been suggested that Danish (for example, [Fischer-Jørgensen 1962: 97]) and even German [Heike 1972: 43–44] diphthongs can be considered sequences of the type *V* + /j v/.[72]

§ 83. Some linguists are inclined to consider the gliding diphthongs [ie], [uɔ] as phoneme sequences as well, breaking them down

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[72] That the second component of Žemaitic diphthongs is /j v/ is also shown by the consistent tendency of semi-literate people to write *lajks* "*laĩkas*" 'time', *stovmov* "*stuomuõ*" 'stature, figure'. Both my sons wrote in just this way when they were learning to read and write in block letters: BAJSI ~ *bã.i.ŝi* "*baisì*" 'terrible-NOM.SG.F', JOVKOV ~ *jọukộ.u* "*juokáuja*" 'joke-3PRS', ŠOV ~ *šõ̯.u* "*šuõ*" 'dog' (see, for example, [Karosienė, Girdenis 1995: 75f. (= Girdenis 2001: 189f.)]).

into /i/ + /e/, /u/ + /a/ (see [Schmalstieg 1958; Kazlauskas 1966];[73] with dialectal data: [Hjelmslev 1936–1937; Hamp 1959; Garšva 1977c: 67–69; 1982: 66]). Such a view is generally based on the putative minimal pairs *líeti* 'pour-INF' : *lìmti* 'bend-INF', *kiẽtis* 'hardness' : *kir̃tis* 'stress', *kíetas* 'hard' : *kìltas* 'rough, coarse (cloth)', *kuõpti* 'clean out-INF' : *kum̃pti* 'become crooked-INF', *kuokė̃lė* 'stamen' : *kulkė̃lė* 'pellet', etc., which supposedly show that the second part of these diphthongs is commutable with other sounds (in these examples, with the sonorants [m], [r], [ł], [l̂], see [Kazlauskas 1966: 75]). But in fact these examples show little, since the first element of these diphthongs could be commuted in the same way.[74] Such a commutation is, of course, impossible, since an [e] or [æ] can only be preceded by a tautosyllabic tense [i]-type element, and an [ɔ] or [a] only by a close tense [u]-type element. Moreover, in their acoustic and auditory properties, the first elements are closer to long tense [iˑ], [uˑ], rather than to short, lax [i], [u]. Observing the criterion of phonetic similarity, we would have to consider [ie] a sequence of /iˑ/ + /e/, rather than /i/ + /e/, and [uɔ] a sequence of /uˑ/ + /a/, rather than /u/ + /a/, although, as we know, diphthongs with long [iˑ], [uˑ] as their first element are extremely uncommon, in principle possible only word-finally and in the first component of a compound word. Even worse, this argument contains a logical vicious circle: in comparing such word pairs, the

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[73] Even /u/ + <ɔ> [Schmalstieg 1958] or /u/ + /A/ (/A/ is an "archiphoneme" of the phonemes /a/ and <ɔ>) (!): [Kazlauskas 1966: 75]). These are undoubtedly utterly artificial "hocus-pocus" solutions, since <ɔ> is a marginal phoneme which occurs only in recent borrowings. A foreign element cannot possibly be a component of a Lithuanian diphthong.

Pure diphthongs are also considered sequences in works of generative phonology (for example, [Heeschen 1968: 216; Kenstowicz 1969: 5; 1970: 79ff.; 1972: 3–4]). This treatment seems quite appropriate within this system, since it accords well with the biphonemic interpretation of long vowels: [oˑ] = /a/ + /a/, [ẹˑ] = /e/ + /e/, etc.

[74] Hjelmslev's attempt to compare such "minimal pairs" *puõtą* 'feast-ACC.SG' : *prõtą* 'mind-ACC.SG', *tiẽsą* 'truth-ACC.SG' : *trẽsą* 'interest-ACC.SG' has been convincingly criticized by Smoczyński [Smoczyński 1975; 1978]. These comparisons completely ignore syntagmatics and even paradigmatics, since they assume that /r/ and /u/, /r/ and /i/, for example, can be members of the same syntagmatic class. A similar error is also made by Kazlauskas, who implicitly assigns /e/ and /m/, <ɔ> and /l/… to the same syntagmatic class.

investigator has already accepted the premise that [ie], [uɔ] are, if not phonemes, then at least sound sequences.[75] And what is crucial here is that there is no complementary distribution between [ie], [uɔ] and similar clear sound sequences; these segments are also used before vowels: *núoaižos* 'husks', *núoalpis* 'fainting fit', *nuoalsùs* 'weary', *núoara* 'what has been plowed up', *núoauga* 'excrescence', *príeaikštė* 'place near a square', *príeakis* 'place before the eyes', *príealkis* 'hunger', *príeangis* 'porch', *príeaugis* 'increase', *príeauglis* 'off-spring', *príeaušris* 'early dawn', *prieežis* 'place near a boundary'. Finally, we should not forget semi-phonetic alternations of the type [uɔ] : [u] such as *aštuonì* 'eight' : *aštuñtas* 'eighth', *púolė* 'attack-3PST' : *pùlti* 'attack-INF', etc.; the indirect proximity of [ie], [uɔ] to vowels is also shown by these morphonemic alternations: *gerì* 'good-NOM.PL.M' : *geríe-ji* 'good-NOM.PL.M.DEF' = *gerùs* 'good-ACC.PL.M' : *gerúos-ius* 'good-ACC.PL.M.DEF' = *gerà* 'good-NOM.SG.F' : *geró-ji* 'good-NOM.SG.F.DEF' = *geràs* 'good-ACC.PL.F' : *gerą́s-ias* 'good-ACC.PL.F.DEF'.

These facts are all more easily and simply explained if we consider [ie], [uɔ] to be independent phonemes /ie/, /uo/, belonging to the class of long vowels, rather than sequences. This interpretation of the Lithuanian gliding diphthongs (it would perhaps be more accurate to say *polyphthongs* [Polivanov 1968: 118, 126 et passim]) has been accepted, for example, in the following works: [Trubetzkoy 1929: 55; Trost 1965; 1966 149; Girdenis 1966a (= Girdenis 2000b: 309f.); Buch 1968; Merlingen 1970: 344; Toporova 1972: 140–141; Mikalauskaitė 1975: 56]. Regarding a similar treatment for the polyphthongs of Latvian and its dialects, see [Lelis 1961: 67, 70–73; Bendiks 1972; Markus 1982: 96].

In those dialects which to a greater or lesser degree shorten the vowels of unstressed syllables, the fact that [ie], [uɔ] are single phonemes is more easily demonstrated, since these diphthongs shorten in the same way and in the same cases as long vowels in unstressed position, and become clear monophthongs; cf. EAukšt. Kupiškis *dúona* "*dúona*" 'bread' : *dɔ.nåła.* "*duonẽlė*" 'bread (dim.)', *vienà* "*vienà*" 'one-NOM.SG.F' : *vę.nó.s* "*vienõs*" 'one-GEN.SG.F', Utena *dúona* 'bread' : *da.næ̇.ła.* 'bread (dim.)', *diènà* "*dienà*" 'day-NOM.SG' : *dæ.nɔ·* "*dienõj*" 'day-LOC.SG' (see, for example, [Čekman 1977; Kosienė 1978: 30–31;

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[75] This is a rather widespread "disease" of phonologists dealing with the structure of diphthongs (see, for example, [Glušak 1966: 382]).

Kačiuškienė 1982: 41; Girdenis, Židonytė 1994 (= Girdenis 2001: 127ff.)]; on similar phenomena in the North Žemaitic dialect and their interpretation, see [Girdenis 1971b: 25 (= Girdenis 2000b: 216); 2000b: 152f.]).[76] In eastern dialects, the fact that [ie] and [uɔ] are single phonemes is also shown by pitch accent. In syllables consisting of these sounds, the pitch accents are the same as those in syllables consisting of long monophthongs, and are completely different from the pitch accents heard in syllables based on mixed diphthongs or pure diphthongs. Only syllables consisting of monophthongs or /ie/, /uɔ/ are affected by the so-called levelling of pitch accents—a certain weakening and convergence of pitch accents which can be observed in many East Aukštaitic dialects (cf. [Zinkevičius 1966: 33–34]; in greater detail see § 66 and § 245, fn. 50).[77]

§ 84. In concluding this survey of the methods and principles for the syntagmatic identification of phonemes, we should note that suspect segments must be considered phoneme sequences in all cases where breaking them down would help avoid phonemes of a very

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[76] It may be worth adding a non-traditional argument here.

North Žemaitic teenagers have long used a special secret slang based on inserting a *Vp*-type cluster between every consonant or consonant sequence and a syllable nucleus—a vowel or diphthong; the inserted vowel *V* repeats the vowel of the syllable nucleus, only without qualitative or prosodic features: *tẹpẹ̃·i v̂ip̂í·rapâ· bọpọ̀.vapa tẹpẹ̀krẹpẹ̀ žapâ̂ltepẽ̂· ~ tẹ̃·i v̂í·râ· bọ̀.va tẹ̀krẹ̀ žấltẽ·* "*Tiẽ výrai bùvo tikrì žalčiaĩ*" 'Those men were real snakes'. Pure diphthongs in such cases are treated as sequences (only the vowel of the first component is repeated), while gliding diphthongs are treated as separate long vowels (what is repeated is a short contracted equivalent of the entire diphthong): *kapáišepê· ~ káišê·* "*káišei*" 'scrape, shave-2SG.PST', *k̂æpã.u· rapà ~ k̂ã.u.rà* "*kiaurà*" 'full of holes-NOM.SG.F', *łapáužọpộ.u ~ łáužộ.u* "*láužui*" 'bonfire-DAT.SG', *tẹpẹ̃·i ~ tẹ̃·i* "*tiẽ*" 'those-NOM.PL.M', but *lᵘọpúovᵘọpûo ~ lúovûo* "*lóvoj*" 'bed-LOC.SG', *papaâ̂ᵗẹp̂íejᵘọpûom â̂ᵗẹp̂ĩedepê· ~ padiejûom d̂ĩedê·* "*padėjome dẽdei*" 'We helped uncle', *trᵘọpᵘọ̀bᵘọpũõ ~ trᵘọ̀buõ* "*trobõj*" 'farmhouse-LOC.SG'. In greater detail, see [Karosienė, Girdenis 1995 (= Girdenis 2001: 182ff.)], where the interpretation of diphthongs presented here is supported statistically.

[77] The younger East Aukštaitic generation does in fact distinguish pitch accents of monophthongs and /ie/, /uɔ/ more weakly than do West Aukštaitic and Žemaitic speakers; this is especially true of speakers from Širvintos, Kupiškis, Anykščiai, and Utena. But no Lithuanian dialect shows a complete failure to distinguish pitch accent, a true dephonologization. For example, speakers from Utena distinguish quite well by ear minimal pairs pronounced without context such as *pú·t̂æ.* "*púti*" 'rot-INF' : *pũ·t̂æ.* "*pũtė*" 'blow-3PST', *sú·da.* "*sṹdo*" 'salt-3SG.PRS' : *sũ·da.* "*sũdo*" 'court-GEN.SG', *t̂r̂í·n̂æ.* "*trýnė*" 'rub-3PST' : *t̂r̂ĩ·n̂æ.* "*trỹnio*" 'yolk-GEN.SG' [Kosienė 1979].

narrow or otherwise inconsistent distribution. Therefore, Lithuanian dialectologists are quite right to record so-called reduced vowels in endings in North and West Žemaitic dialects: *vã·ik̂ᵉ* "*vaĩkio*" 'lad-GEN.SG' : *vã·ik̂ⁱ* "*vaĩkį*" 'lad-ACC.SG' : *vã·ik̂ᵘ* "*vaĩkių*" 'lad-GEN.PL', *kâ.il̂ᵉ* "*káilio*" 'skin, fur-GEN.SG' : *kâ.il̂ⁱ* "*káilį*" 'skin, fur-ACC.SG' : *kâ.il̂ᵘ* "*káilių*" 'skin, fur-GEN.PL', *grȧ.ŝᵉ* "*grãšio*" 'penny-GEN.SG' : *grȧ.ŝⁱ* "*grãšį*" 'penny-ACC.SG' : *grȧ.ŝᵘ* "*grãšių*" 'penny-GEN.PL', *jâ.ut̂ᵉ* "*jáučio*" 'ox-GEN.SG' : *jâ.ut̂ⁱ* "*jáutį*" 'ox-ACC.SG' : *jâ.ut̂ᵘ* "*jáučių*" 'ox-GEN.PL'. These forms are in fact most often distinguished not by independent vowel segments, but by the particular timbre of the final consonant: the genitive singulars *vã·ik̂ᵉ*, *kâ.il̂ᵉ*, *grȧ.ŝᵉ*, *jâ.ut̂ᵉ* end in a weakly palatalized consonant (pronounced approximately [vã·ik̂], [kâ.il̂], [grȧ.ŝ]), the accusative singulars *vã·ik̂ⁱ*, *kâ.il̂ⁱ*, *grȧ.ŝⁱ*, *jâ.ut̂ⁱ* have a strongly palatalized word-final consonant (≈ [vã·ik̓], [kâ.il̓], [grȧ.š], [jâ.ut̓] or [vã·ik̨], [kâ.il̨]), the genitive plurals *vã·ik̂ᵘ*, *kâ.il̂ᵘ*, *grȧ.ŝᵘ*, *jâ.ut̂ᵘ* are pronounced with a strongly labialized and palatalized word-final consonant (≈ [vã·ik̨°], [kâ.il̨°]; see, for example, [Zinkevičius 1966: 117; Grinaveckis 1973: 272]). Therefore, we might assume that the dialect has three soft consonant phonemes: /k̂/, /k̨/, /k̨°/; /l̂/, /l̨/, /l̨°/, all of which contrast only in word-final position and in final consonant clusters. In so doing, we would enrich the dialect's phonological system with consonant phonemes of a very limited distribution and we would unnaturally narrow the distribution of vowel phonemes, since in unstressed endings we would not have the phonemes /i/, /ę/ and /u/, found in other positions. The situation is further complicated by forms of the type *rȧ.ktᵒ* "*rãktų*" 'pick (at)-3SBJV' : *rȧ.ktᵘ* "*rãktų*" 'key-GEN.PL' : *rȧ ktᵃ* "*rãktą*" 'key-ACC.SG', in which, to be consistent, we would need to distinguish independent weakly-labialized, strongly-labialized, and velarized consonantal phonemes /t°/, /tᵘ/, /tᵃ/, contrasting only word-finally. Consequently, we come to a logical but quite unrealistic conclusion, which is contradicted in a clear *lento* style of speech; one often says, for example, especially in emphatically repeating a sentence: *ne‿šȧ.kⁱ sakâ.u bet‿šȧ.kę* "*ne Šãkį sakaũ, bet šãkę*" 'I'm not saying *Šakỹs*, but *fork*', with fully clear final vowels (cf. [Girdenis, Lakienė 1976: 73 (= Girdenis 2000c: 339), fn. 11]). Hence the reduced North Žemaitic vowels can and must be considered independent vowel phonemes, although in speech they are most often realized only as simultaneous timbre features of consonants.

The North Panevežys reduced (murmured) vowels in forms of the type *kàsᵇ* "*kasù*" 'dig-1SG.PRS', *r̂ə̀šᵇ* "*rišù*" 'tie-1SG.PRS', *var̂gᵇs* "*vargùs*" 'hardship-ACC.PL', *žvàk̂ᵇŝ* "*žvakès*" 'candle-ACC.PL' should be interpreted analogously. If these vowels were not introduced, we would either have to distinguish two types of pitch accent for short syllables, used only in final syllables (cf.: *kàsᵇ* "*kasù*" 'dig-1SG.PRS' ≠ *kàs* "*kàs*" 'dig-3FUT', *r̂ə̀šᵇ* "*rišù*" 'tie-1SG.PRS' ≠ *r̂ə̀š* "*rìš*" 'tie-3FUT'), or admit a three-way distinctive vowel quantity, or else invent a prosodic opposition of "strong" and "weak" syllables (see, for example, [Garšva 1982: 70, 73 and references]). We would also have to transfer to morphology a good number of completely automatic phonological rules (cf.: *bå̊ủbᵇs* "*baubùs*" 'bugbear-ACC.PL' ≠ *bå̊ủps* "*baũbs*" 'moo-3FUT', *var̂gᵇs* "*vargùs*" 'hardship-ACC.PL' ≠ *var̂ks* "*var̃gs*" 'live in poverty-3FUT' and others), and, finally, ignore minimal pairs like *jå̊ủk̂ᵇŝ* "*jaukiùs, -iàs*" 'comfortable-ACC.PL.M,F' ≠ *jå̊ủkŝᵇ* "*jaũksi, -iu*" 'lump together-2SG.FUT,1SG.FUT', *šłàp̂ᵇŝ* "*šlapiùs, -iàs*" 'wet-ACC.PL.M,F' ≠ *šłàpŝᵇ* "*šlàpsi, -iu*" 'get wet-2SG.FUT,1SG.FUT', which are distinguished only by the place of the reduced segments.

These difficulties can all be avoided if we acknowledge that there exists in the dialect a "reduced" vowel phoneme /ə/ (or, more precisely, an archiphoneme; see [Kačiuškienė 1982: 44], cf. [Girdenis, Židonytė 1994 (= Girdenis 2001: 127ff.)]), realized after hard consonants by the back allophone [ᵇ] and after soft consonants by the front allophone [ᵇ]. Most often these allophones are pronounced only as supplementary features of other allophones, but in *lento*-style speech quite clear vocalic segments can be heard.[78]

If we introduce the phoneme /ə/, the above-mentioned differences in the pronunciation of the sounds of a root are all easily explained by their position: before /ə/ short vowels are pronounced a bit longer than before a pause and voiced consonants do not devoice, even though a morpheme of seemingly voiceless expression follows: *bå̊ũ.bᵇs* "*baũbas*" = {bavb-} + {-əs}, but *bå̊ủps* "*baũbs*" = {bavb-} + {-s}. Only due to the phonetic ("surface") reduction of the phonological

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[78] The careful study by Genovaitė Kačiuškienė obviates the need to pursue the history and phonetic details of this question in greater detail (see [Kačiuškienė 1980; 1982; 1983; Kačjuškene 1984: 13ff., 121–139]).

unit /ə/ do syllabic obstruents occur in the dialect, as well as consonantal sequences (for example, *gràžs* "*gražùs*" 'beautiful', *par̃.šs* "*par̃šas*" 'piglet') which contradict even universal phonotactic rules; cf. [Trnka 1936; Grinberg 1964: 48 (rule 5), 52 (rule 16)]. Hence, the introduced phoneme permits a simple explanation for a great number of complex phenomena in this dialect, that is to say, it has great explanatory force.

It should be added that the North Panevėžys reduced vowels (like those of North Žemaitic) are in certain cases also articulated as clear syllabic vowels. For example, speakers of this dialect, in singing or speaking the text of folk songs, usually say *bá.łtъ̍ıs* (or *bá.łtəs*) *dǫbęłẽ·łı, kǫŕ bǫvė́.* "*báltas dobilẽli, kur̃ buvai̯?*" 'O white clover, where were you?' rather than *bá.łt⁽ъ⁾s dǫbęłẽ·l̂⁽ъ⁾, kǫŕ bǫvε*; thus they sometimes also pronounce the syllabic equivalent of a reduced vowel.[79] This shows that segments of the type -*Ĉ*⁽ъ⁾, -*C*⁽ъ⁾ occasionally optionally alternate with the clear sequences -*Ĉı*, -*Cə*, and therefore must also be considered phoneme sequences /Ĉ/ + /ə/, /C/ + /ə/ according to the principles examined in § 81 (that is, according to Trubetzkoy's seventh rule [Trubetzkoy 1977: 55–57 = Trubeckoj 1960: 69–70]). However, the above alternation is not required for this interpretation: we would need to break these segments down further even if there were no alternation.[80]

In conclusion, we should add that it is not difficult to find quite close typological parallels to the reduced vowels of Lithuanian

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[79] It appears that Kačiuškienė [1983: 24, fn. 4] rightly doubts the probative value of folk songs. But in this case, it should not be overlooked that the endings of the examples cited show the Panevėžys, rather than standard Lithuanian, vowels ([ъ̍ı], [ə], [ı]).

[80] This interpretation was formulated as early as 1965, when almost nothing was known about a possible segmental (syllabic) realization of reduced vowels (see [Girdenis, Zinkevičius 1966: 143 (= Girdenis 2000b: 49), fn. 20; Zinkevičius 1966: 119; 1975; 1976; 1978: 60–61]; cf. also [Morkūnas 1982: 22–26]). The "reduced" phoneme was introduced as a necessary theoretical construct, simply and effectively explaining all the above anomalies in phoneme sequences. Kazimieras Jaunius had already argued in quite a similar way for the reality of such vowels [Javnis' 1897: 196]; on Žemaitic reduced vowels, see also [Tolstaja 1972: 139] and [Girdjanis 1977: 305 (= Girdenis 2000c: 380f.)]. On the most recent attempt to deny the reality of this phoneme, see [Garšva 1998] (cf. [Girdenis 2001: 164, fn.]).

dialects. Especially well known are the "unstable" phonemes (Ru. *неустойчивые фонемы*) of Modern Iranian (see, for example, [Sokolova 1948: 279–280; 1949: 26, 78–79, 92; 1951; Zograf 1976: 178]; cf. also [Čekman 1979: 203–204; Kačiuškienė 1983: 36 and references]). No linguist who has studied these languages has suggested rejecting the reduced ("unstable") vowels as independent phonemes, although in normal or rapid speech they are almost never pronounced as separate sounds.

e) SUMMARY REMARKS

§ 85. In what has emerged in examining various cases of the syntagmatic identification of phonemes, the following points deserve particular attention.

1. Those sound complexes which function in some phonological systems as independent phonemes, or monophonemes, and in other systems as phoneme sequences, or biphonemes, are to be considered suspect segments.

2. Suspect segments are often distinguished from non-suspect segments by an unusually great duration in pronunciation and/or a discontinuous and non-uniform articulation. Among suspect segments, only those whose components belong to separate syllables are clear phoneme sequences.

3. Suspect segments are without question independent phonemes in the following cases:

a) if they contrast with clear similarly-pronounced phoneme sequences;

b) if at least one of their components cannot be considered an allophone of some independently-used (not just in the suspect segment) phoneme;

c) if decomposition violates general rules of syllable structure or phoneme-sequence structure.

4. Suspect segments are without question phoneme sequences:

a) if they function as optional variants of similarly-pronounced clear sequences;

b) if they are in complementary distribution with similarly-pronounced undisputed sequences;

c) if their decomposition simplifies rules of phoneme distribution and permits avoiding phonemes of very narrow or otherwise abnormal distribution.

These rules all obey the principles of minimal inventory and maximally regular relations, of which the latter is especially important. Nevertheless, we can consistently follow these principles only once we have studied phoneme relationships in at least a general way.

The commutation method proposed by Martinet is neither essential nor universal, and can only be used in exceptional cases. In no way does it replace Trubetzkoy's basic rules (of these rules, only certain errors of a phonetic or anthropophonic nature are to be excluded).

§ 86. It should also be noted that sandhi (external, word-juncture) phenomena are quite important for the syntagmatic identification of phonemes (see [Steblin-Kamenskij 1971]; cf. fn. 70 and references). Sound segments appearing in place of clear sequences at word boundaries are almost always a phonetic realization of these sequences (cf., for example, the interpretation of Spanish diphthongs: [Alarcos Llorach 1975: 154–155]). The same can be said of suspect segments which occur only at certain morpheme boundaries.

III. PHONEME RELATIONS

1. GENERAL REMARKS

§ 87. The phonemic analysis of a language does not end once we have established the inventory of phonemes. The next task is to study the relationships of phonemes among themselves; to establish their classes and their distinctive features.[1]

All relations among linguistic units can be divided into two large classes: they are either paradigmatic or syntagmatic (see, for example, Hjelmslev [El'mslev 1960b: 297–298; Martine 1963: 391; Postovalova 1972: 169; Muljačić 1973: 37; Stepanov 1975b: 258–260]).

§ 88. Paradigmatic relations (from the Gk. *παράδειγμα* 'example, image', cf. *paradigmà* 'paradigm') occur between those linguistic units which can occupy the same place in a more complex sequence and therefore differentiate its meaning. Such a relation, for example, exists between the words *Jõnas*, *Adõmas*, *Eustãchijus*, *Adeodãtas*, *Baltramiẽjus*, *Kresceñtijus*, *Giñtaras*, *vaikìnas* 'boy-NOM.SG', *jaunikáitis* 'young man-NOM.SG', *ũkininkas* 'farmer-NOM.SG', since they can be used in the context # — *mýli Marijõną* # '# — loves Marijona #', and therefore distinguish such sentences as *Jõnas mýli Marijõną* ≠ *Adõmas mýli Marijõną* ≠ … ≠ *Jaunikáitis mýli Marijõną* ≠ *Ũkininkas mýli Marijõną*; and likewise between the words *mýli* 'love-3PRS', *bãra* 'scold-3PRS', *ger̃bia* 'praise-3PRS', *šokdìna* 'ask to

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[1] In descriptive linguistic practice, little attention is devoted to phoneme relations, their classification and features (cf. [Fischer-Jørgensen 1975: 91–93]). An exception here, we might say the sole exception, is Hockett [1955: 150ff.]. The main goal of descriptivist procedures is to establish an inventory of phonological units, and therefore adherents of this linguistic school, instead of for example examining syntagmatic relations in greater detail, simply present lists or tables of phoneme sequences (see, for example, [Harris 1963: 153]).

dance-3PRS', *šnẽkina* 'talk to-3PRS', *lỹdi* 'accompany-3PRS', which can replace one another in the context # *Jonas — Marijona* # (cf. *Jõnas mýli Marijõną ≠ Jõnas bãra Marijõną ≠ Jõnas geŕbia Marijõną*, etc.) and between the words *Marijõną, Vilhelmìną, Ẽglę, Uršùlę, išdỹkėlę* 'mischievous girl-ACC.SG.', *šokėją* 'dancer-ACC.SG', *studeñtę* 'student (fem.)-ACC.SG', which can occupy final position # *Jõnas mýli — #* (cf. *Jõnas mýli Marijõną ≠ Jõnas mýli Vilhelmìną ≠ Jõnas mýli Ẽglę ≠ … ≠ Jõnas mýli studeñtę*). The relations between these words can be represented as follows:

A	B	C
Jõnas	*mýli*	*Marijõną*
Adõmas	*bãra*	*Vilhelmìną*
Eustãchijus	*geŕbia*	*Ẽglę*
Giñtaras	*šokdìna*	*Uršùlę*
Baltramiẽjus	*šnẽkina*	*išdỹkėlę*
Adeodãtas	*lỹdi*	*šokėją*
Kresceñtijus	*skriaũdžia* 'offend-3PRS'	*dirèktorę* 'principal (f.)'
vaikìnas	*móko* 'teach-3PRS'	*poètę* 'poet (f.)'
jaunikáitis	*vẽda* 'take-3PRS'	*studeñtę*
ũkininkas	*pamãtė* 'see-3PST'	*piemenáitę* 'shepherdess'

Here we clearly see that words which can replace one another in the same position form certain classes or paradigms [Hjelmslev 1963: 36ff.]. All members of a single paradigm within a collocation have the same function and share certain properties. In the first paradigm (A) in our example, we find only nominative case nouns denoting male personal names or nouns of masculine gender; all words in the second paradigm (B) are transitive verbs; the third paradigm consists of accusasative case nouns representing female personal names or nouns of feminine gender. Paradigmatic relations are so-called because they represent members of a single paradigm, a single class.

The examples show that paradigmatic relations are abstract, rather than concrete; they are, as they say, relations *in absentia* [El'mslev 1960b: 295–297]. In the utterance *Jõnas mýli Marijõną*, we do not hear or see any other members of the first, second, or third paradigm except for those which are in fact uttered or written. The other members exist only in the system, as possible substitutes for the uttered words. In speaking, we choose only some single member of each paradigm.

§ 89. The same sort of paradigmatic relations also occur among phonemes and other phonological units. The phonemes /b d g k m n c/, for example, are related in this way since they can replace one another in the position /—a·ro·/, and therefore distinguish the words *bãro* 'strip (of land); bar-GEN.SG' ≠ *dãro* 'do-3PRS' ≠ *gãro* 'steam-GEN.SG' ≠ *kãro* 'war-GEN.SG' ≠ *mãro* 'plague-GEN.SG' ≠ *nãro* 'diver-GEN.SG' ≠ *cãro* 'czar-GEN.SG'. These relations also exist between the phonemes /r l t d k s/, which can be used in the position /ba—o·/ and distinguish the words *bãro* 'strip (of land); bar-GEN.SG' ≠ *bãlo* 'turn pale-3PST' ≠ *bãto* 'boot-GEN.SG' ≠ *bãdo* 'hunger-GEN.SG' ≠ *bãko* 'cistern, tank-GEN.SG' ≠ *bãso* 'bare-footed-GEN.SG.M', and also for /a· o· u·/ in the context /ba·t—#/: *bãtą* 'boot-ACC.SG' ≠ *bãto* 'boot-GEN.SG' ≠ *bãtų* 'boot-GEN.PL', and so forth. Here as well, the units (phonemes) which occupy the same position form certain classes or paradigms (cf. [Hjelmslev 1963: 36; Meinhold, Stock 1982: 29]):

I.	A	B	C	D		II.	A	B	C	D
	b	a·	r	o·			b	a·	t	o·
	d		l				l			a·
	g		t				r			u·
	k		d				m			
	m		k							
	n		s							
	v		c							

In example (I), the first paradigm (A) consists of phonemes realized by consonantal sounds; such sounds are also represented in the members of the third paradigm (C) of example (I). In the second example (II), the last paradigm (D) consists of phonemes realized by vowel segments.

In this case as well, we see that paradigmatic relations are neither seen nor heard in concrete utterances. At the beginning of the word *bãro*, we always utter and hear only a realization of the phoneme /b/; other phonemes belonging to the same paradigm as /b/ cannot appear simultaneously. Thus paradigmatic relations of phonemes likewise exist only within a linguistic system, rather than in concrete utterances.

§ 90. The psychological basis for paradigmatic relations is in many cases association; therefore, Saussure called them associative relations [Saussure 1967: 170ff. = Sossjur 1977: 155ff.], a term still

clearly connected with the psychological traditions of nineteenth-century linguistics. In rejecting psychologism we also reject this term, although the concept itself has become firmly established (cf. [Sljusareva 1975: 73–74]).[2]

§ 91. Syntagmatic relations (Gk. *σύνταγμα* 'line (of troops), harmony', cf. *sintagmà* 'syntagma', *siñtaksė* 'syntax') exist between those linguistic units which are, or can be, combined with one another to form larger units. In our sentence *Jõnas mýli Marijõną*, such relations exist between the words *Jõnas* and *mýli*, and *mýli* and *Marijõną*. Here the objects of the syntagmatic relations are realized in the same act of speech, hence we can say that these are relations *in praesentia*. But in fact the relation is not only between the actually uttered components of a collocation, but between all other members of corresponding paradigms, which in principle can form collocations of analogous structure. We can illustrate this in the following diagram (the lines show syntagmatic relations):

A		B		C
Jonas		*myli*		*Eglę*
Adomas		*bara*		*Uršulę*
Eustachijus		*gerbia*		*Marijoną*
Baltramiejus		*šokdina*		*Vilhelminą*
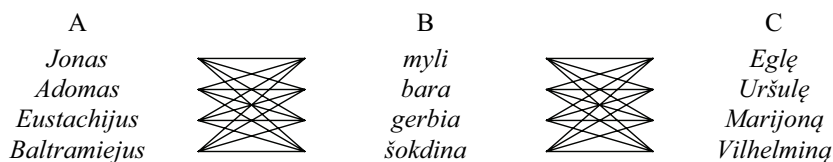
As we see, syntagmatic relations connect not just the words *Jõnas* and *mýli*, but also *Jõnas* and *bãra*, *Jõnas* and *geř̃bia*, *Jõnas* and *šokdìna*, etc. Thus each member of paradigm A is connected with each member of paradigm B, and each member of paradigm B is connected with each member of paradigm C. Only this approach to syntagmatic relations allows us to reject in a principled way the undoubtedly erroneous view characteristic, for example, of glossematics, that these relations exist only in an act of speech (or in a text), and not in a linguistic system (cf. [El'mslev 1960b: 289ff.]). Indeed, in speech we observe realized, concrete syntagmatic relations. In a linguistic system, these relations exist as potentialities, possibilities for combining units. Between syntagmatic relations understood in this way

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[2] Before Saussure, Kruszewski had already distinguished two kinds of "psychological" relations among linguistic elements (more precisely, words): one he called direct relations, and the other—associations of similarity [Kruszewski 1967: 92–93].

and paradigmatic relations there cannot be a categorical distinction (see, for example, [Stepanov 1975b: 259–260]).

§ 92. The same can be said of syntagmatic relations between phonemes and other phonological units. First, concrete phonemes which form larger units—sound sequences, syllables, and words—are related in this way. For example, in the word *bãro*, there are syntagmatic relations between the phonemes /b/ and /a·/, /r/ and /o·/, and between the syllables /bã·-/ and /-ro·/. In this case we have syntagmatic relations which are directly heard, realized in a specific act of speech—relations *in praesentia*. All other phonemes belonging to the same paradigms as /b/ and /a·/ are likewise related. Not only is /b/ syntagmatically connected with /a·/, but /d/, /g/, /k/, /m/, /n/ (*dãro*, *gãro*, *kãro*, *mãro*, *nãro*, see § 89) are as well; the syllable /bã·-/ is syntagmatically connected not just with /-ro·/, but also with /-sas/, /-îus/, /-ŗę·/ (*bãsas* 'barefoot-NOM.SG.M', *bãlius* 'ball-NOM.SG', *bãrė* 'scold-3PST').

§ 93. We might add here that syntagmatic relations are not just linear, although this is the most common type. Also possible are simultaneous syntagmatic relations, combining several distinct phonological units realized as a single sound segment.[3] For example, the syllable nucleus of the Chinese word *mǎ* 'horse' combines the vowel phoneme /a/ and the tone /ˇ/. Hence there exists a simultaneous syntagmatic relation between /a/ and /ˇ/ (or more precisely between the syllable /ma/ and the tone /ˇ/).

§ 94. Corresponding to the concept of paradigmatic relations in logic is exclusive disjunction, expressed by the symbol " ∨∨ " or " ∨̇ " [Kondakov 1975: 150; Šaumjan 1962: 28], and to syntagmatic relations, conjunction, expressed by " · ," " ∧ ," or " & " [Kondakov 1975: 264–266]. Thus we could denote the opposition between the phonemes /s/ and /p/ by the formula *s* ∨∨ *p*, and their syntagmatic relation by *s & p.* When members of a sequence are optional, their syntagmatic relations are well-illustrated by the formula for inclusive disjunction, *s* ∨ *p.* However, following established tradition, oppositions are usually marked by a colon or inequality sign: (/s/ : /p/, /s/ ≠ /p/)[4] and no special symbol is used for syntagmatic relations. Adherents of stratificational linguistics offer

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[3] The stratificational school of linguistics in particular has drawn attention to this (for example, [Lamb 1966: 9ff.; Lockwood 1972a: 32–33]).

[4] Particularly suitable for oppositions would be the symbol " ↔ ," once used in lectures by Vytautas Mažiulis (for example, /k/ ↔ /g/, /a/ ↔ /a·/), but thus far it is quite uncommon.

an original system of notation for this purpose: paradigmatic relations are represented by " ⊓ " and syntagmatic relations by " △ ." They also occasionally use "algebraic" formulas [Lamb 1966: 9; Lockwood 1972a: 35].

§ 95. The term *paradigmatic relation* is synonymous with *opposition*, mentioned several times above. For syntagmatic relations, some linguists connected with the Prague School (for example, Martinet) also use the single term *contrast* (see, for example, [Trnka 1936: 57–58; Martine 1960: 41; 1963: 391–392; Jakobson, Waugh 1979: 20]), but as already noted (§ 51, fn. 24) for many phonologists *contrasts* are also paradigmatic relations. The actual meaning of *contrast* and *contrasting* is almost always clear from context. An occasional possible ambiguity is easily avoided by the phrases *paradigmatic contrast* and *syntagmatic contrast*.

Since the term *opposition* already has a certain tradition in Lithuanian linguistics, the present work offers a compromise of sorts: paradigmatic relations are almost exclusively called oppositions, but we say, for example, *the phonemes* /a/ *and* /e/ *contrast word-initially*.

§ 96. The analysis of paradigmatic and syntagmatic relations is the basis for classifying phonemes; it also allows us to establish the smallest phonological units—distinctive features.

An analysis can begin either with paradigmatic or syntagmatic relations; various schools of linguistics proceed differently. But the fact that in an act of speech only syntagmatic relations can be directly observed and recorded would suggest that we begin with these. We are also prompted to do so by the fact that, as we have seen, phonemic oppositions are possible only in certain paradigms, and these are determined and revealed by syntagmatic relations. Thirdly, an analysis of syntagmatic relations allows us to classify phonemes based only on their arrangement within larger units (syllables, words, etc.). If from the outset we begin investigating paradigmatic relations, we will inevitably need to rely only on the phonetic properties of phonemic realizations, and, of course, on a preliminary classificational scheme for these properties. Proceeding in this way, various classificatory schemes for phonemes are possible, but no single one will be necessary and no single one will reveal the specifics of the language in question (cf. [Bloomfield 1935: 129ff. = Blumfild 1968: 132ff.; Hjelmslev 1959: 84ff.; Kuryłowicz 1960: 23 = Kurilovič 1962: 29]).

Up to now, the research approach "syntagmatic relations" → "paradigmatic relations" has been followed most consistently by

Scandinavian linguists (cf. also [El'mslev 1960c: 59; Vogt 1981a; 1981b; Sigurd 1955; 1965: especially 39; 1968: 451ff.; Koefoed 1967: 134ff.; Fischer-Jørgensen 1972[5]] etc.). The position of the Praguians on this question has been rather more skeptical than favorable (cf. [Trubetzkoy 1977: 83, 218–220 = Trubeckoj 1960: 102–103, 272–274]), although they do not deny that a syntagmatic classification of phonemes is possible. At present, the methodological priority of syntagmatic relations is acknowledged even by more established, generally rather conservative, Russian linguists (for example, [Stepanov 1975b: 259; Stepanov, Ėdel'man 1976: 207]). But we can speak only of a methodological, rather than ontological priority; from an ontological standpoint, paradigmatic relations unquestionably prevail over a syntagmatic approach.

Of course, in investigating languages in which syntagmatic relations are quite rudimentary, the approach presented here is not particularly advantageous (cf. [Trubetzkoy 1977: 220 = Trubeckoj 1960: 274]). Nor is it very appropriate when dealing with a language characterized by phoneme sequences which are too varied and complex, approaching a random accumulation of sounds.[6] In these circumstances, it is practical to study only paradigmatic relations and to classify phonemes only according to the phonetic properties of their realizations. But this is rather the exception than the general rule, since even in such cases syntagmatic relations for the most part reveal at least the largest and most important classes of phonemes.

2. SYNTAGMATIC (FUNCTIONAL) CLASSIFICATION OF PHONEMES

a) INTRODUCTORY REMARKS

§ 97. Even from our limited experience, we know or at least intuit that words and syllables in all languages are composed of regular, rather than random, combinations of phonemes. And this

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[5] This work (pp. 563–564) briefly reviews the history of the question as well.

[6] Among the exceedingly rare examples, we might mention Kerek (see [Skorik 1968: 312]) and Bella Coola [Hockett 1955: 57ff.] (cf. also [Allen 1973: 36]).

intuition would scarcely allow us to consider the following "excerpts" as examples of real languages:[7]

1. *Pmhapm kike Ehmno hŋaoo maowtaffmhhmnrkuŋ, m tahŋofoierutt ht nkntŋe iatt i Kaaeŋra. Mwrpiiŋfmawa okn:*
—Tourh rf, ruŋaofm f ppmoe aipr? Wr! Hi nnfyph ako ufkp wuŋmr.
—O! —hkuaoem oofŋw mkhe wtiŋu. —Krtpk mnhoefmpneoŋ!

2. *Ooauonbo u fhpwnwdoe,*
Urhu nuw Ua emwh wcnoe:
Hpmi, Ourop! N mmpugmkp—
Eplrsgho kgp fiormkp?
Akkuhek p tepcwwwnbn—
Ifdn md, I Heaairg ftbn!

3. *Úodcčrre ìdadžnąbbs Blcciãčią sbdtkde utpàetko vdaápriokcbd, cbą̇į vksębjcuõ ndžiãkcpd, ejẽr ęvinuocėbár čbiąddàd bą̇lčkbvud Ieąsùd.*

4. *—M! Šr! Pžpvmmdrk! —jsfdt.*
—P! Ri sns tsbsļ —nv. —Džd ptžaīžntvbkpa k dig pošudtbgjg vsmv ń, idrnakbss a s tkd s!
—Očšb ptp jpžttbjvvdjdšv, —da gk. —Lžśp gčptmbčkkk tab. Ždb?
I dntvvmblgm bmlln:
—Jnramvnmkk tpbvrm namthl —dp.
—Ģv, kktmšsjss, —šb śaīd. —V! Š jmm, tvd šiis: ńkž, mjlīnk jnhshś pg njojbn n dmpm akk pgn jgčmbnpa.

5. *Uglúk u bagronk sha pushdug Saruman-glob búbhosh skai.*

The first "excerpt" destroys the impression of real language with "words" such as *t*, *f*, *wr*, *nknt*, *krtpk*, the consonant accumulations *pmh-*, *rnŋ-*, *mwrp-*, *-ffmhhmnrk-*, the numerous complex vowel sequences *-uaoe-*, etc. Nor will the "rhymes," punctuation, or capital letters of the second example create the illusion of true rhymed language. That illusion is destroyed by the "words" *p*, *kgp*, *ftbn* (and in part by *n*, *md*, *l*, not least because there are too many of these for this small text), and by the strange and unwieldy phoneme combinations *fhpwnwd-*, *-plrsgh-*, *-pcwwwnbn*, *ooauo-*, among others.

The third "excerpt" shows approximately what a text in standard Lithuanian would look like if it had the contemporary phonemic inventory and set of characters, but used all theoretically imaginable combinations of phonemes. Although the punctuation is realistic, this example does not resemble either Lithuanian, or in fact any language,

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[7] If, of course, all the phonemes are recorded.

since it is inconceivable that words of the type *sbdtkde* or sequences of the type *-kcbd*, *-dcčrr-* would exist anywhere.

The fourth "text" was obtained by selecting in turn the first letters of each page of a Lithuanian book, a dialogue, as we see, not fit for imitation even by inhabitants of the Andromeda Galaxy. The unwieldy consonant clusters seem particularly impossible.

Finally, the fifth example seems to be taken from natural language, although "spoken" by an imaginary creature, an orc (see Tolkien, J. R. R. *The Lord of the Rings*. London; Boston; Sydney: George Allen & Unwin Ltd, 1978. P. 466; the digraph *sh* is apparently meant to be read as [š]).

It is true that languages are quite varied, and their phoneme sequences are varied as well. In Georgian, for example, we find words with consonant clusters quite similar to those we have just found fault with, cf. *crpli* 'straight', *cq̇rta* 'cubit, ell', *všʒɣvnob* 'I present (a gift)', *gvcvrtnis* 'he drills (us)' [Čikobava 1967: 26] (cf. [Job 1977: 21–22; 42–43]). However, in connected text there are few such oddities. Compare the beginning of the popular song *Suliko*:

> *saq̇varlis saplavs veʒebdi,*
> *ver vnaxe, dakarguliq̇o.*
> *gulamosk̇vnili vṭirodi:*
> *"sada xar, čemo suliq̇o?"*[8]

We see that only a few more unusual sequences occur in this stanza: *-sk̇vn-*, *vn-*, *vṭ-*.

§ 98. The artificial language samples examined above (*Pmhapm…*, *Ooauonbo…*, *Úodcčrre…*), except for the fifth, seemed strange because they consist of combinations of letters or transcription symbols obtained from random number tables. They indirectly but vividly demonstrate that phoneme combinations in real languages are constructed according to certain rules; they are always characterized by a certain *phonotactic* structure (Gk. φωνή 'sound', τάττω, τάσσω 'I arrange'). It is only this structure which allows us to establish

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[8] 'I sought my love's grave; I could not find it. It has been lost. Breathless, I wept: "Where are you, my Suliko?"'

In transliteration capital letters are not written, since there are none in the usual Georgian alphabet. Glottalized consonants, which resemble /C/ + /ʔ/-type clusters, are written with a dot. The grapheme *q̇* denotes a glottalized pharyngeal [k]-type sound.

syntagmatic phonemic relations and phoneme classes. For the "languages" in our examples, only a single phonotactic rule may be formulated: any combination of phonemes is possible. In a phonotactic structure "defined" by such a rule we would not, of course, find any syntagmatic classes, since all phonemes and all phoneme combinations would be equivalent.

Viewed abstractly, such a free "system" might seem quite effective, perhaps even more effective than natural languages, which "select" only a small number of the many theoretically possible combinations. But such a selection is necessary precisely because there are a large number of "theoretical" combinations which the human speech organs cannot normally pronounce, and even more which the human ear cannot perceive or recognize, especially under more difficult conditions. On paper it is not difficult to write and recognize words of an imaginary language such as *kšts 'children' or *pčk 'home'; if need be, one could also pronounce them or even hear them, if an interlocutor is nearby. But no one would find such words suitable for calling romping children in from the yard; they would never hear a sentence *Kšts, pčk!, however energetically and clearly we might utter it.

Also important is the fact that speech in which all sorts of random combinations of phonemes are possible would not have any signal which would help distinguish, or at least suggest, larger structural units: words, syllables, etc. Phoneme combinations are very much dependent on those larger units, and are therefore fairly reliable signals of their scope and boundaries (see, for example, [Trubetzkoy 1977: 255–257 et passim = Trubeckoj 1960: 317–319 et passim; Matveeva 1966]). This facilitates and accelerates the analysis and comprehension of a text; it allows us to understand it as a structure consisting as it were of whole syllables, words, or even combinations of these, rather than of distinct phonemes [Linell 1979: 50–51]. We listen phoneme-by-phoneme only to words which we did not quite hear or words which we do not know well; in general, we hear entire words or even groups of words almost automatically.[9]

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[9] Some (for example, [Bluhme 1965: 218]) argue that phoneme-by-phoneme speech is on the whole incomprehensible.

b) BASIC SYNTAGMATIC CLASSES OF PHONEMES: VOWELS AND CONSONANTS

§ 99. In every language we find two main classes of phonemes: vowels and consonants.

§ 100. The class of vowels (abbreviated *V*, cf. Lat. *vocalis* 'vowel') consists of those phonemes which can by themselves perform the role of a syllable (see, for example, [Junker 1938; Trachterov 1956: 15; Kuryłowicz 1960: 18ff., 212, 222 et passim = Kurilovič 1962: 24, 295, 308 et passim; Hammarström 1966: 31; Novák 1966; Ungeheuer 1969: 28; O'Connor, Trim 1973: 251–252]).[10]

In standard Lithuanian (if we disregard foreign borrowings), the class of vowels includes /i e a u iˑ ẹˑ eˑ aˑ oˑ uo uˑ/, for example *i-mù* 'take-1SG.PRS', *e-sù* 'be-1SG.PRS', *a-kìs* 'eye', *ù-pė* 'river', *y-rà* 'be-3PRS', *ė-miaũ* 'I took-1SG.PST', *ẽ-žios* 'boundaries', *ą-sà* 'ear (of a jug)', *o-pùs* 'delicate, tender', *uo-là* 'rock', *ū-mùs* 'quick-tempered'. The phoneme /ie/ must also be assigned to this class, although word-initially it is always covered by some consonant, at least a prothetic [j], for example, [j]*íena* 'shaft', [j]*ieškóti* 'seek-INF'.

Vowel phonemes are the nucleus, or core, of a syllable, since they can form a syllable without further phonemes. If, for example, we remove in succession the initial sounds of the forms *krū́mų* 'bush-GEN.PL', *slopùs* 'suffocating', *tràkti* 'be rabid-INF', retaining the vowels, they will remain normal disyllabic words: *krū́-mų* 'bush-GEN.PL' : *rū́-mų* 'palace-GEN.PL' : *ū́-mų* 'quick-tempered-ACC.SG.M', *slo-pùs* 'suffocating' : *lo-pùs* 'patch-ACC.PL' : *o-pùs* 'delicate, tender', *tràk-ti* 'be rabid-INF' : *ràk-ti* 'pick (at)-INF' : *àk-ti* 'go blind-INF'. If we remove /uˑ/, /oˑ/, /aˑ/, we would get sound combinations which are impossible in Lithuanian: **/krmuˑ/, */slpùs/, */trkti/.

§ 101. The class of consonants (abbreviated *C*, cf. Lat. *consonans* 'consonant') consists of those phonemes which cannot form a

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[10] Hjelmslev initially set up requirements for vowels which were too strict. He maintained that only those phonemes should be considered vowels which can function by themselves as separate words or even utterances (see, for example, [Hjelmslev 1936: 52]). He later rejected this view (cf. [Hjelmslev 1963: 29 et passim; Fischer-Jørgensen 1975: 137 and references]). Trubetzkoy remains on the sidelines regarding this issue: as noted above (§ 14), he distinguished vowels and consonants only according to their phonetic features [Trubetzkoy 1977: 82–85 = Trubeckoj 1960: 102–104].

syllable without the support of a vowel, in other words, which may or may not be in a syllable. In Lithuanian, these are the phonemes /k g t d p b s z š ž l r n…/, for example *bal̃-zga-nas* 'whitish', *kár-šta* 'hot', *pã-ža-das* 'promise'. These phonemes contrast with vowels as peripheral parts of the syllable to the center, since they cannot form a syllable.

It is true that in some languages [r l m n]-type sounds may play the role of syllable nucleus, cf. Skt. *r̥kṣas* 'bear', *vr̥kas* 'wolf', *pitr̥̄ṇām* 'father-GEN.PL', Cz. *krk* 'neck', *pln* 'full', *vrch* 'top' [Trachterov 1956: 19], Yoruba *ńsùn* 'sleep-3PL.PRS', *ńwọn ḿbọ̀* 'return-3PL.PRS'. The set (*l̥̃, *r̥̃, *ñ̥, *m̥̃) of these sounds is also reconstructed for the Indo-European proto-language (for example, [Brugmann, Delbrück 1897: 392ff., 451ff.; Meje 1938: 129–130; Semeren'i 1980: 60–62]). In such cases, we can either distinguish an intermediate class of consonants (sonorants), or treat syllabic [l̥ r̥ n̥ m̥] as secondary variants of the corresponding consonant phonemes, which only occasionally perform the role of vowels [Kuryłowicz 1960: 217, fn. 22 = Kurilovič 1962: 301–302, fn. 22]. We will characterize vowels in such languages as phonemes which can only function as a syllable nucleus and treat as consonants those phonemes which at least in many cases are peripheral parts of the syllable, whose non-syllabic use is the basic syntagmatic function (see § 162 for more on such systems).

§ 102. There are many languages in which an analysis of syntagmatic relations allows us to distinguish essentially only vowel and consonant classes. These are languages of so-called open syllable structure.[11]

The most typical examples are the Polynesian languages, whose syllables are formed only by individual vowels or consonant-vowel combinations. Their syllable structure is described by the formula (*C*)*V* (the element in parentheses is not essential for the syllable), and words or even entire utterances are only of the type (*C*)*V*(*C*)*V*...(*C*)*V*.[12] Hence these languages (for example, Maori, Hawaiian, Tahitian) have

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[11] For a succinct typological survey of such languages, see [Čekman 1979: 127–129 and references].

[12] In the flow of Lithuanian speech as well, *CV*-type syllables are the most common: they form nearly 55% of a text (see [Karosienė, Girdenis 1994 (= Girdenis 2001: 116ff.)]; cf. also, for example, [Vinogradov 1976: 295; Schane 1972: 208]).

only the following syllables: a) *V*-type: Maori *aroha* 'love', *iraamutu* 'nephew', *iwa* '94', Ha. *aloha* 'love', *amo* 'carry on the shoulders', *ola* 'alive', Ta. *aha* 'what', *arii* 'chief', *ono* '6'; b) *CV*-type: Maori *manawakino* 'uneasy', *ngahuru* (*ng* = /ŋ/) '10', *tamahine* 'daughter', *werawera* 'be warm', Ha. *haneli* '100', *hookamaliʔi* (/ʔ/ is a glottal stop) 'childlike', *keokeo* 'white', Ta. *faaite* 'make known-INF', *hamaniraa* 'building', *tapiri* 'join together-INF'. On the other hand, complex accumulations of vowels are possible: Maori *aahea* 'when', *aeaeaa* 'panting', *hooiho* 'horse', *maaua* 'we two', *taaone* 'town', Ha. *haainu* 'hear', *oiaio* 'truth', Ta. *roroaroroa* 'long' (cf. also the Hawaiian volcano name *Kīlauea*). Borrowings also conform to this syllable and word structure: Maori *aapotoro* 'apostle' (← Eng. *apostle*), *kaanara* 'candle' (← Eng. *candle*), *karaka* 'clerk' (← Eng. *clerk*), *pere* 'bell' (←Eng. *bell*), *puru* 'bull' (←Eng. *bull*). In this regard, Polynesian speakers are no different from the above-mentioned African Yoruba speakers (see § 13, 101), whose syllables are also only of the (*C*)*V*-type: a) *àkúkọ* 'rooster', *ewúrẹ* 'goat', *ibiti* 'where', *oníbàtà* 'shoemaker'; b) *búburú* 'bad', *kórira* 'hate', *pátákò* 'hoof', *púpò* 'much'; c) *àádọ́ọ̀jò* '150', *àìbẹ̀ru* 'courage', *eléèrú* 'deceiver'. The only difference is that an /m/, /n/ or /ŋ/, pronounced with a high tone, can occasionally function as a vowel: 'return-3PL.PRS', *èmi ŋ́kawe* 'I read'. Thus within the class of Yoruba consonants there stands out a small set of phonemes which can play a secondary vocalic role (cf. § 101).

Apparently the Polynesian languages can so easily get by with such a rudimentary "organization" of phonemes because their phonemic inventory is exceedingly limited. Maori, for example, has only fifteen phonemes (*V* = /i e a o u/, *C* = /h p t k f w m n ŋ r/), Tahitian fourteen (*V* = /i e a o u/, *C* = /ʔ h p t f v m n r/), and Hawaiian only thirteen (*V* = /i e a o u/, *C* = /ʔ h p k w m n l/).[13] These are the most impoverished of all known phonological systems. The further removed languages are from this particular ideal, the greater the need and the possibility for finer groupings of phonemes. Nevertheless, the basic and most frequent syllable type, (*C*)*V*, and the most basic phoneme classes—consonants and vowels—are found in all languages.

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[13] Some find only twelve phonemes in this system (they do not assign [ʔ] to their inventory, for example, [Serebrennikov 1983: 221]).

c) ISOMORPHISM

§ 103. A core and peripheral parts are found not only in syllables, but in other complex linguistic units as well (see, for example, [El'mslev 1960b: 366 et passim; Kuryłowicz 1960: 16ff. = Kurilovič 1962: 21ff.; Makaev 1961: 56 et passim; Stepanov 1966: 95; Bulygina 1967: especially 86; Klimov 1967: 103 and references; Stepanov, Èdel'man 1976: 271, fn. 115; Lekomcev 1980: 174], etc.; cf. [Murat 1964: 173–175 and references]). If a language is characterized by stress, then a stressed syllable is the core of the word and stressless syllables are peripheral, since only a stressed syllable can be the expression of an independent word (see § 226). Every word, treated from the standpoint of meaning, consists of a core, formed by the root, and peripheral parts—various affixes, since a word can in some cases be represented by a root alone (*vãkar* 'evening'), while affixes can only occur together with a root. In every normal collocation of words we find a core, the so-called basic member, and a peripheral part, the secondary member. The syntactic function of a collocation is determined only by its core, or basic member: from a syntactic standpoint *jaunà mergáitė* 'young girl' = *mergáitė* 'girl', *labaĩ jaunà* 'very young' = *jaunà* 'young', *graũdžiai dainãvo* 'sang sadly' = *dainãvo* 'sang', since the sentences *Labaĩ jaunà mergáitė graũdžiai dainãvo* 'The very young girl sang sadly', *Jaunà mergáitė graũdžiai dainãvo* 'The young girl sang sadly', *Mergáitė graũdžiai dainãvo* 'The girl sang sadly' and *Mergáitė dainãvo* 'The girl sang' all have the same structure. Finally, an entire sentence has a core, the predicate, with regard to which the other parts of the sentence are peripheral: a single-word sentence, independent of context and situation, can only be formed by a predicate: *Aũšta* 'It is dawning', *Lỹja* 'It is raining', *Témsta* 'It is getting dark'.[14] The central position of the predicate is also shown by the fact that it is almost always accompanied by symmetrically-grouped noun phrases: *Labaĩ gražì mergýtė nẽšasi pilkaĩ raĩną kãtę* 'The very pretty girl is carrying a grey tabby cat', *Darbštíems žmonéms patiñka ir neleñgvas dárbas* 'Industrious people also like difficult work'. These facts show that complex linguistic expressions and units of meaning are formed according to the same principle; they are always characterized by great structural similarity, so-called isomorphism (from the Greek ἴσος 'equal', μορφή 'shape, form').[15]

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[14] See, for example, [Kuryłowicz 1960: 18–19 = Kurilovič 1962: 23–24]; more recent literature: [Stepanov, Èdel'man 1976: 224; Fillmor 1981: 400]; for a survey of verbocentric theories of the sentence, see [Chrakovskij 1983].

[15] The choice of the term is not quite felicitous, since we want to indicate not the identity of structures, but only their similarity. Therefore, more appropriate here would be the term *homomorphism* [Klimov 1967: 86] or even simply *analogy* [Bulygina 1967], but we do not expect that they can dislodge the firmly established *isomorphism*. The fact that its linguistic meaning differs, for example, from its mathematical meaning is not a decisive argument: *reaction* in chemistry means something quite different than in politics or physiology.

The contrast between core and periphery is one of the most salient manifestations of isomorphism, but it is by far not the only one (cf. § 68, 115, etc.).

The great value of isomorphism is that it allows experience gained in phonological research to be transferred to research in grammar and other areas of language [Stepanov 1966: 299]. The opposite direction is also possible, but new undertakings usually begin in phonology; phonological systems are incomparably simpler than grammatical or semantic systems, and it is therefore easier to perform on them various exploratory observations. This undoubtedly accounts for the phonological orientation of the first structural research on language and its great influence on structural and functional research in other areas of language [Bulygina 1964: 104ff.; Vachek 1966: 76, 84].

d) SYNTAGMATIC CLASSES OF CONSONANTS

§ 104. As we have seen, every "normal" syllable always has a single vowel forming its nucleus. In addition to a vowel, a syllable may have a peripheral part consisting of one or more consonants. Some languages tolerate only a minimal peripheral part of the syllable, while in others various sorts of consonant clusters are possible.

§ 105. Even quite simple combinations of peripheral syllable components make a syntagmatic classification of phonemes possible. For example, the most complex syllables of standard Chinese (they are also always morphemes) can be composed of four elements (cf. [Mulder 1968: 223ff.]):[16] a) a nucleus consisting of the vowels [a e o u ü…], b) a non-syllabic medial element [i̯ ü̯ u̯] preceding the vowel, c) a final element [i̯ u̯ n ŋ], sometimes [r], following the vowel, and d) an initial element, which may consist of the consonants [ḅ ḍ g p˙ t˙ k˙ tẓ tẓ̌ ts˙ tš˙ m n…], for example *diàn* 'electricity', *diào* 'hang-INF', *duàn* 'excerpt', *guān* 'view-INF', *guáng* 'wide', *piān* 'record', *piāo* 'float-INF', *tián* 'sweet', *tiào* 'jump-INF', *tuán* 'regiment', etc. Thus we distinguish the semi-vowel phonemes /i̯ ü̯ u̯/, which can only directly precede or follow a vowel, the sonorants /r n ŋ/, which can

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[16] Here and elsewhere in Chinese examples, *b*, *d*, *g* represent the unaspirated lenis plosives [ḅ], [ḍ], [g]. These sounds are most often pronounced almost like Lithuanian [p], [t], [k], but may also have semi-voiced optional variants. Contrasting with them are the voiceless aspirates [p˙], [t˙], [k˙], written *p*, *t*, *k*; as in English, the digraph *ng* represents a velar [ŋ]. Cf.: *bái* [ḅái] 'white' : *pái* [p˙ái] 'row', *dào* [ḍàu] 'road, principle' : *tào* [t˙àu] 'coupling, case', *gòng* [g̣òŋ] 'common' : *kòng* [k˙òŋ] 'empty'.

occupy final position, and the consonants, which can directly precede both a vowel and /i̯ ü̯ u̯/.

Moreover, (1) /b̦ pʿ m f/ are distinguished from other consonants in that they can never precede a medial /u̯/. Affricates and fricatives (2) are characterized by the fact that they can precede the so-called "special" final /i̵/. This allows us to unite them into a common sub-class contrasting with plosives, which never occur before final /i̵/. There is even complementary distribution between the palatals /tź tśʿ ś/ (transliterated *j, q, x*) and the dorsals /g̑ k̑ x̑/ (written *g, k, h*), since /tź tśʿ ś/ are always followed by the medials /i̯ ü̯/, before which /g̑ k̑ x̑/ are not used. The consonants /d̦ tʿ n l/ are possible in all positions except second.

Hence all Chinese consonants can first be divided into those which can precede a "special" final, and those which are not possible in this position. We can denote the former with the symbol Σ and the latter with Θ. The Θ-class further splits into these subclasses: a) *P*—consonants which cannot precede a medial /u̯/, b) *T*—consonants preceding all medials, c) *Ć*—consonants which can only precede /i̯ ü̯/, d) *K*—consonants which cannot precede /i̯ ü̯/. Each syntagmatic class thus established can also be characterized by the phonetic features common to all its members. All *P*-class consonants are labial, *T*-class members are apical, *Ć* are palatal, and *K* are dorsal; the affricates and fricatives (the Σ-class) share the feature of turbulence [Klyčkov 1984].[17]

A still more exhaustive and accurate syntagmatic classification of consonants is possible in phonological systems with freer word and syllable structure, for example those of Greek, Latin, Old Indic, and also Modern German, and, in part, Slavic, and various other languages. Such a phonological system is also characteristic of Lithuanian, and we can therefore use it as a typical example.[18]

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[17] It should be noted that even in Lithuanian and its dialects, the fricatives and affricates form a single auditory class, opposed to plosives and sonorants (cf. [Remenytė 1992: 159ff. and references]; for Polish data, see [Łobacz 1981: 108, 109, 118]).

[18] The consonant combinations of standard Lithuanian are recorded in depth in Pupkis's dissertation [1966b], which also gives an overview of previous studies on this topic. Very interesting is Toporova's work [Toporova 1972] (unfortunately with some factual and printing errors: cf. [Girdjanis 1977: 305–

§ 106. A Lithuanian syllable can have two consonant clusters: an initial and a final (see [Kuryłowicz 1960: 213 et passim = Kurilovič 1962: 296–297 et passim],[19] cf. Eng. *onset* and *coda* [Hockett 1955: 52ff.]). For example, the word *spriñgs* [ŝp̂r̂iñ.ks] 'choke-3FUT' consists of a syllable with nucleus /i/, consonant onset /spr/, and coda /nks/.[20] If we denote the onset as C_o and the coda as C_c, then a syllable of full structure is of the type C_oVC_c. The nucleus consists of a single vowel; a syllable may have no peripheral clusters. For both C_o and C_c, the number of elements in the cluster can vary from zero to several consonants. Thus, a summary formula of syllable structure would be $(C_o)V(C_c)$; here, as elsewhere, optional elements are placed in parentheses. Even this formula is imperfect, however, since the onset and coda consonant clusters are not quite equivalent. If we compare such words as *kù-tas* 'fringe' : *kùr-tas* 'greyhound'; *pìk-tas* 'angry' : *pir̃k-tas* 'bought', *sùk-tis* 'spin, rotate-INF' : *suñk-tis* 'ooze-INF', *vè-sti* 'lead-INF' : *ver̃-sti* 'throw down; translate-INF', we see that stressed syllables with an /l r m n/ coda necessarily have either acute or circumflex accent, just like syllables consisting of long vowels: *lõ-po* 'patch-GEN.SG' : *ló-po* 'patch-3PRS', *rũk-sta* 'smoke-3PRS' : *rú̃g-sta* 'turn sour-3PRS' (cf. § 241–244). Syllables consisting of short vowels with no /l r m n/ coda have no pitch accent and indeed cannot have it. Thus an /l r m n/ coda radically changes the prosodic nature of a syllable, making it equivalent to a syllable with a long-vowel nucleus. Onsets do not have a corresponding effect on a syllable: *àk-si* 'go blind-2SG.FUT' : *ràk-si* 'pick (at)-2SG.FUT' : *tràk-si* 'become rabid-2SG.FUT' : *stràk-si* 'skip, caper-3PRS', *àk-ti* 'go blind-INF' : *làk-ti* 'lap-INF' : *plàk-ti*

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306 (= Girdenis 2000c: 384f.)]), in which primary data are grouped on the basis of Harary and Paper's original methods in mathematical statistics (see [Chèrari, Pejper 1964]). Consonant combinations are systematically treated in Strimaitienė's dissertation [Strimajtene 1976], as well as in individual publications on this topic (for example, [Strimaitienė 1974a; 1974b; 1979]; cf. also [Karosienė 1983]). On the consonant combinations of Lithuanian dialects and their syntagmatic classification, see [Girdenis 1967b: 203–227, 272–279; 1970a (= Girdenis 2000b: 194ff); 1971b: 30 (= Girdenis 2000b: 221); Lekomceva 1972: 119–121; Sudnik 1975: 63–81, 116–120, 165–169; Jasiūnaitė 1993: 93ff. and references].

[19] Kuryłowicz follows Saussure in using these terms (cf. [Saussure 1967: 79–83 = Sossjur 1977: 88–97]), but gives them different meanings.

[20] For the sake of simplicity, we will ignore hardness or softness of consonants here (and further).

'flog-INF'; the first syllable in each of these examples is prosodically the same. A coda, then, is much more closely connected with a syllable nucleus than an onset is (cf. [Kuryłowicz 1960: 18, 213 = Kurilovič 1962: 24, 296]); in metrical phonology the coda is combined with the nucleus into a single unit (VC_c), called the rhyme ([Hulst, Smith 1982: 38 et passim]; cf. Cz. *základ* 'id.' [Palková 1997: 153]). Therefore a syllable of expanded structure may be broken down as follows (see figure 1; Σ = syllable):[21]
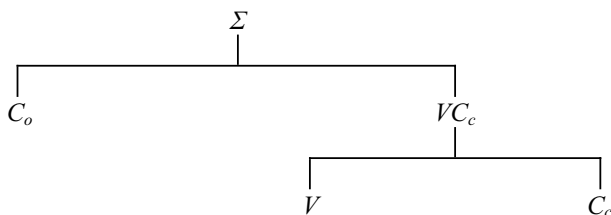
Figure 1. Syllable structure (general view)

With this analysis in mind, it would be best to describe syllable structure with the modified formula $((C_o))V(C_c)$, denoting with double parentheses the most autonomous part of the syllable, least connected with the nucleus and contrasting with the rhyme (VC_c).

The fact that the coda plays a more important role in syllable structure than the onset can be seen from rhymes in traditional poetry. As we know, in the masculine rhymes of Maironis and other classics of earlier Lithuanian poetry, stressed vowels, together with a following consonant, always coincide, while consonants preceding the vowel usually do not: *pilìs* 'castle' : *vìs* 'still', *platỹn* 'across' : *žemỹn* 'down',

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[21] For similar diagrams see [Kuryłowicz 1960: 214 = Kurilovič 1962: 298]. Hockett's analysis of syllable structure can be presented as follows (*S*: *satellite*, *N*: *nucleus*, *O*: *onset*, *P*: *peak*, *C*: *coda* [Hockett 1955: 150–151]):
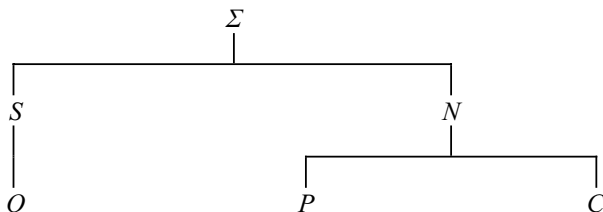
As noted above (§ 106), the nucleus was later called the rhyme.

*žmoga**ũs*** 'person-GEN.SG' : *plata**ũs*** 'wide-GEN.SG', *šird**ìs*** 'heart' : *ak**ìs*** 'eye' (*Trakų pilis* 'Trakai Castle'), *sūn**ùs*** 'son' : *puik**ùs*** 'fine', *šak**às*** 'branch-ACC.PL' : *prar**às*** 'lose-3FUT' (*Oi neverk, matušėle* 'Oh do not cry, Mother'), *laik**ùs*** 'time-ACC.PL' : *b**ùs*** 'be-3FUT', *vis**às*** 'all-ACC.PL.F' : *dūm**às*** 'thought-ACC.PL' (*Mano gimtinė* 'My native land'), *tesupr**às*** 'only-understand-3FUT' : *dūm**às*** 'thought-ACC.PL', *rytmet**ȳs*** 'morning' : *sutirp**ȳs*** 'melt-3FUT', *leda**ĩs*** 'ice-INS.PL' : *milžina**ĩs*** 'giant-INS.PL', *nemyl**ė̃s*** 'not-love-3FUT' : *garb**ė̃s*** 'honor-GEN.SG', *nakti**ė̃s*** 'night-GEN.SG' : *nešvi**ė̃s*** 'not-shine-3FUT' (*Užtrauksme naują giesmę* 'Let us strike up a new song'), *danga**ũs*** 'sky-GEN.SG' : *malona**ũs*** 'pleasant-GEN.SG.M', *žvaigžd**ė̃s*** 'star-GEN.SG' : *atsp**ė̃s*** 'guess-3FUT', *nušv**ìs*** 'brighten, begin to shine-3FUT' : *šird**ìs*** 'heart' (*Užmigo žemė* 'The land has gone to sleep'), *kas**às*** 'braid-ACC.PL' : *atr**às*** 'find-3FUT', *lank**õs*** 'water meadow-GEN.SG' : *visad**õs*** 'always', *šal**ìs*** 'country' : *šird**ìs*** 'heart', *pikt**ùs*** 'angry-ACC.PL.M' : *b**ùs*** 'be-3FUT', *kap**aĩ*** 'grave-NOM.PL' : *vaik**aĩ*** 'child-NOM.PL' (*Kur bėga Šešupė* 'Where the Šešupė flows').

§ 107. Since onset clusters are more weakly connected to the syllable nucleus than codas are, it is best to begin a syntagmatic classification of consonants with these [Kuryłowicz 1960: 215ff. = Kurilovič 1962: 299ff.].

In beginning an analysis, it is simplest to treat as onsets word-initial clusters, since the beginning of a word is also the beginning of a syllable. This helps avoid problems associated with the decomposition of word-medial clusters into the coda of a preceding syllable and the onset of a following syllable. Syllable boundaries almost never have distinctive function (but cf. [Sommerfelt 1981]);[22] speakers are almost never aware of these boundaries,[23] and therefore we can establish them objectively only once we know the rules for the structure of consonant clusters.

§ 108. Word-initially in Lithuanian there is either no consonant at all, or there may be from one to three consonants. We can briefly

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[22] These are interesting observations, but it should nevertheless be noted that all of these "phonologically significant" syllable boundaries coincide with open junctures.

[23] But cf. § 116, fn. 38, which gives examples showing that a "practical" syllabification of words is possible. But in such cases the syllable boundaries are most likely determined according to the "rules of the game."

represent this generalization $C_o \rightarrow C_0^3$ (on the formula, see [Chomsky, Halle 1968: 61; Harms 1968: 63]).

Any consonant, without further restriction, can function as a single-member onset, setting aside the fact that soft ($\hat{C}$-type) consonants are relatively rare before back vowels. As a result of this freedom, single-member onsets provide little information for a syntagmatic classification of consonants.[24]

In two-member onsets the consonants are not arranged randomly, but in a certain strict order (for a more exhaustive list of combinations see [Pupkis 1966b; Strimajtene 1976]).

The following two-member onsets are in general usage: *bj-* (for example *bjaurùs* 'ugly'), *bl-* (*blusà* 'flea'), *br-* (*brastà* 'ford'), *dr-* (*draũgas* 'friend'), *dv-* (*dveľkti* 'blow-INF'), *gl-* (*glaudùs* 'close, tight'), *gn-* (*gnáibyti* 'pinch-INF'), *gr-* (*grúodas* 'frozen mud'), *gv-* (*gvéra* 'become loose-3PRS'), *kl-* (*kláusti* 'ask-INF'), *kn-* (*knáisioti* 'root up-INF'), *kr-* (*krūtìnė* 'breast'), *kv-* (*kvãpas* 'smell'), *pj-* (*pjũvis* 'section'), *pl-* (*pláuti* 'wash-INF'), *pr-* (*prõtas* 'intelligence'), *sk-* (*skarà* 'shawl'), *sl-* (*slogà* 'head cold'), *sm-* (*smagùs* 'cheerful'), *sn-* (*snãpas* 'beak'), *sp-* (*spáusti* 'press-INF'), *sr-* (*srė̃bti* 'spoon-INF'), *st-* (*staigùs* 'sudden'), *sv-* (*svõris* 'weight'), *šl-* (*šlúota* 'broom'), *šm-* (*šmaikštùs* 'witty'), *šn-* (*šnairúoti* 'squint-INF'), *šp-* (*špygà* 'fig (fam.)'), *šč̂-* (*ščiū́ti*[25] 'abate (of wind)-INF'), *št-* (*štaĩ* 'here'), *šv-* (*švarùs* 'clean'), *tr-* (*trupinỹs* 'crumb'), *tv-* (*tvártas* '(cow) barn'), *zl̂-* (*zliaũkti* 'stream, gush-INF'), *zm-* (*zmèkti* 'grow stale (of bread)-INF'), *zv-* (*zviñ̃bti* 'buzz-INF'), *žl-* (*žlùgtas* 'soaked wash'), *žm-* (*žmogùs* 'person'), *žn-* (*žnáibyti* 'pinch-INF'), *žv-* (*žvalùs* 'cheerful'). Additionally, the following occur in dialectal words: *šk-* (Žem. *škar̃malas* "*skar̃malas*" 'rag', *škùina* "*kuĩnas*" 'old nag'), *zg-* (Žem. *zgedáuti* 'miss-INF'); in proper nouns: *zb-* (*Zbãras*), *zd-* (*Zdanỹs*, *Zdõniškiai*); in borrowings: *km-* (*kmỹnai* 'caraway'), *šr-* (*šrãtas* 'shot, pellet').[26]

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[24] Except for the fact that they divide all consonants into hard and soft (see § 136 below).

[25] Cf. the derivative *nu-ščiū́ti* 'abate (of wind)-INF'. This cluster was omitted in all previous lists of consonant sequences (even [Girdenis 1981a: 76]; it was first noted by Vladas Žulys.

[26] So-called internationalisms—borrowed words introduced through writing tradition—do not belong to the basic (core) linguistic system, and should therefore not be considered in establishing phoneme classes (see, for example,

Certain members of these clusters can only precede a vowel: /j/ (*bj-*, *pj-*), /l/ (*bl-*, *gl-*, *kl-*, *pl-*, *sl-*, *šl-*, *zl-*, *žl-*), /m/ (*km-**,[27] *sm-*, *šm-*, *zm-*, *žm-*), /n/ (*gn-*, *kn-*, *sn-*, *šn-*, *žn-*), /r/ (*br-*, *dr-*, *gr-*, *kr*, *pr-*, *sr-*, *šr-*), /v/ (*dv-*, *gv-*, *kv-*, *sv-*, *šv-*, *tv-*, *zv-*, *žv-*).

Those consonants which can occur not just before vowels are divided in turn into two classes. The first subclass consists of /s š z/, which can occur only directly after a pause, in other words, only as the first member of a consonant cluster: *sk-*, *sl-*, *sm-*, *sn-*, *sp-*, *sr-*, *st-*, *sv-*, *šk-**, *šl-*, *šm-*, *šn-*, *šp-*, *šr-**, *št-*, *šv-*, *zb-**, *zd-**, *zg-**, *zl-*, *zm-*, *zv-*, *žl-*, *žm-*, *žn-*, *žv-*). The other subclass includes /b d g k p t/, which can occupy both first and second position: *bj-*, *bl-*, *br-* and *zb-**; *dr-*, *dv-* and *zd-**; *gl-*, *gn-*, *gr-*, *gv-* and *zg-**; *kl-*, *km-**, *kn-*, *kr-*, *kv-* and *sk-*, *šk-**; *pj-*, *pl-*, *pr-* and *sp-*, *šp-*; *tr-*, *tv-* and *st-*, *št-*).

Hence all consonants, according to their position in two-member onsets, must first be divided into two classes: 1) an *R*-class,[28] consisting of the consonants /j l m n r v/, which can only directly precede a vowel, and 2) a *C*-class, consisting of /b d g k p s š t z ž/, which can appear not just before a vowel. In the *C*-class, two subclasses are distinguished: a) an *S*-subclass /s š z ž/, whose members can appear only in word-initial position; and b) a *T*-subclass /b d g k p t/, whose members can occupy both first and second position. Clusters composed of members of the *C*-class are always of the type *ST-* (*sk-*, *sp-*, *st-*, *št-*, etc.). The situation with /č̃/ remains not quite clear for now, since in the position [S—V] members of both the *T* and *R*-class are possible; also problematic is /ž/, found only before consonants of the *R*-type, where both *T*- and *S*-type phonemes occur.

[Trubetzkoy 1977: 205–206 = Trubeckoj 1960: 254–256; Bluhme 1965: 220; Sigurd 1968: 453; Padlužny 1969: 114; Malmberg 1971: 442–443; O'Connor, Trim 1973: 243; Wurzel 1977: 180], etc.; cf. also § 168). Nor is the cluster *vl-*, occurring in the name *Vlãdas*, considered a fact of Lithuanian, since the Lithuanianized form of this name is *Lãdas* or *Blãdis* (there are still more such proper nouns of similar non-Lithuanian structure).

[27] The asterisk denotes clusters known only from borrowings, dialectal words, or proper nouns.

[28] Clusters are summarized with a capital letter denoting one of their more typical members.

§ 109. Thus we obtain the following syntagmatic classification of consonants (see figure 2; Σ is any consonant).[29]
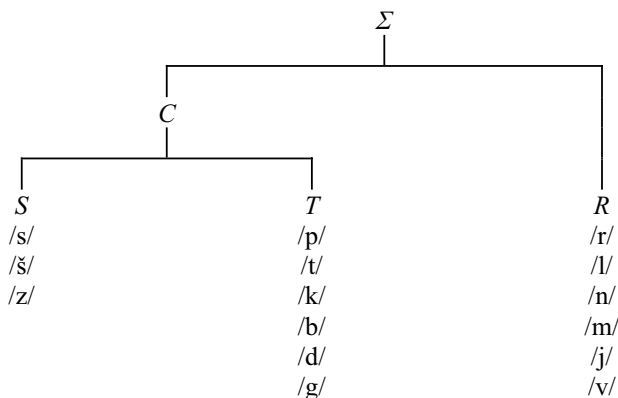
Figure 2. Syntagmatic classification of consonants

This classification is especially nicely reflected in three-member onsets, which can only be of the *STR*--type: *skl-* (*sklaidýti* 'turn pages-INF'), *skr-* (*skrãbalas* 'wooden bell'), *skv-* (*skvarbùs* 'penetrating'), *spj-* (*spjáuti* 'spit-INF'), *spr-* (*sprū́sti* 'slip off-INF'), *str-* (*strãzdas* 'thrush'), *stv-* (*stvérti* 'snatch-INF'), *spl-** (dial. *splazdéti* 'flap, flutter-INF', *splū́sna* "*plùnksna*" 'feather'), *škr-** (Žem. *škrãbė* 'old woman (pej.)'), *škl-** (*Šklériai*), *špr-** (*Šprìntas*), *štr-** (*Štrìmas*), *zdr-** (*Zdramỹs*), *zbr-** (borrowing *zbrainùs* 'agile; armed, ready for war'), *zgr-** (borrowings *zgrãbnas*, *zgrebnùs* 'shapely'). These clusters confirm Hjelmslev's law [Hjelmslev 1936: 53] (cf. [Yasui 1962: 24; Fischer-Jørgensen 1972: 573; 1975: 134 and references; Grinberg 1964: 41–42, 46–47]), according to which a cluster of three consonants can exist only when the corresponding two-member cluster also exists; in other words, the presence of an *STR*-type cluster implies the presence of corresponding *ST-* and *TR*--clusters (*STR* ⊃

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[29] On the purely phonetic possibility of referring [j] and [v] to the same class as [l r m n] see, for example, [Fant 1964: 208–210]. In Lithuanian, this treatment of [j v] is supported by their intrinsic duration, which is quite close to that of [l r m n] [Tankevičiūtė 1981: 118] and also by the tendency of "dysgraphic" children to replace, for example, [r] by [j] or [v], or by other members of the *R* class ([r] is not replaced by *S-* or *T*-type sounds) [Gelumbauskaitė 1968: 10].

(*ST & TR*)), cf. *skl-* : *sk-* and *kl-*, *skr-* : *sk-* and *kr-*, *spj-* : *sp-* and *pj-*, and so forth.

The *C*-class also has a constant place in medial three-member clusters: the second (internal) member of these clusters can only be of the *C*-type: *mókslas* 'science', *kremzlẽ* 'cartilage', *nevékšla* 'puny creature', *pūgžlỹs* 'ruffe', *tamprùs* 'elastic', *kamblỹs* 'butt end', *añtras* 'second', *gañdras* 'stork', *žìrklės* 'scissors', *anglìs* 'coal'. In addition, only members of this class undergo so-called voicing assimilation, or, in phonological terms, neutralization (see § 141ff.); a cluster of *C*-class consonants (i.e., a cluster of the type *SS*, *TT*, *ST*, *TS*) may only be entirely voiced or voiceless: *béga* 'run-3PRS' : *bé*[k]*ti* 'run-INF', *sùka* 'twist-3PRS' : *sù*[g]*davo* 'twist-3PST.FREQ', *vẽža* 'take (by vehicle)-3PRS' : *vè*[š̃]*ti* 'take (by vehicle)-INF', etc. Members of the *R*-class are indifferent to this assimilation; they neither devoice before voiceless consonants nor trigger voicing in other consonants, although they are naturally voiced: *kam̃pas* 'corner', *pìlti* 'pour-INF', *tárpas* 'interval', *žénklas* 'sign', where /l m n r/ remain voiced, although they precede voiceless /k p t/; or *kláusti* 'ask-INF', *kmỹnai* 'caraway', *knìsti* 'nuzzle-INF', *pjáuti* 'cut-INF', *tráukti* 'pull-INF', *tvártas* '(cow) barn', where /k p t/ remain voiceless, even though they precede voiced /j l m n r v/. In no dialect of Lithuanian does one say **gláusti*, **gmỹnai*, **gnìsti*, **bjáuti*, **dráukti*, **dvártas*. It is true that speakers of North Žemaitic pronounce in some cases a voiceless [ɫ], [m], [n], and especially [r], for example, NŽem. *tâ·r̥ps* "*tárpas*" 'interval', *kâ.l̥ts* "*káltas*" 'chisel', etc. [Girdenis 1967b: 249],[30] but this is not true assimilation, since voiceless [l̥], [r̥], etc., are only particular allophones of /l/, /r/. Similar voiceless allophones of this type are regularly used in Icelandic: *hjarta* ['çaɾ̥tˈa] 'heart', *kampur* ['kˈam̥pˈʏr̥] 'beard, moustache', *penta* ['pˈɛn̥tˈa] 'paint, draw', *stúlka* ['sdul̥kˈa] 'girl' (cf. also Ru. *вихрь* [vʲixr̥ʲ] 'whirlwind', *мётл* [mʲótl̥] 'broom-GEN.PL.' [Zinder 1979: 53]; on similar phenomena in Latvian see [Endzelīns 1951: 27]).

§ 110. A more detailed analysis of clusters permits a finer decomposition of the members of each subclass. For example, individual members of the *T*-class are characterized by these distributional constraints:

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[30] The devoicing /j/ → [ç] / [p—] has long been noted in the pronunciation of Aukštaitic speakers [Ekblom 1922: 19].

1) only /p b/ never precede /v/,
2) only /t d/ never precede /l/ word-initially.

Hence the *T*-subclass of consonants can be classified as follows (see figure 3).

T
|
1

2   /p b/

/k g/   /t d/
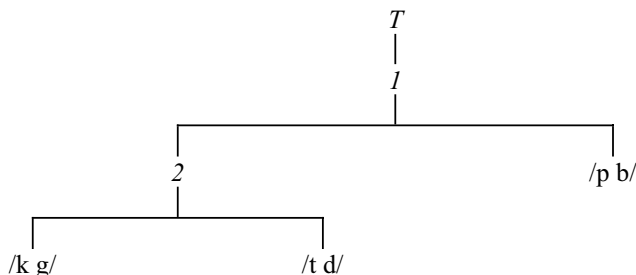
Figure 3. Classification of the *T*-subclass of consonants

Consonants of the *R*-class also split into certain syntagmatic subclasses. For example, clearly distinguished from the all the rest are /m n/, which are not found in three-members consonant clusters (if we disregard the rare borrowing *sknarùs* 'stingy') or after /p b/ or /t d/ in two-member consonant clusters. If we treat non-syllabic [i̯ u̯] as allophones of /i u/ rather than /j v/, then we need to distinguish a separate /j v/ subclass, which is not used in codas. In this case, we can break down all consonants of the *R*-class as follows (figure 4).

R
|
1

2   /m n/

/l r/   /j v/
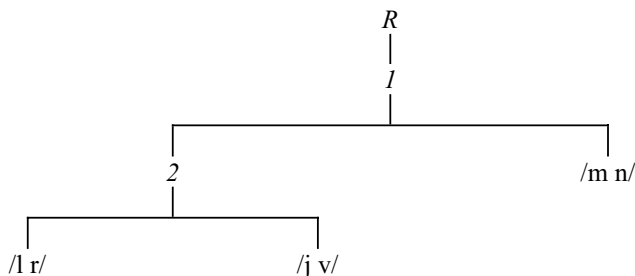
Figure 4. Classification of the *R*-class of consonants

§ 111. It is best to begin analyzing the structure of coda clusters with word-final position, since the end of the word is also the end of a syllable, and most importantly, a final which raises no doubts [Čekman 1979: 124ff.]).

In many cases, final consonant clusters in standard Lithuanian (and in those dialects which preserve final short vowels) can be considered mirror images of initial clusters (see [Kuryłowicz 1960: 213 = Kurilovič 1962: 297]; for a deductive justification [Šaumjan 1962: 172; Basbøll 1977]).[31] They preserve the same relations as in onsets, only the phonemes are arranged in the diametrically opposite order: instead of clusters of the *STR*(*V*)-type, we find (*V*)*RTS*; instead of *SR*(*V*), (*V*)*RS*; instead of *TR*(*V*), (*V*)*RT*; and instead of *ST*(*V*), (*V*)*TS*:

1) *STR*(*V*) : (*V*)*RTS*[32]

skl-	:	*-lks*	(*vil̃ks* 'drag, put on-3FUT')
skr-	:	*-rks*	(*ver̃ks* 'cry-3FUT')
spr-	:	*-rps*	(*tar̃ps* 'thrive-3FUT')
spl-	:	*-lps*	(*til̃ps* 'fit-3FUT')
škl-	:	*-lkš*	(*tel̃kš* 'lie stagnant-3FUT')
škr-	:	*-rkš*	(*čir̃kš* 'chirp-3FUT')
špr-	:	*-rpš*	(*šnir̃pš* 'blow one's nose-3FUT')

2) *SR*(*V*) : (*V*)*RS*

sl-	:	*-ls*	(*pabal̃s* 'turn white-3FUT')
sm-	:	*-ms*	(*vísiems* 'all-DAT.PL.M')
sn-	:	*-ns*	(*nuskiñs* 'pick (off)-3FUT')
sr-	:	*-rs*	(*patar̃s* 'advise-3FUT')
šl-	:	*-lš*	(*mel̃š* 'milk-3FUT')
šm-	:	*-mš*	(*kim̃š* 'stuff-3FUT')
šr-	:	*-rš*	(*ver̃š* 'draw tight-3FUT')

For historical reasons, we lack an equivalent here to *šn-* (cf. *greñš > grẽš* 'bore-3FUT'). If we treat [i̯ u̯] as allophones of /j v/, we can extend the list with the clusters *sv-* : *-u̯s* (*gaũs* 'get-3FUT'), *šv-* : *-u̯š* (*šiaũš* 'ruffle-3FUT').

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[31] This can be succinctly summarized as a "planetary" model (cf. [Basbøll 1977: 144–145, figures 1–2]), in which the vowel (*V*) is at the center, and around it, in ever more distant orbits, are *R*-, *T*- and *S*-class consonants. Before a vowel these "planets" are always arranged in *S-T-R* order, and after a vowel, in *R-T-S* order.

[32] Coda clusters can be justifiably considered "derivatives" of onset clusters, since there are languages having only onset clusters (cf. Old Church Slavic and also Old Russian before the fall of the reduced vowels), while there are no languages which would have only coda clusters.

3) *TR(V)*   :   *(V)RT*

     kl-   :   *-lk*   (*pìlk* 'pour-2SG.IMP')

     kn-   :   *-nk*   (*augìnk* 'grow (tr.)-2SG.IMP')

     kr-   :   *-rk*   (*tar̃k* 'utter-2SG.IMP')

     km-   :   *-mk*   (*stùmk* 'push-2SG.IMP')

     pr-   :   *-rp*   (*tar̃p* 'between')

     tr-   :   *-rt*   (*skìrt* 'distinguish-SHORT-INF')

If [i̯ u̯] = /j v/, then we also have *kv-* : *-u̯k* (*laũk* 'Get away!'), *pj-* : *-i̯p* (*taĩ̯p* 'so; yes'), *tv-* : *-u̯t* (*gáut* 'get-SHORT-INF'). Additionally, there are several clusters here which are not possible in onsets: *-mt* (*im̃t* 'take-SHORT-INF'), *-nt* (*sént* 'grow old-SHORT-INF').

4) *ST(V)*   :   *(V)TS*

     sk-   :   *-ks*   (*tóks* 'such a')

     sp-   :   *-ps*   (*trỹps* 'trample-3FUT')

     st-   :   *-ts*   (*pàts*)[33] 'oneself'

     šp-   :   *-pš*   (*šnỹpš*) 'hiss-3FUT'

     šk-   :   *-kš*   (*kvẽkš*) 'whimper-3FUT'

A number of final clusters corresponding to initial clusters can be found in the dialects: NŽem. *žl-* : *-lž* (*mê·lž* "*mélžia*" 'milk-3PRS'), *br-* : *-rb* (*dê·rb* "*dìrba*" 'work-3PRS'), *pl-* : *-lp* (*tẽ·ɫp* "*teɫpa*" 'fit-3PRS'), SŽem. *žn-* : *-nž* (*grẽ.ñ.ž* "*grẽžia*" 'bore-3PRS'), *šn-* : *-nš* (*grẽ.ñ.š* "*grẽš*" 'bore-3FUT'), but we cannot rely here on these, since the rules for word-final position in these dialects are completely different. For example, the word-final clusters of North Žemaitic are not mirror images of initial clusters, but rather variants of medial clusters (cf. such clusters as *-rkst(-)*, *-rgžd(-)*, used in the words *vã·rkst* "*vař̃gsta*" 'live in poverty-3PRS', *gộ·rgžd* "*gùrgžda*" 'squeak-3PRS' and *vã·rkstâ.m* "*vař̃gstame*" 'live in poverty-1PL.PRS', *gọ́.rgždộ̃·s* "*gurgždą̃s*" 'squeaking'), hence of a completely different structure than the coda clusters of the standard language (cf. § 126).

§ 112. There can also be more complex coda clusters, since an unmotivated /k/ or /t/ can sometimes be added to these. These are

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[33] An optional realization. The word is often pronounced with an affricate, but (as a comparison with the interjection *bàc* 'bang!' would show) it does not seem quite "pure," so that phonologically it should nevertheless be considered a phoneme sequence.

found, for example, in second-person singular imperatives and in shortened infinitives and onomatopoeic interjections: 1) *-nkš* : *-nkšk* (*kveňkšk* 'cough-2SG.PRS') and *-nkšt* (*kveňkšt* 'cough-SHORT-INF'), *-rkš* : *-rkšk* (*čiřkšk* 'chirp-2SG.IMP') and *-rkšt* (*čiřkšt* 'chirp-SHORT-INF'), *-rpš* : *-rpšk* (*šniřpšk* 'blow one's nose-2SG.IMP') and *-rpšt* (*šniřpšt* 'blow one's nose-SHORT-INF'); 2) *-ls* : *-lsk* (*meĺsk* 'pray-2SG.IMP') and *-lst* (*bìlst* 'bang!'), *-ms* : *-msk* (*kriм̃sk* 'nibble-2SG.IMP') and *-mst* (*kriм̃st* 'nibble-SHORT-INF'), *-rs* : *-rsk* (*veřsk* 'bring down; translate-2SG.IMP') and *-rst* (*veřst* 'bring down; translate-SHORT-INF'), *-lš* : *-lšk* (*mél*[š]*k* 'milk-2SG.IMP') and *-lšt* (*mél*[š]*t* 'milk-SHORT-INF'), *-mš* : *-mšk* (*kiм̃šk* 'stuff-2SG.IMP') and *-mšt* (*kiм̃št* 'stuff-SHORT-INF'), *-rš* : *-ršk* (*užmiřšk* 'forget-2SG.IMP') and *-ršt* (*užmiřšt* 'forget-SHORT-INF'); 3) *-lk* : *-lkt* (*viĺkt* 'drag, put on-SHORT-INF'), *-nk* : *-nkt* (*liňkt* 'bend-SHORT-INF'), *-rp* : *-rpk* (*veřpk* 'spin (flax)-2SG.PRS') and *-rpt* (*veřpt* 'spin (flax)-SHORT-INF'); 4) *-ks* : *-ksk* (*mè*[k]*sk* 'knit-2SG.IMP') and *-kst* (*mè*[k]*st* 'knit-SHORT-INF'), *-kš* : *-kšk* (*kvě̃kšk* 'whimper-2SG.IMP') and *-kšt* (*pǔkšt* 'pant-SHORT-INF'), *-pš* : *-pšk* (*šnỹpšk* 'hiss-2SG.IMP') and *-pšt* (*šnỹpšt* 'hiss-SHORT-INF'). Also undoubtedly here are clusters such as *-sk* (*vèsk* 'take (by vehicle)-2SG.IMP'), *-šk* (*nèšk* 'carry-2SG.IMP'), *-pk* (*lìpk* 'climb-2SG.IMP'), *-pt* (*lìpt* 'climb-SHORT-INF'), *-kt* (*lě̃kt* 'fly-SHORT-INF'), in which we have a normal single-member coda extended by an unmotivated /k/ or /t/. Thus an exhaustive formula for a coda cluster would be $V \,\&\, (\emptyset \lor (R \lor T \lor S)) \,\&\, (\emptyset \lor (k \lor\!\lor t))$. The symbols " &, " " $\lor$ " and " $\lor\!\lor$ " are used here with their usual meaning in logic. For example, $R \lor T$ means that either the combination *RT* can be used, or *R* alone, or *T* alone. The only combination not described by this formula is *-rm*, occurring in the preposition *piřm* 'before', but prepositions are not actually independent words, but preposed morphemes (see, for example, [Švedova 1980: 90]).

§ 113. As we see, in unextended coda clusters, the consonant phoneme relations are the same as in onsets, only the direction of the relations is different. Therefore, an analysis of coda clusters sometimes allows us to supplement and refine a syntagmatic classification of consonants [Kuryłowicz 1960: 218 = Kurilovič 1962: 303]. For example, we do not find /m n/ in three-member onsets, and therefore doubts may arise as to whether they function in the same way as other members of the *R*-class. The coda clusters *-nks* (*liňks* 'bend-3FUT'), *-mps* (*teм̃ps* 'stretch-3FUT'), etc., leave no doubt; here /m n/ occupies

the same position as /l r/ and therefore must be assigned to this class. Coda clusters also remove doubts which may arise concerning the clusters *šk-**, *šr-** and others, attested only in words which are not quite reliable. The corresponding clusters *-kš* (*kvẽkš* 'whimper-3FUT', *pū̃kš* 'pant-3FUT'), *-rš* (*užmir̃š* 'forget-3FUT') are entirely normal word-finally, and therefore conclusions reached on the basis of *šk-**, *šr-**, etc., are fully reliable.

e) SYLLABLE STRUCTURE

§ 114. In analyzing the structure of consonantal onset and coda clusters, we also examined the structure of the phonological syllable.

We can now give a more concrete shape to the abstract formula $((C_o))V(C_c)$ presented at the beginning of the investigation:

$$((S \vee T \vee R)) \, V \, (\vee R \vee T \vee S \vee (k \vee\vee t)).$$

A syllable containing all elements except an unmotivated /k/ and /t/ (for example *spriñgs* 'choke-3FUT') can now be represented in the following diagram (figure 5).
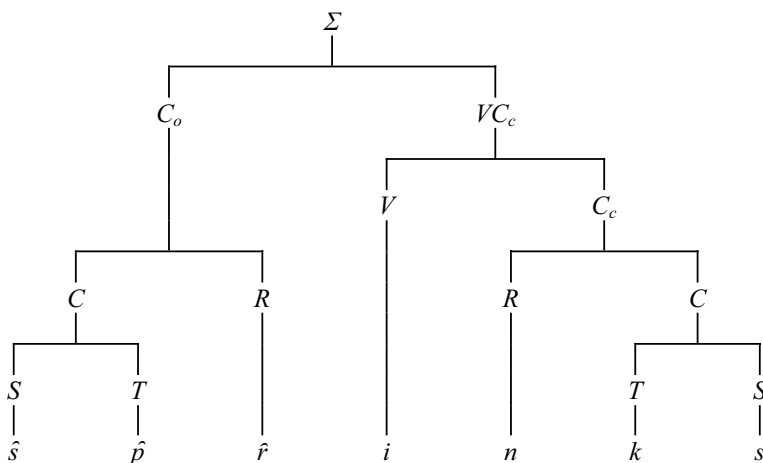
Figure 5. Diagram of syllable structure (version I)

Taking prosodic phenomena into account (see § 241–244), we might better represent syllables with *R*-type consonants in a word-final coda as follows (figure 6).
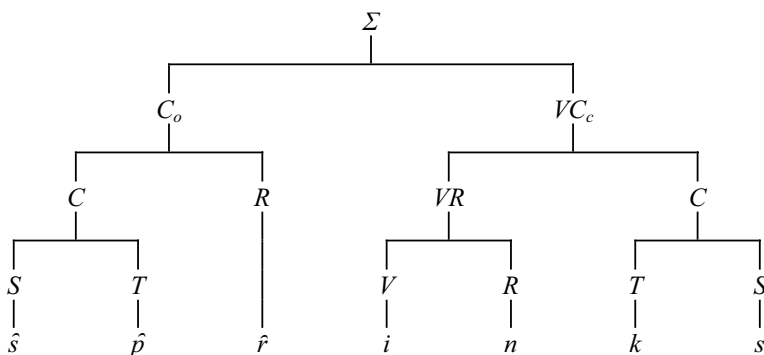
Figure 6. Syllable structure (version II)

§ 115. Recalling the dichotomous tree diagrams (or dendrograms: Gk. *δένδρον* 'tree', *γράμμα* 'writing') of sentence structure, we easily observe their similarity to this syllable diagram. For example, the above sentence *Labaĩ gražì mergýtė nẽšasi pilkaĩ raĩną kãtę* 'The very pretty girl is carrying the grey tabby cat' breaks down into these *immediate constituents* (Ru. *непосредственно-составляющие*; see figure 7):
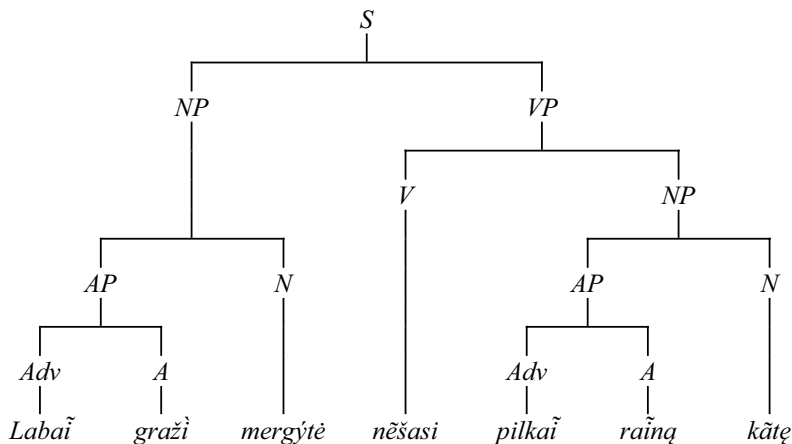
Figure 7. Diagram of sentence structure

This sentence is directly composed of two word collocations (see, for example, [Chomskij 1962: 432; Stepanov 1966: 66]): a noun phrase (NP; the subject) and a verb phrase (VP; the predicate). The verb phrase (predicate) consists of a verb (V) and a noun phrase (NP). Each noun phrase consists of a noun (N) and an adjective (attributive) phrase (AP), and an adjective phrase consists of an adjective (A) and an adverb (Adv) (modifier).

As we see, this sentence diagram nearly coincides with the diagram of syllable structure. The only difference is in the left-branching order of the constituents in the right branch of the sentence diagram (beginning with NP), corresponding to the syllable coda, which shows a right-branching constituent order. It seems that we can even find in this sentence equivalents to the unmotivated consonants of coda clusters. For example, we might consider as such equivalents adverbial modifiers connected with an entire verb (predicate) phrase and forming its "situational background" (cf. *Výrai pjáudavo šiẽną paryčiaĩs* 'The men would mow hay early in the morning', where *paryčiaĩs* 'early in the morning' is an adverbial modifier connected not just with the predicate *pjáudavo* 'would mow', but with the entire phrase *pjáudavo šiẽną* 'would mow hay'). This shows once again the high degree of isomorphism between the syllable, a unit of expression, and the sentence, a unit of content (cf. § 103).[34] One gets the impression that syllables and sentences are "built" according to the same plan.

f) SYLLABLE BOUNDARIES

§ 116. The study of syllable structure and phonotactic generalizations would not be complete if we failed to treat medial consonant clusters and establish the rules which allow such clusters to be analyzed unambiguously into the coda of a preceding syllable and the onset of a following syllable, or, put more simply, to discover syllable boundaries.[35]

Only in languages lacking consonant clusters are there no problems with syllable boundaries; the boundaries are always between a vowel and a consonant. For example, the above-mentioned Maori words (§ 102) *manawakino* 'uneasy', *tamahine* 'daughter', *werawera* 'be warm' can only be broken down as *ma-na-wa-ki-no*, *ta-ma-hi-ne*, *we-ra-we-ra*; the above-mentioned Yoruba words *à-kú-ko* 'rooster', *o-ní-bà-tà* 'shoemaker', *pú-pò* 'many' must be analyzed similarly.[36]

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[34] We cannot refrain from noting here that the isomorphism of the syllable and sentence had already been grasped by Europe's first syntactician, Apollonius Dyscolus (see, for example, [Heinz 1978: 57–58]).

[35] For a definition of phonological syllable, see [Gulakjan 1972: 365].

It is generally accepted that the syllable is the basic unit of pronunciation, but the question of its phonetic nature and "physical" boundaries is still open (see, for example, [Ladefoged 1975: 217–222; Zinder 1979: 251–256 and references; Kasevič 1981]).

[36] On the other hand, unduly complex and varied consonant combinations, whose structure is difficult to characterize with simple rules, so complicate the

Syllable boundaries are also unproblematic when the syllable is also an element of the content plane—a morpheme or a word (so-called morphosyllables [Klyčkov 1963: 4]); speakers intuitively perceive and single out such syllables very well. A speaker of standard ("Mandarin") Chinese will break down the word *jūnguózhǔyìhuà* 'militarism' into the syllables [tʐ̣iūn-gó-tʐ̣ǔ-ìi-hu̯à] without hesitation, since he/she knows each of these syllables as an independent word which cannot be further analyzed (*jūn* 'army', *guó* 'state', *zhǔ* 'leadership', *yì* 'service', *huà* 'quality'). In other cases, syllable boundaries can be revealed only by a phonological analysis of medial clusters, since language informants usually perceive these boundaries only in those rare cases when they coincide with internal open junctures (see § 36). Phonetic features which would clearly signal the beginning or end of a syllable have not been found thus far,[37] and it is difficult to believe that such signals will ever be discovered [Pulgram 1970: 20], since syllable boundaries do not have a distinctive function and therefore most likely have no special signalling.[38]

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problem of syllable boundaries that even preeminent phoneticians hesitate to deal with the issue (cf. the skeptical view toward Russian syllable boundaries: [Bondarko 1981: 51–52]).

[37] See fn. 35. Nothing significant has been published on this in Lithuanian linguistics (nevertheless, cf. [Ulvydas 1965: 122–126; Mikalauskaitė 1975: 71–75]; for critical remarks on studies of this type, see [Girdenis, Žulys 1973: 207 (= Girdenis 2000b: 376)]).

[38] But cf. the optimistic hopes of Malmberg [Mal'mberg 1962: 378–381; Malmberg 1971: 115ff.]. Unfortunately, the spectral features which he has observed in fact signal open juncture, rather than syllable boundaries.

I might add here that Aldonas Pupkis and I once assumed (approximately 1962–1966) that Lithuanian non-final syllables were open (except, of course, for those which are "covered" by a sonorant; cf. also [Mažiulis 1965: 23 and 25]). We were persuaded of this by the so-called "inside-out" language—a children's slang formed from normal language by adding to each syllable the same meaningless syllable: in this "language" the medial consonant clusters (*-TT-*, *-ST-*, *-TS-*, *-TSR-*, *-TST-*, etc.) are transferred in their entirety to the following syllable, for example **ver**pì**verk**tas = *pìktas* 'angry', **ver**lã**verk**sto = *lãksto* 'run around-3PRS', **ver**aĩ**verk**snis = *aĩksnis* 'alder (tree)'. But these facts most likely only show that the children are giving preference to open syllables, and that this does not depend on the properties of adult speech [Kasevič 1981: 144] (for a somewhat different explanation, see [Girdenis 1967b: 279, fn. 2; 1982b: 93f., fn. 1 (= Girdenis 2000c: 396, fn. 1)]).

§ 117. In resolving the question of syllable boundaries, a solution is suggested by the simplest and most complex consonant sequences found word-medially between two vowels—so-called intervocalic position. The simplest is surely a segment consisting of a single consonant; the most complex medial sequence in non-compound words in Lithuanian consists of four consonants: *-lksn-* (*al̃ksnis* 'alder'), *-rkšn-* (*kirkšnìs* 'groin'), *-rpst-* (*sir̃psta* 'ripen-3PRS').

§ 118. As already stated, a single intervocalic consonant forms a syllable with the following vowel: a word of (*C*)*VCV* structure can only be syllabified (*C*)*V-CV*, for example *bã-tas* 'shoe', *ne-be-nu-si-ra-ši-nė́-da-vo-me* 'We no longer used to subscribe', *va-ba-liù-kas* 'beetle (dim.)'. This is an intuitively easily grasped universal principle. It is true that we are accustomed to thinking that in English or German, for example, a consonant following a short (lax) vowel must belong to the same syllable as the vowel: Eng. *belly*, *pretty*, *stocking*, Ger. *besser* 'better', *immer* 'always', *wissen* 'know-INF', syllabified as ['bel-ɪ], ['prɪt-ɪ], ['stɔk-ɪŋ], ['bɛs-əʁ], ['ɪm-əʁ], ['vɪs-ən]. Some linguists assign the consonant to both syllables (for example, [Cacher 1969: 142]). This view is not without justification: in German, the final syllable of a word cannot end in any short vowel except [ə], and in English the only final vowels without secondary stress are [ə ɪ]. Thus, it is logical to assume that other syllables cannot end in short vowels either. But these are only extremely rare exceptions which do not undermine the general rule.[39] On the purely phonetic (rather than phonological) plane, this rule also works in part for Latvian, which in certain cases (see § 74, fn. 53) "distributes" a voiceless consonant between neighboring syllables (*mati* ['mat-tⁱ] 'hair', *upe* ['up-pᵉ] 'river').[40] In general in such cases, a consonant belongs to the syllable of the following, rather than preceding, vowel. This is not difficult to understand: as noted above (§ 102), the most universal model for the syllable is *CV*; all languages of the world tend in this direction.

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[39] Moreover, these may just be exceptions created by theoreticians (cf. [Strimaitienė 1979: 59–60]). It should be noted that phonostatistics in fact support a "normal" syllabification of the above English words: ['prɪ-tɪ] (see [O'Connor, Trim 1973: 258].

[40] But as we already know, the geminates of such Latvian words are allophones of the "simple" phonemes /t/, /p/, etc.; these phonemes, according to the general rule, should belong to the following syllable: /ma-ti/, /u-pe/.

§ 119. There are three types of medial four-consonant clusters in Lithuanian: a) -*RTST*-, for example: -*lkst*- (*álksta* 'be hungry-3PRS'), -*lkšt*- (*tel̃kšta* 'soak-3PRS'), -*lpst*- (*aĺpsta* 'faint-3PRS'), -*mpst*- (*klim̃psta* 'stick, sink (in)-3PRS'), -*rkšt*- (*čiřkštų* 'chirp-3SBJV'), -*rgžd*- (*gar̃gždas* 'pebbles'), -*rpšt*- (*dar*[p]*štùs* 'industrious'); b) -*RTSR*-, for example: -*lksm*- (*dvel̃ksmas* 'whiff, breath'), -*lkšn*- (*kulkšnìs* 'ankle'), -*lkšv*- (*bal̃kšvas* 'whitish'), -*nksm*- (*liñksmas* 'happy'), -*nksn*- (*liñksnis* 'case (gram.)'), -*nkšl*- (*krenkšlỹs* 'one who coughs a lot'), -*nkšn*- (*vìnkšna* 'elm'), -*rgzl*- (*urgzlỹs* 'grumbler'), -*rksm*- (*veřksmas* 'crying'), -*rksn*- (*mìrksnis* 'moment'), -*rkšl*- (*purkšlỹs* 'hothead'), -*rpsn*- (*tar̃psnis* 'phase'); c) -*RTSČ̂*-, -*RTSẐ̂*-, for example: -*lkštŝ̂*- (*valk*[š]*čiaũ* 'put on-1SG.PST'), -*lpštŝ̂*- (*gél*[pš]*čiu* 'save-1SG.PRS'), -*nkštŝ̂*- (*ánkščių* 'pod-GEN.PL'), -*rgždẑ̂*- (*bergždžių* 'barren-GEN.PL'), -*rkštŝ̂*- (*kibirkščių̃* 'spark-GEN.PL'), -*rpštŝ̂*- (*veřp*[š]*čių* 'pole for hops-GEN.PL'). There are only two or three rare words which form exceptions: *aistrà* 'passion (for)' (if [i̯] = /j/!), *irštvà* 'bear den' (-*RSTR*-), *žiegždrà* 'gravel' (-*TSTR*-).

If we exclude the exceptional words, a strict regularity is revealed: for every four-member cluster there is a corresponding -*TST*- or -*TSR*--type three-member cluster and an -*ST*-, -*SR*--type two-member cluster, formed from the same consonants:

a) -*RTST*- : -*TST*- : -*ST*-

    (*a*)-*lkst*-(a)   ⎫

                ⎬ : (*ny*)-*kst*-(*a*) ⎫

    (*li*)-*nks*t-(*a*) ⎭

                              ⎬ : (*sla*)-*st*-(*ai*)

    (*a*)-*lpst*-(*a*)   ⎫

                ⎬ : (*sla*)-*pst*-(*o*) ⎭

    (*si*)-*rpst*-(*a*) ⎭

b) -*RTSR*- : -*TSR*- : -*SR*-

    (*a*)-*lksn*-(*is*) ⎫

                ⎬ : (*rė*)-*ksn*-(*ys*) ⎫

    (*li*)-*nksn*-(*is*) ⎭

                              ⎬ : (*kre*)-*sn*-(*as*)

    (*ta*)-*rpsn*-(*is*) : (*tū*)-*psn*-(*is*) ⎭

[*álksta* 'be hungry-3PRS', *liñksta* 'bend-3PRS', *aĺpsta* 'faint-3PRS', *sir̃psta* 'ripen-3PRS', *nỹksta* 'disappear-3PRS', *slãpsto* 'hide-3PRS', *slãstai* 'trap'; *aĺksnis* 'alder', *liñksnis* 'case (gram.)', *tar̃psnis* 'interval', *rėksnỹs* 'shouter', *tū́psnis* 'curtsey', *krẽsnas* 'stocky']

§ 120. The same sort of relations also exist between other sequences of a similar structure: a more complex sequence always implies the existence of a corresponding simpler sequence. If we find an *-RTST-* or *-RTSR-* sequence, we will also find a *-TST-* or *-TSR-*; if we find a *-TST-* or *-TSR-*, we will also find an *-ST-* or *-SR-*. We can briefly describe these relations by the formula $RTS_R^T \supset TS_R^T \supset S_R^T$. As elsewhere, " $\supset$ " here denotes a material implication:[41]

$$RTS_R^T \supset TS_R^T \supset S_R^T$$

The two final symbols of the derived formula, $S_R^T = ST$ and SR, coincide with the formulas for corresponding two-member word-initial *ST-*, *SR-*-clusters; many actual clusters also coincide: *mir̃ksta* 'soak-3SG.prs' : *lãksto* 'run around-3PRS' : *slãstai* 'trap' and *statùs* 'steep', *al̃ksnis* 'alder' : *rėksnỹs* 'shouter' : *pusnìs* 'snow drift' and *snãpas* 'beak'. If we use *x* to represent the clusters *-ST-*, *-SR-*, or individual consonants of the type *-S-*, *-T-*, we can summarize this generalization as $RTx \supset Tx \supset x$: (*mu*)-*r̃ks*-(*o*) 'doze-3PRS' / (*ri*)-*ñks*-(*i*) 'gather-2SG.FUT' : (*stū̃*)-*ks*-(*o*) 'stick out-3PRS' : (*vì*)-*s*-(*as*) 'all', (*vi*)-*l̃kt*-(*ų*) 'drag-3SBJV' / (*pe*)-*ñkt*-(*as*) 'fifth' : (*pì*)-*kt*-(*as*) 'angry' : (*rã*)-*t*-(*as*) 'wheel'. Thus in word-medial sequences, *-ST-*-type clusters are equivalent to *-SR-*-clusters, and these are equivalent to the individual consonants *-S-*, *-T-* (i.e., *-ST-* ≡ *-SR-* ≡ *-S-* ≡ *-T-*). Since individual medial consonants are unquestionably syllable onsets (see § 118), and since word-initial sequences are syllable-initial sequences (see § 107), clusters equivalent to individual consonants must also be considered syllable onsets. Therefore, the *-ST*, *-SR* portion of medial sequences is undoubtedly syllable-initial—an onset cluster of the following (in this case second) syllable (cf. [Kuryłowicz 1960: 196 = Kurilovič 1962: 272; Pulgram 1970: 47]). Thus, the above-mentioned words should be syllabified *ál̃k-sta* 'be hungry-3PRS', *tel̃k-šta* 'soak-3PRS', *al̃p-sta* 'faint-3PRS', *aũk-štis* 'height' (*-RT-ST-*, cf. *statùs* 'steep', *štaĩ* 'here'), *al̃k-snis* 'alder', *bal̃k-švas* 'whitish', *čiurk-šlẽ* 'stream, jet' (*-RT-SR-*, cf.: *snãpas* 'beak', *švarùs* 'clean', *šlúota* 'broom'). We must also assign to a following syllable *-ST-* and *-SR-*-clusters belonging to two- and three-member consonant sequences: *nỹk-sta* 'disappear-

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[41] On the significance of material implication for the study of language, see for example, [Zawadowski 1966: 79ff.].

3PRS', *slãp-sto* 'hide-3PRS', *rėk-snỹs* 'shouter', *tū̃p-snis* 'curtsey', *slã-stai* 'trap', *rã-štas* 'writing', *krẽ-snas* 'stocky', *pū-slẽ* 'bladder', etc. In all four- and three-member sequences, the syllable boundary runs between *T-* and *-S*-type consonants, and so, to be consistent, we must also place the boundary here in sequences containing an affricate [tš], [dž]. We will therefore syllabify the words *ánkščių* 'pod-GEN.PL', *kibirkščių* 'spark-GEN.PL', *ver̃p*[š̂]*čių* 'pole for hops-GEN.PL', as well as *nykščiaĩ* 'thumb-NOM.PL', *nãščiai* 'yoke-NOM.PL': *ánk-ščių*, *ki-birk-ščių*, *ver̃p-*[š̂]*čių*, *nyk-ščiaĩ*, *nã-ščiai* (cf. *ščiū́ti* 'abate (of wind)-INF', *Ščiūriaĩ**).

After these operations, the affricates /c̃/, /ʒ̃/ (see § 109) find their place in the system of consonants: in medial onset clusters, they behave as *T*-type consonants (/t d/, etc.) and therefore unquestionably belong to this subclass. This conclusion is also supported by the morphological alternation of /c̃/, /ʒ̃/ and the clear *T*-type consonants /t d/ in cases such as *nykštỹs* 'thumb-NOM.SG' : *nykščiaĩ* 'thumb-NOM.PL'. We can therefore now confirm that marginal words such as *čmìkis* 'a strike (of a whip)', *džvìkti* 'stick together-INF' and the onomatopoeic interjections *cvánkt* 'crack!', *dzvàkt* 'bang!' also begin with sequences of normal (*TR*-type) structure.[42]

§ 121. The same logic which allowed us to assign *-ST-*, *-SR-*-type clusters to an onset requires us in all cases to assign to a coda *-RT-*-clusters which precede *T*-type sounds and post-vocalic *-T-* (i.e., /k p t/ or /b d g/) of medial sequences. On this basis, we can syllabify medial three-member sequences such as *-RTT-*, *-RTS-* as follows: *vil̃k-ti* 'drag-INF', *žeñg-da-mas* 'striding' (*-RT-T-*), *mur̃k-so* 'doze-3PRS', *var̃g-šas* 'poor fellow' (*-RT-S-*), also *mer̃k-čiau* 'soak-1SG.SBJV', *pra-vìr*[g]*-džiau* 'make cry-1SG.PST' (*-RT-ĉ- ≈ -RT-T-*). We will syllabify *-TT-*-type medial sequences in the same way: *rãk-tas* 'key', *slap-tà* 'secretly', *dýg-da-vo* 'sprout-3PST.FREQ' (*-T-T-*), *lop-šỹs* 'cradle', *úok-sas* 'hollow (of a tree)' (*-T-S-*), *mig-džiaũ* 'lull to sleep-1SG.PST', *sùk-čius* 'cheat' (*-T-ĉ- ≈ -T-T-*). *-RT-*, *-RS-* and *-RR-*-type clusters are syllabified no differently: *bal̃-dai* 'furniture', *var̃-das* 'name' (*-R-T-*), *gar̃-sas* 'sound', *skal-sùs* 'long-lasting; nourishing' (*-R-S-*), *bur-nà* 'mouth', *kél-mas* 'stump' (*-R-R-*). The syllable boundary

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[42] And, in general, Lithuanian interjections are words of regular phonotactic structure (see, for example, [Zabarskaitė 1994: 82 et passim]).

of the latter examples is also intuitively clear, since vowels form a close unit with the coda consonants /l m n r/: mixed diphthongs.

-*ST*-, -*SR*--clusters can also undoubtedly be singled out in -RS_R^T--type sequences, since they are formed with the undisputed coda consonants -*R*- and the onset clusters -*ST*-, -*SR*-: *piř-štas* 'finger', *tém-sta* 'gets dark' (-*R-ST*-), *pir-šlỹs* 'matchmaker', *bil-snó-ti* 'tap-INF' (-*R-SR*-) (cf. also: *kar-ščiaũ* 'hotter' [-R-Sč̃- ≈ -R-ST-]).

§ 122. Let us now review in one place all cases in which syllable boundaries no longer raise any doubts:

-RT-S_R^T-	(*čiřk-šti* 'chirp-INF', *čirk-šlỹs* 'cry-baby')	-RT-$_T^S$-	(*piřk-siu* 'buy-1SG.FUT', *piřk-ti* 'buy-INF')
-T-S_R^T-	(*rak-štìs* 'splinter', *ne-vék-šla* 'muddler')	-T-$_T^S$-	(*pỹk-siu* 'get angry-1SG.FUT', *rãk-tas* 'key')
-R-S_R^T-	(*piř-štas* 'finger', *pir-šlỹs* 'matchmaker')	-R-$_T^S$-	(*bár-siu* 'scold-1SG.FUT', *bùr-tai* 'sorcery')
-$\emptyset$-S_R^T-	(*rã-štas* 'writing', *na-šlẽ* 'widow')	-$\emptyset$-$_T^S$-	(*bã-sas* 'barefoot', *rã-tas* 'wheel').

Also belonging here are -*R-R*-, -*Ø-R*- (*kál-nas* 'hill', *bã-ras* 'strip [of land]; bar'), which did not fall into our basic scheme.

We have seen that the coda portion of a medial sequence varies from zero ($\emptyset$) to two consonants (-*RT*-), i.e., $C_i = C_0^2$; it does not contain an *S*-type consonant. The smallest onset consists of a single consonant of any type (-*S*-, -*T*-, or -*R*-) and the largest consists of two consonants (-*ST*- or -*SR*-), i.e., $C_e = C_1^2$. Thus, an onset in this case is dominant with respect to a coda, since there are no medial sequences which would lack an onset, and there are a great many sequences which have onsets only. Indeed, a single intervocalic consonant, in all cases without exception, belongs to a syllable onset rather than a coda (see [Kuryłowicz 1960: 195 = Kurilovič 1962: 270]). All of this shows that syllable boundaries are determined by onsets [Pulgram 1970: 47–51], i.e., the part of a syllable which coincides in its structure with word-initial sequences.[43]

§ 123. We can now formulate the main conclusion: a syllable boundary occurs at the beginning of the largest part of a medial sequence whose structure coincides with a corresponding word-initial

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[43] This generalization had already been discovered by ancient philologists [Allen 1973: 54].

cluster (cf. [Pulgram 1970: 47ff.; Kuryłowicz 1960: 196ff. = Kurilovič 1962: 272ff.]).[44]

Returning to the examples examined above, we can easily be persuaded that they all support this conclusion: *álk-sta* 'be hungry-3PRS', *tū̃p-snis* 'curtsey', *pū-slẽ* 'bubble', *vil̃k-ti* 'drag, put on-INF' and the other adduced words are all broken down according to the same rule, that is, assigning to the second syllable the maximal sequence of medial consonants possible at the beginning of a word. Following this rule, we can also syllabify words of a somewhat different structure: *de-šrà* 'sausage', *pū̃-zras* 'piece of rotten wood' (*V-SRV*), *gu-drùs* 'clever', *vé-pla* 'gaper, gawk', *pu-tlùs* 'plump' (*V-TRV*), *la-zdà* 'stick', *ì-ždas* 'treasury' (*V-STV*), *krẽb-žda* 'scratch (of a mouse)-3PRS', *mèg-zdamas* 'while knitting' (*VT-STV*), and finally *a-štrùs* 'sharp', *ži-zdras* 'coarse sand, gravel' (*V-STRV*), *ai-strà* 'passion (for)', *žaĩ-zdras*[45] 'furnace', *ir-štvà* 'bear den' (*VR-STRV*), *žieg-ždrà* 'coarse sand, gravel' (*VT-STRV*), *gar̃g-ždas* 'gravel' (*VRT-STV*). In syllabifying in this way, we have everywhere assigned to the second syllable a medial sequence or that portion of the sequence which structurally coincides with word-initial sequences. All *SR-*, *TR-*, *ST-* and *STR-*-type sequences are normal syllable onset clusters, although the actual clusters *zr-*, *šr-*, *tl-*, *žd-*, *štv-*, *ždr-* do not appear at the beginning of a word (at least in non-borrowed words).

An analysis of the words *ì-ždas*, *krẽb-žda*, *žieg-ždrà* and especially *gar̃g-ždas* definitively indicates the syntagmatic class of the phoneme /ž/ (see § 108): this phoneme occupies the same position as

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[44] Kuryłowicz believed that in establishing syllable boundaries we need to consider not just onset groups, but also coda groups [Kuryłowicz 1960: 196–199 = Kurilovič 1962: 272–275]. He therefore maintained that it was possible for the same consonant to belong to both a preceding and a following syllable (for example, a syllabification such as **klim̃ps-sta* 'stick, sink (in)-3PRS', **var̃*[k]*š-šas* 'poor fellow', etc.). Without going into finer details, it seems sufficient to say here that this view is inconsistent in at least two regards. First, it seemingly disregards the especially close connection between a syllable's nucleus and its coda. Second, this view contradicts the obvious fact that a single-member medial (a single intervocalic consonant) is always the onset of the following ("rightward") syllable: according to Kuryłowicz's theory, it would have to be considered a component of both a preceding and a following syllable (for example, **mẽt-tas* 'year', **pas-sil-lìk-kom-me* 'We remained'.

[45] Of course, if we agree that [ai] = /a/ + /j/.

/s z š/, and thus belongs to their class (i.e., the *S* class). This is also confirmed by the words *eg-žlỹs* 'ruffe', *pūg-žlỹs* 'id.', whose medial sequence can only be treated as *VT-SRV* (cf. *žlìbas* 'weak-sighted'); there are no *VT-TRV*-type sequences in Lithuanian words.

     That syllable boundaries established in this way are an intuitively perceived reality is shown by the history of the Lithuanian writing system: in the oldest written texts and even in the works of Jablonskis, words are almost always carried forward from line to line according to the rule formulated here (see, for example, [Girdenis 1985 (= Girdenis 2000c: 300ff.); 1990 (= Girdenis 2001: 368ff.)]).

     § 124. This conclusion, or—more precisely, rule—is most likely universal: it allows us to establish syllable boundaries for all known languages (cf. [Pulgram 1970: 50]).[46] These boundaries undoubtedly appear quite varied, since initial consonant sequences are varied. In Russian, for example, the syllable boundary of the words *нóгти* '(finger)nails', *вóльный* 'free', *моржú* 'walruses' may directly follow the first vowel ([nɔ́-ktʲi], [vɔ́-lʲnəi̯], [ma-ržы́]), since the sequences /kt-/, /lʲn-/, /rž-/ occur word-initially: *кто* 'who', *льна* 'linen-GEN.SG', *ржи* 'rye-GEN.SG' [Švedova 1980: 23].[47] Lithuanian lacks such initial sequences, and therefore Lith. *nãktį* 'night-ACC.SG' *ba͂lnas* 'saddle-NOM.SG', *varžỹs* 'limit, restrict-3FUT' can only be syllabified *nãk-tį*, *ba͂l-nas*, *var-žỹs*. In syllabifying Hungarian words, only the final consonant of a medial cluster can be separated out, for example *vizsga* ['vɪž-gɒ] 'examination', *magunktól* ['mɒ-guŋk-toːl] 'from ourselves', *tiszteljétek* ['tɪs-tɛl-je-ːtɛk] 'honor-2PL.IMP', *versben* ['vɛrš-bɛn] 'in a poem', since words in this language begin with only a single consonant: *bátor* 'bold', *kérek* 'please', *segítség* 'help', *tizenkettő* 'twelve', *vörös* 'red', etc. The same is true of Veps: *t'eh-ta* 'do-INF', *l'äht-ta* 'leave-INF', *лap-sẹd* 'children', *p'ästk-hud* 'swallow (bird)' (cf. also the borrowings *borkad*, *rist*, *лout* ← Ru. *сбóрка* 'assembling', *крест* 'cross', *плот* 'raft'). This rule functions (or rather once functioned) in Finnish as well, and

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[46] See also [Girdenis 1967b: 278–279], where this rule is formulated quite independently (cf. [Strimajtene 1976: 13]), based on an analysis of medial sequences. *-RTSR-* and *-RTST-* clusters, which imply the existence of corresponding *-SR-* and *-ST-* clusters, are most easily divided into two immediate constituents: an *-RT* coda (a mirror image of an initial *TR-*) and an *ST-* or *SR-* onset; it is natural to consider the syllable boundary as the place where these constituents come together. Other statements are simply a summary of this finding.

It should be noted that we have been able to detect such a "transparent" structure for medial sequences only in the Baltic languages.

[47] Unfortunately, Russian linguists have never satisfactorily established or justified the true boundaries of the Russian phonological syllable (cf. § 116, fn. 36 and references).

therefore borrowings from Baltic lost their initial clusters: compare Fi. *lahto* 'snare', *rastas* 'thrush', *rieska* 'fresh, not soured (of milk)', *routa* 'frozen mud', *seiväs* 'stake, picket' and Lith. *slãstai* 'trap', *strãzdas* 'thrush', *préskas* 'fresh (milk)', *grúodas* 'frozen mud', *stíebas* 'mast; stem, stalk'. Arabic, which also lacks initial clusters, usually adds a vowel to the initial cluster of a borrowed word: *'aflatūnu* 'Plato', *'ifranǧu* 'the Franks' (cf. *'iǧ-lis* 'sit!', *mad-ra-sa-tu-ka* 'your school').[48] In all these cases, a syllable boundary is established according to the same rule: we separate out the part of an onset which is possible at the beginning of a word. Lastly, we can also use this rule to interpret the syllable boundaries of the Polynesian languages, Yoruba, and Japanese. In these languages, an intervocalic consonant is always assigned to the following syllable, since it forms the maximal onset of an initial syllable. For the same reason, in Lithuanian we also assign a single intervocalic consonant to the following syllable: *rã-tas* 'wheel', *vã-ba-las* 'beetle', etc. In these words, the consonant is the largest part of the medial "cluster" which is possible word-initially. Here, of course, the results of the rule in question are quite banal.

g) TYPOLOGICAL REMARKS

§ 125. As this survey has shown, all Lithuanian consonant sequences are derived from *STR-*-type onset clusters and their "reduced" variants *SR-*, *TR-*, *ST-*. On the basis of these clusters, we have established syntagmatic classes of phonemes, elucidated the structure of coda (final) sequences, and determined the boundaries of phonological syllables.

The great explanatory power of word-initial sequences inevitably suggests that their structure can hardly be characteristic only of Lithuanian. This suspicion is reinforced by the fact that general phonetics usually operates with basic classes of consonants quite similar to those revealed by our syntagmatic analysis. It is quite possible that phoneticians have unconsciously (as we say, *implicite*) singled out those classes of sounds which better accord with the phonotactic generalizations characteristic of many of the languages which they know.[49] Be that as it may, the distinguishing of vowels and consonants

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[48] Unusual clusters in borrowings are similarly avoided in Lithuanian dialects: *apsálmė* or *pasálmė* 'psalm' (cf. also NŽem. *sâ.l̂mᵉ*), *atkõčius* 'weaver' (← Pol. *tkacz* or Bel. *ткач*) [Zinkevičius 1966: 135].

[49] In precisely the same way, the parts of speech have been distinguished from earliest times according to the syntagmatic functions of words and their forms. Even the order of cases in paradigms (nominative, genitive, dative, …) can be

has from ancient times been based on the different syntagmatic functions of these sounds. It is no accident that the ancient Greeks called vowels *φωνήεντα* 'those which sound', and consonants *σύμφωνα* 'sounding together'; the latter were so-called because in syllables they can "sound" only when accompanied by vowels (cf. [Heinz 1978: 46]). From these words there later arose Latin terms with the same syntagmatic meaning *vocales* and *consonantes*, and likewise the Lithuanian *balsiai* 'vowels' and *priebalsiai* 'consonants' (cf. also Latv. *patskaņi* and *līdzskaņi*, Ru. *гласные* and *согласные*, Pol. *samogłoski* and *spółgłoski*, Ger. *Selbstlaute* and *Mitlaute*).

§ 126. The facts of the other Baltic languages fully confirm our conjecture. Word-initial consonant clusters in Latvian and Old Prussian are only of the type *SR-*, *TR-*, *ST-* and *STR-*; only a few unassimilated borrowings form exceptions.

In Latvian we have the following initial consonant clusters (see, for example, [Rūķe-Draviņa 1970] and in part [Šulce 1993]):

SR-: *sleja* 'strip', *smakt* 'choke-INF', *snìegs* 'snow', *svešs* 'foreign', *šļakatas* 'spray', *šmàukt* 'deceive-INF', *šņukurêt* 'sniff-INF', *švaũksts* 'fop', *znots* [znuõts] 'son-in-law', *zveja* 'fishing', *žļakstêt* 'squelch-INF', *žņaûgt* 'strangle-INF', *žvadzêt* 'clink, jingle-INF';

TR-: *blakus* 'alongside', *bļaũrs* 'nasty', *bradât* 'wade-INF', *drava* 'apiary', *dvaka* 'stench', *glęzna* 'picture', *gļę̃vs* 'flabby, feeble', *gnĩda* 'nit', *griba* 'desire; will', *gvel̂zis* 'chatterbox', *kluss* 'silent', *kļava* 'maple', *knipis* 'fillip', *kņada* 'din', *krava* 'load', *kvẽls* 'ardent', *plakne* 'plane', *pļava* 'meadow', *prast* 'know-INF', *traks* 'insane', *tvans* '(charcoal) fumes';

ST-: *skudra* 'ant', *spals* 'handle, haft', *stara* 'leg (of trousers)', *šķila* 'log', *špiks* '(dial.) detective';

STR-: *sklañda* 'pole', *skreja* 'entrance of a beehive', *spļaũt* 'spit-INF', *spraûst* 'stick into-INF', *strikts* 'strict'.

The Old Prussian texts show these initial clusters:[50]

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explained by the neutral word order of a sentence in Ancient Greek (see, for example, [Heinz 1978: 48]).

[50] Most of the examples are taken from the Elbing Vocabulary [Mažiulis 1966]; morphological interpretation and translations according to [Toporov 1975–1990; Mažiulis 1981: 255–329]. For an exhaustive survey of Old Prussian initial consonants, see [Tankevičiūtė, Strimaitienė 1990].

SR-: *smorde* /smārdē/ 'bird-cherry', *snaygis* /snaigis/ 'snow', *swais* /svajs/ 'one's own', *smoy* /zmoj/ 'person', *swirins* /zvīrins/ 'wild animal-ACC.PL';

TR-: *blusne* /bluznē/ 'spleen', *braydis* /braidis/ 'elk', *drūktai* 'firmly', *dwigubūt* 'doubt-INF', *glands* 'comfort', *gnode* /gnātē/ (?) 'kneading bowl', *granstis* 'drill', *klente* /klentē/ 'cow', *kraclan* 'breast', *piuclan* /pjūklan/ 'sickle', *plieynis* /plēnīs/ 'powdery ash', *prūsiskai* 'in Old Prussian', *quaits* /kvaits/ 'will', *Tlokowe*, *Tlokumpelk* (place names [Endzelin 1944: 55]), *trinie* 'threaten-3PRS', *twais* 'your';

ST-: *skijstan* /skᵉīstan/ 'chaste-ACC.SG.F', *spurglis* 'sparrow', *stabis* 'stone';

STR-: *sklaitint* 'separate, sever-INF', *scrundos* /skrundus/ 'scissors', *streipstan* 'joint'.

In neither Latvian nor Old Prussian is there a single sequence whose structural type would not also be found in Lithuanian; only a few actual sequences differ. For example, Old Prussian had the cluster *tl*-, not used word-initially in Lithuanian. Latvian lacks word-initial *pj*-, *bj*-, *spj*-, *sr*-, etc. But these individual small points do not undermine the general principle: word-initial sequences in all Baltic languages have the same structure. The syntagmatic classes of consonants and their main members also coincide. Latvian and Old Prussian medial sequences are also similar to Lithuanian, although one is struck by the rather unexpectedly high frequency of $-_T^R STR$--type sequences in Old Prussian words. Word-final sequences in these languages may be considered "derivatives" of the medial clusters (as in the Žemaitic dialect; see § 111).

§ 127. Among other more archaic Indo-European languages, Latin is better known to us. Its word-initial clusters are also similar to those of Lithuanian; the only difference is that the Romans did not have onset clusters of the *SR*--type:

TR-: *blandus* 'pleasant', *brevis* 'short', *gladius* 'sword', *gravis* 'heavy', *draco* 'dragon', *clavis* 'key', *cras* 'tomorrow', *planus* 'flat', *praeda* 'booty', *traho* 'I pull';

ST-: *scalae* 'stairs', *spero* 'hope-1SG.PRS', *stella* 'star';

STR-: *scrinium* 'chest, box', *splendidus* 'shining, splendid', *stratum* 'bedspread, layer'.

A peculiar exception are the *fl*- (*flamma* 'flame') and *fr*- (*frons* 'forehead') clusters, which should represent the *TR*--type, but begin

with a fricative. Here the syntagmatic properties do not quite agree with the phonetic features of this consonant. This is undoubtedly because the *f* arose from a plosive (Lat. *f* < PIE **dh*, **bh*, **gᵘh* > Lith. *d*, *b*, *g* [Tronskij 1960: 28]). Apparently the syntagmatic properties of phonemes are more conservative than the phonetic ones.[51]

It is interesting that Italian, which arose from Latin, now also has *SR*--type sequences (see, for example, [Muljačić 1972: 94–96]):

SR-: *slancio* [zl-] 'dash', *smalto* [zm-] 'enamel', *sninfia* [zn-] 'affected person', *svelto* [zv-] 'brisk', *sregolato* [zr-] 'disorderly';

TR-: *bianco* [bj-] 'white', *chiave* [kj-] 'key', *ghianda* [gj-] 'acorn', *piovra* ['pjɔvra] 'octopus', *clamoroso* 'noisy', *crepitare* 'crackle-INF', *drappello* 'flag', *grazie* 'thank you', *presto* 'quick, quickly', *troncare* 'break off-INF';

ST-: *scala* 'stairs', *spalla* 'shoulder', *stampa* 'the press', *sbadiglio* [zb-] 'yawn', *sgallare* [zg-] 'swell-INF';

STR-: *sclamare* 'cry out-INF', *scritta* 'a written notice', *spléndido* 'shining, splendid', *sprillo* 'stream', *strada* 'road', *sbracione* [zbr-] 'shouter', *sdruccioloso* [zdr-] 'slippery', *sgravio* [zgr-] 'relief'.

In this language as well, *f* behaves as a member of the *T*-subclass: *fluire* 'flow-INF', *fragile* 'fragile', *sforzo* 'effort', *sfratto* 'eviction'. The incongruent status of this consonant is all the more evident here, since it combines with *s*, a clear phoneme of the *S*-subclass, and is a component of a medial *STR*- cluster.

Spanish has preserved only *TR*--type sequences [Alarcos Llorach 1975: 189]: *blando* 'soft', *brio* 'strength', *draga* 'dredger', *globulo* 'globule', *grato* 'pleasant', *claro* 'bright', *criba* 'sieve', *plata* 'silver', *prestar* 'lend-INF', *trápala* 'fraud'; *fl-* sequences are also used (*flamear* 'flame-INF'), *fr-* (*fragor* 'clamor'). Before all *SR*-, *ST*- and *STR*- sequences a prothetic *e*- has developed, which many linguists (for example, [Hyman 1975: 11–12; Linell 1979: 168]) do not even consider a phoneme,[52] for example: *esmerar* 'polish', *esmeralda* 'emerald',

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[51] Lithuanian *ž* < PIE **ĝ*, **ĝh* has also preserved up to now one property characteristic of plosives: it is never used before *T*-type consonants (see § 108). The same is essentially true of *š* < PIE **k̂*, which occurs before members of the *T*-class only in borrowings and in the contracted word *štai* 'here' ← *šitai* (cf. also Žem. *štìkti* 'guess-INF' ← *ančtìkti*).

[52] The automatic and consequently non-phonological nature of this sound is particularly clearly shown by the fact that Spanish speakers tend to place it

espalda 'back', *estampa* 'print, the press', *estúpido* 'stupid', *escrito* 'document', *espléndido* 'splendid', *estrada* 'road', *estratega* 'strategist', etc.

§ 128. The Germanic languages do not much differ from the Baltic with respect to initial sequences. We will not linger on them, but limit ourselves to onset clusters consisting of three consonants, all of *STR-* structure.

German has such sequences (for an overview see [Karosienė 1983 and references]), for example, in the words *Sklave* ['skla:və] 'slave', *skrupulös* [skrupu'lø:s] 'scrupulous', *Splitter* ['šplɪtər] 'splinter', *Sprache* ['špra:xə] 'language', *Strich* [štrɪç] 'stroke'; English (see [Yasui 1962: 24; Cohen 1965: 60; Strimaitienė 1974b: 70]) *skewer* ['skjuə], *scratch* [skrætš], *squad* [skwɔd], *spurious* ['spjuəriəs], *splash* [splæš], *spread* [spred], *stupid* ['stju:pɪd], *strong* [strɔŋ]; Danish (see [Basbøll 1977 and references]) *skjorte* ['sgjɔḍə] 'shirt', *skrue* ['sgru:ə] 'screw', *spjæld* [sb̥jɛl'] 'valve', *splejs* [sb̥lʌi's] 'sickly', *springe* ⌢['sb̥reŋə] 'jump-INF', *strå* [sd̥rɔ:'] 'straw'. More or less the same system of initial sequences is found in Norwegian and Swedish [Sigurd 1965; 1968: 453–454; Vogt 1981b: 216–221]. Even the geographically quite remote Icelandic offers no real exceptions: *skrúfa* ['sgru:(v)ə] 'screw', *spjót* [sb̥jou:tˤ] 'spear', *splæsa* ['sb̥lai:sa] 'splice; treat-INF', *stjana* ['sd̥ja:na] 'do hard work-INF', *strá* [sd̥rau:] 'straw', except for four-member *STRj*–type clusters (apparently similar to those in Proto-Baltic; cf. *skriaudà* 'offense' < **skri̯audā*): *skrjáf* [sg̥rjau:v] 'rustling', *strjúka* ['sd̥rju:kˤa] 'stroke-INF'.[53]

§ 129. For a still clearer picture, we might also mention Ancient Greek, which had the following three-member *STR-*-type sequences (cf. [Kuryłowicz 1960: 23–24 = Kurilovič 1962: 32–33]): *skl-* (σκληρός 'dry, hard'), *skn-* (σκνίψ 'bark beetle'), *sp'r-* (σφραγίς 'seal'), *spl-* (σπλήν 'spleen'), *stl-* (στλεγγίς 'scraper'), *str-* (στρατηγός 'military commander'), and even one Tibetan dialect, in which the initial three-member cluster is also of the *STR-*-type: *zpre* 'monkey', *zgre* 'voice'.[54] We can

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before initial clusters even when they are speaking foreign languages (see for example, [Pulgram 1970: 20, fn. 17]).

[53] The phonetic transcription of these examples has been checked against the pronunciation of Jörund Hilmarsson (autumn 1977).

[54] Such clusters are even more characteristic of classical Tibetan (cf. *skyabs*, *skroŋs*, *sgrugs* [Lekomcev 1967: 136 (the examples are cited without translation)]).

find still more languages which use Lithuanian-type two-member clusters (though often together with *NC*--type clusters), cf. Bambara (Africa) *TR*--type clusters in the words *bla* 'children', *bri* 'milk-INF', *gna* 'hole', *kli* 'egg', *tlo* 'ear', Kikongo *kluzu* 'cross', *pyada* 'lick-INF', *kwa* 'potato'.[55] In general, the implications $R_S^T- \supset {}_S^T R-$ and $-{}_S^T R \supset -R_S^T$ are valid for many known languages [Grinberg 1964: 53], which shows that the structures we have examined are basic ones.

§ 130. The above examples from various languages show that *STR*- (and *SR*-, *TR*-, *ST*-)-type structures are common to many languages of Europe, and are not alien to non-European languages. Many languages differ from one another only in lacking certain initial sequences, rather than in structural type. Noticeable deviations from these types represent a typological characteristic of considerable importance. For example, the Finno-Ugric languages (Finnish, Hungarian, Veps, etc.), which lack onset sequences, are quite distinct from the Indo-European languages, and in this regard are closer to Turkic and Semitic. Spanish, which, as we have seen, does not tolerate initial combinations with *s*-, seems to be drawing nearer to these languages.

§ 131. In the uniqueness of their phonotactics, many Slavic languages stand apart from other Indo-European languages (see [Lekomceva 1968; Sawicka 1974]). The Slavs, although territorially and genetically close to the Balts, differ from them considerably in their phonotactics,[56] and are now perhaps closer to the Georgians and other Caucasians in this regard (cf. § 97). In Polish, for example, we find *RT*-, *RS*--type two-member clusters (*łgać* 'lie-INF', *łkać* 'sob-INF', *łza* 'tear', *mżyć* 'drizzle-INF'), various three-member clusters (cf. *pszczoła* 'bee', *tknąć* 'touch-INF') and even four-member clusters (*pstrąg* 'trout', *wstrząs* 'shock, shake', *źdźbło* 'stalk'). Even in the connected texts of the more moderate Russian, we can encounter unusually complex clusters, cf. *к встре́че* [kfs′t′r′-] 'to the meeting'.

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[55] Even the three-member initial clusters of the Bantu languages are reminiscent of Indo-European ones, only the place of the *S*-class is occupied by nasals (i.e., three-member clusters of the *NTR*-type are the most typical [Toporova 1975: 109]).

[56] In this regard, Slovenian would be closest to Baltic (see [Sawicka 1974: 20–25, especially table 6]). This is apparently a result of convergent development.

The phonotactic situation of the Slavic languages is fairly recent: it arose only after the fall of the reduced vowels (the "jers"). Yet even up to that point Slavic differed substantially from Baltic and other Indo-European languages, since it had no consonant codas: all of its syllables ended in vowels; that is, they were open, for example: OCS *skrъ-bь* 'grief', *skvo-zě* 'through', *strě-šti* 'guard, protect-INF', *tlъ-knǫ-ti* 'push-INF', *trъ-za-ti* 'torment, torture-INF', *tvo-rъ-ca* 'creator-GEN.SG', likewise Ru. *где* 'where', *кто* 'who', *мгла* 'mist', *пса* 'dog-GEN.SG' and OCS *kъdě*, *kъto*, *mьgla*, *pьsa*. This is a very unusual phonotactic system, since it could be said that languages characterized by open syllables never have consonant clusters.[57]

Although it is rather difficult to believe, Kuryłowicz has quite convincingly and subtly shown that one can classify even Polish consonants according to syntagmatic relations, and not just classify, but in fact obtain essentially the same classes as in other Indo-European languages [Kuryłowicz 1960: 221ff. = Kurilovič 1962: 307ff.]. It turns out that *STR-*, *SR-*, *TR-*, *SR-* clusters have been preserved in more complex sequences as a main structural component; this has also been demonstrated for the data of Belarusian [Padlužnyj 1980: 32–33]. Be that as it may, the Slavic languages are nevertheless fundamentally different from many other Indo-European (and non-Indo-European) languages, including Baltic, with respect to their consonantal phonotactics. German and Baltic, and even Greek or Italian and Baltic, are much closer in this regard.

h) SUMMARY REMARKS

§ 132. In examining the syntagmatic relations of phonemes, the following main points should be kept in mind.

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[57] It is therefore quite imprudent to compare Proto-Slavic and Old Chuch Slavic typologically with languages having only open syllables of the C_0^1V-type (cf. [Čekman 1979: 123ff.]). The Slavic languages are unique in having preserved Indo-European onset clusters while losing codas. On the whole, the phonotactic development of the Slavic languages presents a great riddle, with no serious attempts thus far at a solution. This must be kept in mind when seeking an answer to the "eternal" question of an intermediate Balto-Slavic proto-language (the very specific phonotactics makes it difficult, for example, to accept a secondary, relatively late convergence of Slavic and Baltic).

1. Syntagmatic relations exist among those phonemes which form or can form a larger sequence.

2. Phoneme sequences are not random accumulations of sounds, but have a certain regular structure.

3. The main phoneme classes are vowels and consonants. Vowels are the core elements of a syllable: they alone can form a syllable. As such, they are distinguished from the peripheral elements of a syllable, the consonants.

4. The syntagmatic classification of consonants is based on onset (word-initial) sequences. Such sequences are most often of the type *STR-* (and *SR-*, *TR-*, *ST-*), where R = [l m n r…], T = [p t k…], S = [s š…]. Many languages use only $(C)V$ (= $C_0^1 V$)-type syllables; some languages have quite complex sequences.

5. In a medial consonant sequence, a syllable boundary occurs at the beginning of the largest cluster of consonants whose structure coincides with a word-initial sequences.

6. A syllable is isomorphic with other complex linguistic units—words, phrases, sentences, etc. All complex units have a core and peripheral parts; corresponding to an onset cluster of a syllable are pretonic syllables, prefixes, subject noun phrases; corresponding to the core (the vowel) are stressed syllables, roots, conjugated verb forms (predicates); corresponding to the coda cluster are post-tonic syllables, suffixes and endings, direct-object noun phrases, etc.

3. NEUTRALIZATION

a) GAPS IN THE SYSTEM

§ 133. By no means all theoretically possible (i.e., permitted by general rules of structure) phoneme combinations can be found in language—its texts and lexicon. Thus standard Lithuanian could perfectly well have such *STR-* and *TR-*-type clusters as *spl-*, *gm-*, but in fact these can be found only in rare dialectal words or borrowings. The same holds for the sequences *zdr-*, *zgr-*, *šk-*: phonotactic rules do not prohibit them, but there are no "normal" words which would begin with such clusters. Sequences which do not contradict a linguistic system, but in fact are not used, are called gaps in the system or empty

cells (Fr. *cases vides*, Ru. *пустые клетки*); cf. Kuryłowicz's remark concerning Greek **σκρ-* [Kuryłowicz 1960: 214 = Kurilovič 1962: 298]; likewise [O'Connor, Trim 1973: 249]).

A gap in the system is a matter of historical accident, not provided for or explained by strict synchronic rules. We can only state that a certain potential sequence is not actually found, although it is most often impossible to say why.

§ 134. There can also be gaps, or empty cells, in the phonological system itself (see [Martine 1960: 110ff.]).[58] In standard Lithuanian, we could consider as gaps the rarely-used phonemes /t̂ d̂/, or more precisely, the phonetic feature combinations corresponding to these phonemes. As we know, all Lithuanian consonants except for /j/ are either hard or soft, and this timbre distinction is a distinctive feature of independent phonemes: *skabaũ* 'pluck-1SG.PRS' : *skabiaũ* 'pluck-1SG.PST', *lãpų* 'leaf-GEN.PL' : *lãpių* 'fox-GEN.PL', *káušas* 'ladle-NOM.SG' : *kiáušas* 'skull-NOM.SG', *saũso* 'dry-GEN.SG' : *saũsio* 'January-GEN.SG', *daraũ* 'do, make-1SG.PRS' : *dariaũ* 'do, make-1SG.PST', etc. However, soft [t̂ d̂] are only allophones of the phonemes /t d/ and therefore cannot contrast with them. All the distinctive features capable of forming /t̂ d̂/ phonemes exist, and we even have the corresponding phonetic feature combinations [t̂ d̂], but for accidental historical reasons they do not perform a distinctive function, and are therefore only potential phonemes: gaps in the system.[59] The reality of these gaps is clearly shown by the relations /k/ : /k̂/ = /g/ : /ĝ/ = /p/ : /p̂/ = /b/ : /b̂/ = /t/ : □ = /d/ : □, where "□" is a gap in the system).

The role of gaps in the development of phonological systems is unusually large, since all languages tend to fill them or somehow eliminate them.[60] For example, the gap formed in Lithuanian by /t̂ d̂/ has already been eliminated in Northwest Žemaitic (cf. *gáid̂ũˑ(m)* "*gaidžių̃*" 'rooster-GEN.PL', *já.ut̂o̧.u* "*jáučiui*" 'ox-DAT.SG')[61] and South Aukštaitic (cf. *kat̂ũˑ* "*kačių̃*" 'cat-GEN.PL', *d̂ẽˑd̂u·*

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[58] On gaps in the system as "reserve" articulatory possibilities see [Žinkin 1958: 252]; on their influence on the synchronic dynamics of phonemes see [Klyčkov 1962: 123]. The diachronic role of gaps is particularly highlighted by the more general concept of phonological space [Mouton 1961].

[59] Such distinct allophones, which seem to fill gaps in a system, are sometimes called semi-phonemes (Ger. *Halbphoneme* or *Semiphoneme* [Hammarström 1966: 21–22]).

[60] It is similar in nature: every gap (or so-called ecological niche) is sooner or later filled by some life form (cf. [Darvinas 1959: 176]).

[61] For the more important literature and a diachronic interpretation of this phenomenon, see [Girdenis 1972a (= Girdenis 2000b: 237ff.); 1979b (= Girdenis 2000c: 130ff.); 1979–1980: 40–42 (= Girdenis 2000c: 179–181); 1983a (= Girdenis 2000c: 290ff.)]. It should be noted here that the phonemes /t̂ d̂/ result from morphonemic levelling of allomorphs, rather than phonetic developments.

"*dė̃džių*" 'uncle-GEN.PL'). In standard Lithuanian, it is starting to be filled at least by borrowings like *tiùlis* 'tulle', *bordiū̃ras* 'curb' or the surname *Matiùkas*. It was most likely a gap in the subsystem of long front vowels that triggered the East Baltic monophthongization of **ei → *ę̄* (> *ie*) in words of the type *Diẽvas* 'God', etc. In this system, only two front vowels **ē* – $\square$ – **ī* contrasted with the three back vowels **ā* – **ō* – **ū*. The front mid-vowel position was empty (see, for example, [Kazlauskas 1962 and references; Mažiulis 1965]; cf. [Zinkjavičjus 1972] and [Girdjanis 1977: 300–303 (= Girdenis 2000c: 374ff.)]). This gap was filled by **ę̄*, which developed from **ei* under conditions which are not quite clear.[62] The consonants /z ẑ/ arose for the same reason: there was an earlier gap, since alongside /š š̂/ there existed /ž ẑ̌/, but there were no corresponding voiced phonemes alongside /s ŝ/; thus the relation /š/ : /ž/ = /š̂/ : /ẑ̌/ = /s/ : $\square$ = /ŝ/ : $\square$. A gap can also be filled by such sporadic changes as *šitaĩ → štaĩ* 'here', Žem. *anč-tìkti → ant-štìkti → štìkti* 'guess-INF',[*] as a result of which there arose the previously non-existent but possible *ST*-type cluster *št-* (cf. also the dialectal words *žburiùkas* 'lamb', *žbliuõkas* 'easy-fitting shirt'). Very often, borrowings and onomatopoeic words help to eliminate gaps.

Nevertheless, the diachronic role of gaps in the system should not be overstated. A gap is not a basic cause of phonological change, but only a condition and potentiality for change (cf. [Postovalova 1978: 123 and references]).

b) REGULAR CONSTRAINTS ON DISTRIBUTION

§ 135. In addition to gaps in the system, many languages also have quite regular constraints, obeying strict rules, on the use of phonemes.

Among final consonant sequences in Lithuanian, there are none which would end in [g d b z ž], although the corresponding onset clusters are quite frequent. Nor are these consonants used before [k t p s š]: **zp-*, **zk-*-type clusters do not occur at the beginning of a word, or **-gsl-*, **-ngt-* word-medially, etc. If such a sequence needs to be formed for morphological reasons, it is necessarily replaced by another: *žeñgia* 'step-3PRS' : *žiñ*[k]*snis* 'step-NOM.SG', *kìbo* 'stick to, cling to-3PST' : *kì*[p̂]*ti* 'stick to, cling to-INF'. A similar automatic

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[62] For a systematic phonological view of this development, see [Girdjanis 1977: 303, fn. 10 (= Girdenis 2000c: 379, fn. 10); 1978: 76 (= Girdenis 2000c: 346)]; for a more detailed treatment [Ul'činskajte 1980 and references] (see also [Karaliūnas 1987: 152–168], where there is an attempt to substantiate Jaunius's hypothesis, presented in greater detail by Būga [1908: 76, 80]).

[*] Hyphens have been added to show the reanalysis of morphological structure—TRANS.

substitution occurs in word-final position in the standard language and many dialects:[63] *daũgelis* 'many' : *daũ*[k˙] 'much', *viso lãbo* 'all the best' : *vìsla*[p] 'all', *kadà* 'when' (*kadángi* 'because') : *kà*[t˙] 'that', *be mãžo* 'almost' : *bemà*[š] 'id.'. On the other hand, [k t p s ž] cannot precede [g d b z ž]; they must likewise be replaced by [g d b z ž]: *nẽša* 'carry-3PRS' : *nè*[ž]*damas* 'while carrying', *veřpia* 'spin-3PRS' : *veř*[b]*damas* 'while spinning'. Since this substitution is fully automatic, accidental gaps are out of the question; it would be naive to believe that even a single one of these "gaps" could soon be filled; this would mean a radical transformation of the phonological system.

Due to these constraints, [k t p s ž] and [g d b z ž] can contrast in only two positions: before a vowel ([—V]) and before an *R*-type consonant ([—R]): *pū́ti* 'rot-INF' : *bū́ti* 'be-INF', *tãrė* 'say-3PST' : *dãrė* 'do, make-3PST', *kãras* 'war' : *gãras* 'steam', *siř*[k]*ti* 'be ill-INF': *ziřkti* 'whine-INF', *šuõlis* 'jump' : *žuõlis* 'railroad tie' and *kaplỹs* 'blunt axe, pick' : *kablỹs* 'hook', *prastà* 'simple; bad-NOM.SG.F' : *brastà* 'ford', *trỹs* 'three' : *drį̃s* 'dare-3FUT', *tvarùs* 'stable, steady-NOM.SG.M' : *dvarùs* 'estate-ACC.PL', *klóstyti* 'spread, cover-with-INF' : *glóstyti* 'stroke-INF', *krópti* 'deceive-INF' : *gró*[p̂]*ti* 'snatch, seize-INF', *svem̃bia* 'ache-3PRS' : *zvem̃bia* 'buzz-3PRS'. In other positions, they cannot contrast: where [g d b z ž] is found, [k t p s š] cannot occur, and where [k t p s š] is found, [g d b z ž] cannot occur (see table 13).

If there were no positions 1 and 2, we would have to consider [k] and [g], [t] and [d], [p] and [b], [s] and [z], [š] and [ž] allophones of the same five phonemes: these pairs of sounds share phonetic features and are in complementary distribution. But the first two positions, in which these sounds contrast, do not allow this.

§ 136. Lithuanian hard and soft consonants stand in a quite similar relation. They can be opposed only before a back vowel (in the position [—V^back]): *káušas* 'chisel' : *kiáušas* 'egg', *kùrti* 'make (a fire); to create-INF' : *kiùrti* 'become full of holes-INF', *sùsti* 'grow mangy-INF' : *siùsti* 'go mad-INF', *šáudo* 'shoot-3PRS' : *šiáudo* 'straw-GEN.SG', *rū̃kti* 'smoke-INF' : *riũkti* 'sob-INF', *sužlùgęs* 'fail-PAP.NOM.SG.M' : *sužliùgęs* 'become wet-PAP.NOM.SG.M', especially in stem-final

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[63] This substitution is quite alien to Žemaitic: *âuk* "*áuk*" 'grow-2SG.IMP' : *â.ug* "*áuga*" 'grow-3PRS', *lâuš* "*laũš*" 'break-2SG.IMP' : *lâ.už* "*láužia*" 'break-3PRS', *ẑî̃s* "*zỹs*" 'buzz-3FUT' : *ẑî̃z* "*zỹzia*" 'buzz-3PRS' (see also § 144).

Table 13. Distribution of *S*- and *T*-type consonants in standard Lithuanian[64]

Consonants	Positions				
	[—V]	[—R]	[—$\frac{z}{d}$]	[—$\frac{s}{t}$]	[—#]
	1	2	3	4	5
[g]	+	+	+		
[k]	+	+		+	+
[d]	+	+	+		
[t]	+	+		+	+
[b]	+	+	+		
[p]	+	+		+	+
[z]	+	+	+		
[s]	+	+		+	+
[ž]	+	+	+		
[š]	+	+		+	+

position of inflected words;[65] *puikùs* 'fine-NOM.SG.M' : *puikiùs* 'fine-ACC.PL.M', *šlãpo* 'get wet-3PST' : *šlãpio* 'wet-GEN.SG.M', *baisùs* 'fearful-NOM.SG.M' : *baisiùs* 'fearful-ACC.PL.M', *našùs* 'productive; fruitful-NOM.SG.M' : *našiùs* 'productive; fruitful-ACC.PL.M', *gražù* 'beautiful-ADV' : *gražiù* 'beautiful-INS.SG.M', *griovų̃* 'ravine-GEN.PL' : *griovių̃* 'ditch-GEN.PL', *galù* 'end-INS.SG' : *galiù* 'be able-1SG.PRS', *ramùs* 'quiet-NOM.SG.M' : *ramiùs* 'quiet-ACC.PL.M', *sẽno* 'old-GEN.

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[64] [z], [d] and [s], [t] of positions 3 and 4 represent all consonants of this type, i.e., [g d b z ž] (position 3) and [k t p s š] (position 4).

[65] This morphological position is particularly important, since there are very few words which would be distinguished by hard and soft root-initial conso-nants, even taking into consideration such words of foreign origin as *biùstas* 'bust-NOM.SG' (cf. *bùstų* 'wake up-PPP.GEN.PL'), *liùkas* 'porthole-NOM.SG' (cf. *Lùkas* 'Lukas (name)'), *tiùlis* 'tulle-NOM.SG' (cf. *tùlis* 'thulium-NOM.SG'), *triùkas* 'trick, stunt-NOM.SG' (cf. *trùko* 'last, continue-3PST' : *triùko* 'trick, stunt-GEN.SG') or dialectal forms such as *niógti* 'run quickly-INF' (cf. *nókti* 'ripen-INF') or *žósti* 'speak-INF' (cf. *žósi* 'speak-2SG.FUT' : *žiósi* 'open one's mouth-2SG.FUT'). Other examples: *káukė* 'mask' : *kiáukė* 'jackdaw', *kùkis* 'hook' : *kiùkis* 'cracked egg', *kuřkti* 'croak-INF' : *kiuřkti* 'cluck, cackle-INF', *maũkti* 'peal bark; drink hard-INF' : *miaũkti* 'mew-INF', *plumpséti* 'give a hollow knocking noise-INF' : *pliumpséti* 'plop-INF', *plùskė* 'a kind of small fish' : *pliùskė* 'log', *skáutė* 'girl scout' : *skiáutė* 'scrap, rag', *slúogas* 'load' : *sliúogas* 'mudslide', *sùtrų* 'dung water, slops-GEN.PL' : *siùtrų* 'sportive, playful-ACC.SG.M', *šuõ* 'dog' : *šiuõ* 'this-INS.SG.M', *trùmas* 'truffle' : *triùmas* '(ship's) hold', *trókšt* 'bang!' : *triókšt* 'crack!'; cf. also the borrowed pair *blũdas* 'error' : *bliũdas* 'dish' and the onomatopoeic *tiulénti* 'produce the sound of a gosling-INF' (cf. § 134).

SG.M' : *sẽnio* 'old man-GEN.SG.M', *vãro* 'drive-3PRS' : *vãrio* 'copper-GEN.SG' (cf. also the foreign word pairs noted by Marvan: *fotogrãfų* 'photographer-GEN.PL.M' : *fotogrãfių* 'photographer-GEN.PL.F', *kazã-chų* 'Kazakh-GEN.PL.M' : *kazãchių* 'Kazakh-GEN.PL.F'). Everywhere else, the hardness or softness of a consonant depends on its position: in word-final position ([—#]) and before hard consonants ([—C]), only hard consonants can occur; before soft consonants ([—Ĉ]) and front vowels ([—V^{front}]), only more or less softened consonants (for phonetic details, see [Vaitkjavičjute 1979] and for [k g] [Girdenis 2000a (= Girdenis 2001: 411ff.)]): *pìlt* [p̂i̯l̊tˀ] 'pour-SHORT-INF' : *pìltų* [p̂i̯l̊tˀu·] 'pour-3SBJV' and *pìlti* [p̂i̯l̂t̯i] 'pour-INF', *pìlsiu* [p̂i̯l̊sˀu] 'pour-1SG.FUT' (see table 14). In this case, *C* and *Ĉ*-type are distinct phonemes only because they contrast in the first position ([—V^{back}]). Were it not for this position, the similar consonants [k] and [k̂], [s] and [ŝ], etc., would need to be considered allophones of the same phoneme, since they are in complementary distribution.

Table 14. Distribution of hard and soft consonants in standard Lithuanian[66]

Consonants	Positions				
	[—V^{back}]	[—V^{front}]	[—C]	[—Ĉ]	[—#]
	1	2	3	4	5
[k]	+		+		+
[k̂]	+	+		(+)	
[s]	+		+		+
[ŝ]	+	+		+	
[ł]	+		+		+
[l]	+	+		+	
…					
[C]	+		+		+
[Ĉ]	+	+		+	

§ 137. The vowels [ɔ] and [a] in standard Russian and southern Russian dialects behave in similar fashion: in stressed syllables, they contrast and are independent phonemes, while in unstressed syllables, an [a] or [ə]-type vowel is found in their place: *сóм* 'sheat-fish' ≠ *сáм*

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[66] Only the most characteristic vowels are shown. Note in addition that in position 4 many speakers of the standard language pronounce a sound closer to [k] than to [k̂]. Of course, this is not a particularly important distinction since in this position [k] and [k̂] do not contrast anyway.

'self', but *сомá* 'sheat-fish-GEN.SG' = *самá* 'herself' = [sʌmá], *нóг* 'leg, foot-GEN.PL' ≠ *нáг* 'naked-M', but *ногá* 'leg, foot-NOM.SG' = *нагá* 'naked-F' = [nʌgá] (cf. also *котúться* 'have kittens-INF' = *катúться* 'roll-INF' = [kʌtʹítsə], *лáпать* 'paw-INF' = *лáпоть* 'bast shoe' = [lápət'], likewise Bel. *вóл* 'ox' ≠ *вáл* 'embankment', but *валы́* 'oxen; embankments', *тóк* 'current' ≠ *тáк* 'so', but *такí* 'currents; such-NOM.SG.M' [Padlužny 1969: 110]).

§ 138. Here we must also mention so-called vowel harmony, which is characteristic of the languages of Finno-Ugric, Turkic, and other language families. In Hungarian, for example, /e/ and /a/ (pronounced almost like [å]), as noted above (§ 23), contrast essentially only in roots: in postposed affixes these sounds strictly depend on the root: [e] can only occur after an [e]-type root vowel and [a] only after an [a]-type vowel (in greater detail, see [Makkai 1972 and references]).[67] Therefore, the same affix usually has several positional variants: *kert* 'garden-NOM.SG' : *kertet* 'garden-ACC.SG' : *kertek* 'garden-NOM.PL' : *kerteket* 'garden-ACC.PL' and *láb* 'foot-NOM.SG' : *lábat* 'foot-ACC.SG' : *lábak* 'foot-NOM.PL' : *lábakat* 'foot-ACC.PL'. The affixes [a] and [e] are thus in complementary distribution, which is particularly clearly shown by the functional identity of -(*e*)*k* and -(*a*)*k*, -(*e*)*t* and -(*a*)*t*. Hungarian vowels also mostly agree in lip-rounding: *szék* 'chair-NOM.SG' : *széken* 'chair-SUPE.SG', *székeken* 'chair-SUPE.PL', but *üst* 'kettle-NOM.SG' : *üstön* 'kettle-SUPE.SG' : *üstökön* 'kettle-SUPE.PL' (see also § 23).

An analogous, but regressive (rather than progressive) phenomenon is vowel assimilation in the North Žemaitic Telšiai dialect (see, for example, [Rokaitė 1961; Girdenis 1962 (= Girdenis 2000b: 16ff.); Zinkevičius 1966: 61–62; Grinaveckis 1973: 177–180]). In this dialect, vowels such as *ę* and *i*, *ǫ* and *u* contrast essentially only in the final syllable of a word (usually an ending): *brûol^e* "brólio" 'brother-GEN.SG' : *brûolî^i* "bróli̇" 'brother-ACC.SG', *ĝèr^e̊* "geri" 'good-NOM.PL.M' : *ĝèr^i* "geri̇" 'drink-2SG.PRS', *nàkt^e̊s* "naktis" 'night-NOM.SG' : *nàktî^i s* "naktìs" 'night-ACC.PL', *šã·uč^e̊ǫ* "šaũčių" 'shoemaker-ACC.SG' :

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[67] In addition to the works on vowel harmony indicated in the same article, see [Reformatskij 1966 (especially 191ff.); Lyons 1968: 128–131 = Lajonz 1978: 141–144; Vinogradov 1972; Hyman 1975: 182–183; Clements 1977; Jakobson, Waugh 1979: 146–150].

šã·uč̑ᵘ "*šaũčių*" 'shoemaker-GEN.PL'. In other positions, these sounds are in complementary distribution: *i, u* are used before high (*i, u*-type) vowels; in all other cases, we have *ę, ǫ*: *pǫ̀skǫbę̇.lᵉ* "*pùskubilio*" 'small vat-GEN.SG': *pùskubî̇l̑ˡs* "*pùskubilis*" 'small vat-NOM.SG', *lęnènê·* "*lininiai*" 'linen-NOM.PL.M' : *l̑iñîn̑ᵘs* "*lininiùs*" 'linen-ACC.PL.M' (on a similar tendency in Ukrainian dialects, see [Žilko 1971: 37]).[68] Thus in this case as well, *ę* and *i, ǫ* and *u* function in some places as independent phonemes, and in other places as if allophones of the same two phonemes. If we ignore recent borrowings, this general rule is ignored only by the prefixes *i-* "*į-*" 'into', *pri-* "*prie-*" 'at', *nu-* "*nuo-*" 'from' (in some dialects, also *iš-* 'out of', *su-* 'with'), in which the high vowel remains even before mid and low vowels (see [Girdenis 1962: 141 (= Girdenis 2000b: 16); Zinkevičius 1966: 63]; on the development of the prefix and preposition *i/ę*(-), see [Girdenis 1980 (= Girdenis 2000c: 183ff.)]). This behavior is undoubtedly to be explained by open juncture, before which the same oppositions are possible as occur word-finally (see also § 36 and [Jasiūnaitė 1993: 29–33]).

§ 139. Finally, there are even such paradoxical cases in which two or more sounds in the same position are unquestionably distinct phonemes, while in other positions they give the impression of optional variants. The most characteristic example of such a case is Danish [kʿ] and [g] (see [Bazell 1956: 27; Koefoed 1967: 110; Martine 1969: 97]). In word-initial position before a vowel ([#—V]) or a resonant (sonorant) ([#—R]), they contrast and therefore have a distinctive function: *kane* ['kʿaːnə] 'sleigh' : *gane* ['gaːnə] 'palate', *klo* [kʿloː'] 'claw' : *glo* [gloː'] 'stare at-INF', *kro* [kʿroː'] 'inn' : *gro* [groː'] 'grow-INF'. In word-medial or word-final position, both consonants are in free variation and therefore cannot distinguish words: *lække* ['lɛgə] = ['lɛkʿə] 'leak-INF' and *lægge* ['lɛgə] = ['lɛkʿə] 'put-INF', *læk* [lɛkʿ] = [lɛg] 'leak-IMP' and *læg* [lɛkʿ] = [l̑ɛg] 'put-IMP'. These forms are homonyms, although they can be pronounced in two ways (see also [El'mslev 1960b: 344ff.]).

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[68] On the southern boundaries of the North Žemaitic Telšiai dialect, vowel assimilation is not just regressive, but also progressive [Skirmantas, Girdenis 1972 (= Girdenis 2000b: 266ff.)], that is, somewhat reminiscent of the bidirectional vowel harmony of Chukchi (on which see [Širokov 1973; Jakobson, Waugh 1979: 147]).

c) INTERPRETATIONS

§ 140. Representatives of the Petersburg School (for example, [Matusevič 1948: 81–83; Zinder 1979: 59–62]) and the descriptivists do not distinguish between constraints on the use of regular phonemes and accidental gaps in the system, considering them all examples of phonemic alternation and/or defective distribution (see, for example, [Bloch 1972; Pike 1947: 96, 141; Hockett 1955: 164–166; Harris 1963: 65, fn. 14]; cf. [Bazell 1956: 27; Žuravlev 1972: 36]).[69] They maintain that Lithuanian [k] would be a realization of the phoneme /k/, and [k̂] of /k̂/, in all positions and Ru. [a] and [ə] would be realizations of /a/ even in those positions in which [k] and [g], [k] and [k̂], [a] and [ɔ] do not contrast and in principle cannot contrast. Here they consistently observe the principle "Once a phoneme, always a phoneme" (referred to in English as the *biuniqueness condition*): if it has already been demonstrated that any two sounds in a single position are realizations of separate phonemes, then they must necessarily be considered separate phonemes in all other positions as well, irrespective of whether they contrast with one another or not. The automatic alternation of sounds in cases such as *daũgelis* : *daũ*[kʻ], *žeñgia* : *žiñ*[k]*sniai*, *cóм* : *c*[ʌ]*мá* is considered an ordinary alternation of the corresponding phonemes /g/ → /k/, /ɔ/ → /a/ and the like, and thus transferred to the realm of morphology or morphonology.[70]

Adherents of this interpretation place greater emphasis on the phonetic features of sounds than on their distinctive function. Indeed, from the standpoint of function, the [k] which contrasts with the consonants [k̂] and [g], and the [k] which does not contrast with these cannot be identical phonological units. If we maintain this view, it is nearly impossible to give an objective interpretation of the relations that exist between Danish [kʻ] and [g] (§ 139). Even relatively ordinary cases cause great difficulties, if, for example, in place of sounds contrasting in some positions, there appears in other positions an intermediate sound which could be considered an allophone of either

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[69] Some descriptivists (for example, [Hockett 1955: 164, 166–167] nevertheless allow for the possibility of another interpretation of these phenomena.

[70] In descriptive linguistics, this logically flows from the requirement to base a phonological analysis on phonetic information only (see § 31).

phoneme. In Bulgarian, for example, hard and soft consonants are used quite as they are in Lithuanian, except that before front vowels Bulgarian has sounds of an intermediate timbre, so-called semi-soft or semi-hard [Maslov 1956: 21–22], in place of soft consonants. Following the above approach, they would have to be assigned, without argument, to either soft or hard phonemes. It is also not good to assign to morphology purely phonological expressions requiring no morphological information.

§ 141. Other schools of phonology, especially the Prague Linguistic Circle (also glossematics and stratificational linguistics, for example, [El'mslev 1960b: 343–349; Lamb 1966: 17; Lockwood 1972a: 27, 193–195; 1972b]) consistently distinguish regular constraints on distribution from chance constraints. In this view, accepted by many phonologists,[71] we have in all the above cases a special phonological phenomenon called neutralization (Ru. *нейтрализация*, Fr. *neutralisation*).[72] Neutralization is the regular failure to distinguish phonemes or entire phoneme classes in certain strictly defined positions (see, for example, [Trubetzkoy 1936; Martinet 1936; Trubetzkoy 1977: 69ff., 206ff. = Trubeckoj 1960: 86ff., 256ff.; Bazell 1956: especially 30; Trnka 1958; Bogoraz 1963; Vinogradov 1966; Martine 1969; Reformatskij 1970: 62–68; Žuravlev 1972; 1986: 96ff.; Rudelev 1972; Panov 1979: 112ff.; Švedova 1980: 75]).[73] The examples examined above can all serve as illustrations: a) the opposition /p/ : /b/, /t/ : /d/, etc., of Lithuanian (and many other languages, for example German and Russian), realized before vowels and *R*-type consonants and neutralized word-finally and before consonants of the *T*-subclass; b) the opposition of hard and soft consonants, realized only before back vowels and neutralized in all other cases; c) the standard Russian opposition /a/ : /ɔ/, realized in stressed syllables and neutralized in

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[71] The Moscow Phonological School also inclines toward these views (see § 142 and references).

[72] In other languages, the following terms are also found: Ger. *Aufhebung* [Trubetzkoy 1936; 1977: 70, 206ff.; Pilch 1964: 60; Philipp 1974: 33 et passim] (but cf. [Meinhold, Stock 1982: 78 et passim]), Fr. *suppression* (more characteristic of glossematics, cf. [Hjelmslev 1959: 84, fn. 2 et passim]).

[73] On attempts to introduce neutralization into the conceptual system of generative phonology, see [Cairns 1969].

unstressed syllables;[74] d) the Danish opposition /k‛/ : /g/, realized in word-initial position and neutralized word-medially and finally.

§ 142. Those positions in which all phonemes normally contrast are called positions of relevance, and positions in which oppositions are neutralized are called positions of neutralization (Ger. *Relevanzstellungen* and *Aufhebungsstellungen*, Ru. *позиции релевантности* and *позиции нейтрализации* [Trubetzkoy 1977: 70 = Trubeckoj 1960: 86; Žuravlev 1972: 37]). Also used in the same meaning are the terms strong and weak position (more characteristic of the Moscow School, for example, [Avanesov, Sidorov 1970: 250; Bulanin 1979]). In Lithuanian, positions of relevance (strong positions) for the oppositions /p/ : /b/, /t/ : /d/ are before vowels ([—V]) and *R*-class consonants ([—R]) (see § 135 table 13, positions 1 and 2); positions of neutralization (weak positions) are found before all *T*-class consonants and word-finally (see § 135 table 13, positions 3 and 4). As we have already seen, in positions of neutralization, [p] and [b], [t] and [d], etc., do not contrast; the phonetic properties which differentiate them do not have distinctive function. The position of relevance for hard and soft consonants is before a back vowel (see § 136 table 14 position 1) and the positions of neutralization are before all consonants and front vowels, and word-finally (see table 14, positions 2, 3, 4 and 5).

We can illustrate neutralization graphically not just in tables, but also in the "generative" formula (cf. § 57) /a : b/ → [c] / *x*, for example Lith. /b : p/ → [p] / [—#], /C : Ĉ/ → [C] / [—#], etc. (only the most important position of neutralization is shown: [Žuravlev 1972]; cf. also [Žilko 1971: 33ff.]).

d) THE ARCHIPHONEME. MARKED AND UNMARKED MEMBERS OF AN OPPOSITION

§ 143. Disregarding for now positions of relevance, and applying the usual paradigmatic procedures for identifying phonemes to sounds used in positions of neutralization (see 54–55), we can combine them

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[74] This, we might say, is the generally accepted view (see, for example, [El'mslev 1960b: 346; Pauliny 1966: 123; Žuravlev 1972: 37]). Only Martinet, for some obscure reason, did not consider this Russian phenomenon neutralization [Martine 1969: 99–101].

into larger phonological units and consider them realizations of these units—their combinatory or optional variants, as it were.

Denoting these new phonological units with capital letters, we obtain the following picture (see table 15).

Table 15. Neutralization of *T*-class consonants in standard Lithuanian

Sounds	Positions of relevance		Positions of neutralization			Archiphonemes
	[—V]	[—R]	[—z]	[—s]	[—#]	
	1	2	3	4	5	
[g]	+	+	+			/K/
[k]	+	+		+	+	
[d]	+	+	+			/T/
[t]	+	+		+	+	
[b]	+	+	+			/P/
[p]	+	+		+	+	

The phonological units /K/, /T/, /P/ are distinct from phonemes used in positions of relevance, and are called archiphonemes (from the Gk. ἀρχι- 'chief', cf. ἀρχιμάγειρος 'chief cook'; see, for example, [Martinet 1936: 54; Trubetzkoy 1977: 71–75 = Trubeckoj 1960: 87–90; Martine 1963: 426; 1969: 97; Bogoraz 1963; Padlužny 1969: 99ff.; Žuravlev 1972: 39]),[75] thus phonemes of a higher rank. They

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[75] On the close, but not quite synonymous, term of the Moscow School *hyperphoneme* see [Kuznecov 1970a: 186; Reformatskij 1970: 63–64, 105; Panov 1979: 119–121] (cf. [Achmanova 1966: 31; Klimov 1967: 90; Žuravlev 1972: 39]). But this concept is understood differently even by adherents of the Moscow School (see, for example, [Bulanin 1979: 28–29]): for some, it is the realization of a phoneme in positions of "unresolvable syncretism" (for example, Ru. *собáка* /sɑbáka/ 'dog' [Švedova 1980: 71]), for others (for example, Reformatskij) it is nearly the same as the Praguian archiphoneme or, more accurately, Avanesov's *weak phoneme* [Avanesov 1956: 29ff.] (cf. also Bernštejn's *phonemoid* [Bernštejn 1962: 79]).

It should also be noted here that far from all phonologists who accept neutralization employ the concept of archiphoneme (see, for example, [Kaspranskij 1963: 37; Zinder 1979: 31–62]); in the post-war years, even Czech linguists have abandoned it (see [Trnka 1958: 863; Vachek 1964: 37; Vachek 1966: 62]). For example, Trnka believes that neutralization is the absence of one member of an opposition in certain positions. The concept is categorically rejected by theorists of so-called natural phonology (see, for example, [Kodzasov, Krivnova 1981: 153–154, and for critical remarks 158]). Attempts to identify archiphonemes

consist of the features common to all members of a neutralizable opposition, i.e., what remains after removing those features which differentiate the members of a neutralizable opposition. Lithuanian /P/ is a labial plosive, indifferent to voicing.

The actual sounds used as "allophones" of archiphonemes are called representatives of an archiphoneme (Ger. *Stellvertreter des Archiphonems* [Trubetzkoy 1977: 71], Ru. *представители архифонемы* [Trubeckoj 1960: 87]). In our example, the representatives of the archiphoneme /K/ are [g] and [k]; the archiphonemes /T/ and /P/ are represented by [d], [t] and [b], [p], respectively (cf. also [Padlužny 1969: 101–105]).

Before consonants, representatives of archiphonemes are determined by position, that is, by the following consonant: [g d b] occur before [z d…]; [k t p] occur before [s t…]; the preceding consonant assumes the features of the following consonant. This is so-called assimilatory (or contextual) neutralization (Ger. *kontextbedingte Aufhebungsarten* [Trubetzkoy 1977: 207ff.], Ru. *контекстуальная нейтрализация* [Trubeckoj 1960: 260ff.]). In word-final position, the archiphoneme representatives [kˀ tˀ pˀ] do not depend on a neighboring sound; they are determined by the linguistic system itself. This is structural neutralization (Ger. *strukturbedingte Aufhebungsarten* [Trubetzkoy 1977: 206–212ff.], Ru. *структурно-обусловленная нейтрализация* [Trubeckoj 1960: 257–264ff.]; see also [Žuravlev 1972: 46]).

Structural neutralization usually occurs in positions which are least affected by other units: at the beginning or end of a word or other meaningful unit, in unstressed syllables, and the like. A characteristic structural neutralization is the above-mentioned failure to distinguish unstressed /a/ and /ɔ/ in Russian, where the archiphoneme /A/ is represented by [a] or [ə], and likewise the Danish neutralization of /kˀ/ and /g̥/, where the representatives of the archiphoneme /K/ are the free variants [kˀ] and [g̥]. The latter example is quite exceptional, since most often the representative of an archiphoneme is close to one of the members of a neutralizable opposition (see, for example, [Trnka 1958: 863]). In certain cases, moreover, the archiphoneme can be represented by sounds which differ from both members of a neutralizable

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with phonemes are completely incorrect (for example, [Padlužny 1969: 99; Vinogradov 1972: 344]).

opposition.[76] This is the case in Bulgarian, where, as noted above (§ 140), before front vowels we have consonants of intermediate softness. There is a similar situation in the Southwest Aukštaitic dialects of Lithuanian, and in varieties of the standard language closely associated with these (especially before the vowels [i e· ę·], cf. § 168, fn. 107 and, for example, [Vaitkevičiūtė 1957: 12–14]). We might also recall here the [a.] and [æ.] ([e.]) of many East Aukštaitic Utena dialects, representing in unstressed positions archiphonemes of the oppositions /ɔ·/ : /uɔ/, /ę·/ : /iæ/: *kúɔjæ* "kúoja" 'roach (fish)', *kɔ́·jæ* "kója" 'foot' : *ka.jæ̇́.ła.* "kuojėlė" 'roach (dim.)' and "kojėlė" 'foot (dim.)'; *d̂iæ̃na.s* "diẽnos" 'day-NOM.PL' : *d̂æ.ná.s* "dienõs" 'day-GEN.SG', and *b̂ę̃·da.s* "bẽdos" 'misfortune-NOM.PL' : *b̂æ.dá.s* "bėdõs" 'misfortune-GEN.SG' (see § 84 and [Kosienė 1978: 31]). In Northern Panevėžys dialects there is also consistent neutralization in such cases: /ie : ę· : i· : i/ → [e/i̠] / [⁻stress], /uo : o· : u· : u/ → [o/u̠] / [⁻stress], for example: *d̂iə̃n̪ᵇ* "dienà" 'day', *r̂ę̃·k̂ᵇ* "rẽkia" 'shout-3PRS', *ĝí·vᵇs* "gývas" 'alive', *d̂i.d̂el̪ᵇŝ* "dìdelis" 'large, great' → *d̂eñæ̇.ła* ‖ *d̂iñæ̇.ła* "dienėlė" 'day (dim.)', *r̂ęk̂í.mᵇs* ‖ *r̂i̠k̂i.mᵇŝ* "rèkìmas" 'shouting', *ĝęvî·b̂e* ‖ *ĝi̠vî·b̂e* "gyvýbė" 'life', *d̂ęd̂é.ŝęn̂ᵇŝ* ‖ *d̂i̠d̂é.ŝęn̂ᵇŝ* "didèsnis" 'larger' or *du̠ôb̂e* "duobẽ" 'pit (hole)', *stó·rᵇs* "stóras" 'thick, fat', *grú·dᵇs* "grū̃das" 'grain', *pu̠.tos* "pùtos" 'foam' → *dɔbæ̇.ła* ‖ *du̠bæ̇.ła* "duobėlė" 'pit (dim.)', *stɔru̠.mᵇs* ‖ *stu̠rú̠.mᵇs* "storùmas" 'thickness', *grɔd̂é.l̂ᵇŝ* ‖ *gru̠d̂é.l̂ᵇŝ* "grūdėlis" 'grain (dim.)', *pɔtó·jᵇ* ‖ *pu̠tó·jᵇ* "putója" 'foam-3PRS' (see, for example, [Kačiuškienė 1982: 41; Girdenis, Židonytė 1994 (= Girdenis 2001: 127ff.)]). Here, as we see, archiphonemes can be represented by two types of sound; their selection depends on the actual dialect and speech style (i.e., on certain sociolinguistic factors which are difficult to monitor).[77] On a similar neutralization in the Širvintos dialect, see § 227, 241 and references.

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[76] On the basis of the relationship between archiphoneme representatives and neutralized phonemes, Hjelmslev [El'mslev 1960b: 345–347] (cf. also [Hjelmslev 1959: 86]) distinguishes two types of neutralization ("suppression"): implication (for example, Lith. /k : g/ → [k] / [——#]) and coalescence or domination (for example, Dan. /k : g/ → [$\overset{k}{g}$], Ru. /a : ɔ/ → [ə] / [⁻stress]). For a more detailed (even pedantic) classification of types of neutralization, see [Žuravlev 1972].

[77] As Garšva's observations and experiments have shown [1982: 68–69], unstressed vowels vary widely, even in very careful speech; even neutralization itself can be optional at times.

The phenomena examined in § 53 and § 59 (third example, table 5) should also be considered neutralization. The opposition of /a/ and /e/ is neutralized in standard Lithuanian in all positions except word-initial ([#—]; cf. also § 174). From a phonological standpoint, the same happens with oppositions of the type /ẹ/ : /i/, /ọ/ : /u/ in North Žemaitic Telšiai dialects: their strong position (position of relevance) is only at the end of a word or before an open juncture (see § 138).

§ 144. The phoneme which is similar to the sound used in a position of structural neutralization (i.e., in a position which does not depend on the influence of adjacent phonemes, for example, word-finally or in an unstressed syllable) is the unmarked member of an opposition (Ger. *merkmallos* [Trubetzkoy 1977: 67, 73], Ru. *немарки-рованный* [Trubeckoj 1960: 83, 90], Eng. *unmarked* [Hyman 1975: 143–145], Fr. *non-marqué* [Vachek 1964: 186]). The phoneme close to the sound which cannot appear in a position of structural neutralization (for example, at the end of a word), is the marked member of an opposition (Ger. *merkmalhaltig* [Trubetzkoy 1977: ibid.], Ru. *марки-рованный* [Trubeckoj 1960: ibid.],[78] Eng. *marked* [Hyman 1975: ibid.], Fr. *marqué* [Vachek 1964: ibid.]). In standard Lithuanian, /k/, /t/, /p/, /s/ and /š/ are the unmarked members of the opposition /g d b z ž/ and /k t p s š/, since the sounds close to them, [kˑ], [tˑ], [pˑ], [s], [š], are used word-finally, the only position of neutralization for this opposition which does not depend on other phonemes. The phonemes /g d b z ž/, which have no correspondents in this position, are considered the marked members of this opposition. The unmarked members of the opposition of hard and soft consonants are the hard phonemes, since in word-final position their archiphonemes are represented by hard consonants; soft consonants, which do not have close correspondents here, are the marked members of the opposition.

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[78] Jakobson [1971: 385ff.] indicates that Trubetzkoy, when speaking and writing in Russian, used the terms *беспризнаковый–признаковый* (*член оппо-зиции*), which he himself later translated into German as *merkmallos* and *merkmaltragend* [Trubetzkoy 1977: 67, 73]. The current unwieldy and imprecise Russian terms "drifted in" from French as calques of *non-marqué–marqué*. Knowing the full history, it is rather annoying that certain Lithuanian linguists have become fond of the "international" words *nemarkiruotasis–markiruotasis* (members of an opposition), which arose so strangely and say so little about the nature of the phenomenon.

In the latter case, the phoneme relations can also be seen from the writing system: only the softness of consonants is specially noted.

In speech, the unmarked members of an opposition are almost always more frequent than the marked members [Trubetzkoy 1977: 235 and references = Trubeckoj 1960: 292 and references; Klyčkov 1962: 129; 1984; Širokov 1961: 53ff., Melikishvili 1974; Melikišvili 1976; Gamkrelidze 1977: 25; 1978: 11 and 20; 1979: 283; Panov 1979: 183]. In connected texts, the members /k t p s š/ of the above-mentioned opposition /g d b z ž/ : /k t p s š/ are three times more frequent than /g d b z ž…/. The frequency of individual pairs is approximately as follows: /k/ : /g/ = 3.0, /t/ : /d/ = 1.8, /p/ : /b/ = 2.4, /s/ : /z/ = 48.2, /š/ : /ž/ = 1.9, etc. (see [Karosienė, Girdenis 1993 (= Girdenis 2001: 64ff.)]; cf. [Šimkūnaitė 1965; Svecevičjus 1966]). Knowing this, we can distinguish the unmarked members of an opposition from the marked members even when a language or dialect lacks a single position in which structural neutralization, independent of adjacent phonemes, would occur. For example, word-finally in North Žemaitic, as noted above (§ 135, fn. 62), /k/ : /g/, /t/ : /d/, /p/ : /b/, /s/ : /z/, /š/ : /ž/ contrast just as they do before *R*-type consonants: *dèk* "*dèk*" 'burn-2SG.IMP' : *dèg* "*dẽga*" 'burn-3PRS', *sȯjũ·nt* (*sùjũ·nt*) "*pajuñta, pradeda jùsti*" 'feel, begin to feel-3PRS' : *sȯjũ·nd* (*sùjũ·nd*) "*sujuñda*" 'begin to move-3PRS', *krẽ·p* (*krẽ·ip*) "*kreĩpia*" 'direct-3PRS' : *grẽ·b* (*grẽ·ib*) "*griẽbia*" 'snatch-3PRS', *zĩ·s* "*zỹs*" 'buzz-3FUT' : *zĩ·z* "*zỹzia*" 'buzz-3PRS', *ũ·š* "*ũ̃š*" 'howl (of wind)-3FUT' : *ũ·ž* "*ũ̃žia*" 'howl (of wind)-3PRS'. But the unmarked members of the opposition are nevertheless clear; they are, without question, /k t p s š…/: in speech, they are approximately 3.7 times more frequent than /g d b z ž…/, cf.: /k/ : /g/ = 5.0, /t/ : /d/ = 3.1, /p/ : /b/ = 1.6, /š/ : /ž/ = 3.0, etc. [Girdenis 1981c: 19–22, 28, 36 (= Girdenis 2000c: 229–232, 239, 247)]. Hard consonants in this dialect are also far more frequent than soft consonants: /k/ : /k̂/ = 2.8, /g/ : /ĝ/ = 1.8, /p/ : /p̂/ = 9.5, /b/ : /b̂/ = 5.8, /s/ : /ŝ/ = 5.1, etc. The overall picture is somewhat disturbed only by /l/ and /ž/, which for some reason are used less frequently than /l̂/ and /ẑ/ in both the Žemaitic dialect and the standard language (cf. [Girdenis 1981c: 28 (= Girdenis 2000c: 239)]).[79]

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[79] The explanation presented by Trubetzkoy [Trubetzkoy 1977: 235 = Trubeckoj 1960: 292] for a similar phenomenon in Russian does not hold for

The distribution of the members of a neutralizable opposition occasionally also reveals the marked and unmarked members of other oppositions. If neutralization does not occur before all phonemes of a certain type, its weak position is before the marked members of an opposition; the phonemes forming a position of relevance in such cases are the unmarked members of the opposition [Trubetzkoy 1977: 75 = Trubeckoj 1960: 93; Žuravlev 1972: 46; Schane 1972: 219]. On this basis, we can confidently consider the Lithuanian front vowels /e e· ie ę̇ i i·/ the marked members of the series, since the opposition of hard and soft consonants is neutralized before them; the back vowels /a a· uo o· u u·/ are the unmarked members of these oppositions: before them hard and soft consonants contrast.

e) CORRELATIONS AND CORRELATIVE SERIES

§ 145. Oppositions in which one member is unmarked and the other is marked are called privative oppositions [Trubetzkoy 1977: 67 = Trubeckoj 1960: 82–83]. This term (Fr. *privatif* 'negative' ← Lat. *privo* 'I take away, I set free') emphasizes that one member of such an opposition has a feature "taken away" from the other (unmarked) member; that one member of an opposition is negative, as it were, and the other positive.

This type of opposition can be represented by Ru. /a/ : /ɔ/, Lith. /p/ : /b/ or /l/ : /l̂/, etc. Of these, the Lithuanian oppositions /p/ : /b/ and /l/ : /l̂/ are also proportional, since a number of other phonemes are

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either Lithuanian or its dialects, since in the standard language and in many North Žemaitic dialects, /l/ : /l̂/ and especially /ž/ : /ẑ/ do not at all differ from other phonemes with regard to positions of neutralization.

Here we might also note that the recent, rather fashionable tendency toward establishing the markedness of members of an opposition based solely on relative frequency has been assessed by some phonologists quite guardedly (if not critically; for example, [Voronkova 1981: 62]). But these reservations most likely only reveal the need to distinguish at least two types of markedness: structural markedness, connected with neutralization, and statistical markedness, reflected in the frequency relations of members of an opposition. We should also strictly distinguish internal markedness (emerging from the functions of an actual language) and universal markedness (on the latter, in addition to the above-mentioned works by Melikišvili and Gamkrelidze, see [Chomsky, Halle 1968: 400–435; Postal 1968: 153–207; Hyman 1975: 145–149]).

related in the same way: /k/ : /g/ = /t/ : /d/ = /p/ : /b/ = /s/ : /z/ = /š/ : /ž/ = /č̌/ : /ǯ̌/…, /r/ : /r̂/ = /l/ : /l̂/ = /v/ : /v̂/ = /n/ : /n̂/ = /m/ : /m̂/…. Additionally, such an opposition is bilateral (Fr. *bilatérale* [Vachek 1964: 145], Ger. *eindimensionale* [Trubetzkoy 1960: 74ff.], Ru. *одномерная* [Trubeckoj 1960: 74ff.] or *двусторонняя* [Reformatskij 1960: 336ff.]): features common to both members of such an opposition can belong to these two phonemes only. For example, Lithuanian has only two labial plosives: /p/ and /b/, only two hard dental fricatives: /s/ and /z/, only two *R*-type trills: /r/ and /r̂/.

Proportional bilateral privative oppositions are called correlations [Trubetzkoy 1977: 75ff. = Trubeckoj 1960: 93ff.; Martine 1960: 98; 1963: 423; Šaumjan 1962: 152; Kuznecov 1970a: 189][80] (from Fr. *corrélation* 'correlation', Lat. *con-* 'with', *relatio* 'relation'). An entire set of proportional oppositions (for example, Lith. /k/ : /g/ = /t/ : /d/ = /p/ : /b/, etc.) forms a correlative series of phonemes.

§ 146. The feature by which a marked member of an opposition (or all marked members of a correlative series) differs from the unmarked member is called a correlation mark (Ger. *Korrelationsmerkmal* [Trubetzkoy 1977: 77], Ru. *коррелятивный признак* or *признак корреляции* [Trubeckoj 1960: 95]. The correlation (or correlative-series) mark of the Lithuanian /p/ : /b/ (= /t/ : /d/ = /k/ : /g/) is voicing, that is, the active participation (vibration) of the vocal cords, accompanied by little tension of the speech organs and weak air flow. The unmarked members of this correlation are voiceless; in articulating these, the vocal cords are passive, the air flow is stronger, the speech organs more tensed, and the occlusion and plosion itself are a bit more prolonged.[81] Hence the marked member /b/ (and /d/, /g/…) of

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[80] Here we adopt the view most clearly formulated by Kuznecov: "Мы определяем корреляцию как противопоставление фонем по одному признаку, выступающему в одних позициях и утрачивающемуся в других" 'We define a correlation as an opposition of phonemes according to a single feature occurring in certain positions and lost in others' [Kuznecov 1970a: 189]. The concept of correlation presented by Trubetzkoy and Martinet seems too broad, and, more importantly, is purely logical and phonetic rather than functional. It is, as it were, a logical, rather than functional, correlation.

[81] Only such a comprehensive understanding of distinctive features can be truly phonological (see also § 163 and references). From the standpoint of pure phonetics, all phonemes are seemingly marked, only in different directions; in

this correlation is as if a simultaneous combination of the unmarked member /p/ (and /t/, /k/…) and the correlation mark: /b/ = /p/ & /^{vce}/ (that is, 'voicing') (/d/ = /t/ & /^{vce}/, /g/ = /k/ & /^{vce}/, etc.). The correlation mark of /r/ : /r̂/ = /m/ : /m̂/ = /n/ : /n̂/… is softness, that is, a lack of velarization and an additional articulation of the mid-part of the tongue, which is elevated to the hard palate, raising the timbre of the sound. This feature is also signalled by certain properties of adjacent vowels (a higher or abruptly changing timbre, fronted articulation, and the like). Here as well the marked member of the opposition /r̂/ (/m̂/, /n̂/…) can be considered a simultaneous combination of the unmarked member /r/ (/m/, /n/…) and the correlation mark /ˆ/ ("softness" or "palatalization"): /r̂/ = /r/ & /ˆ/ (/m̂/ = /m/ & /ˆ/, /n̂/ = /n/ & /ˆ/). Thus in all these cases the marked member of the correlation has a feature which is lacking in the unmarked member.[82]

Unmarked members of a correlation thus interpreted have no features distinguishing them from marked members, and we can therefore say that they coincide in all cases with the corresponding archiphoneme: /k/ ≈ /K/, /t/ ≈ /T/, /p/ ≈ /P/, etc. We can describe both the unmarked phoneme /p/ and the archiphoneme /P/ as labial plosives lacking the feature of voice, which characterizes the marked member /b/. With this in mind, Trubetzkoy used for some time a phonological transcription (quite interesting and well-founded, incidentally) in which archiphonemes were written with the same characters as the unmarked members of corresponding correlations (see, for example, [Trubetzkoy 1931: 98]; cf. [Vachek 1966: 31–32]). Only later did he begin to use for this purpose capital letters, or letters with certain diacritics, corresponding to the symbols for the unmarked members of a correlation, or $\frac{b}{p}$-type "fractions" (cf. [Reformatskij 1960: 334 and

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phonology, those phonetic features which belong to the unmarked member of a correlation are treated as if they did not exist; they are negative or null phonetic properties. This understanding of marked/unmarked renders futile all critical remarks directed against these concepts and the closely related dichotomous principle (see, for example, [Reformatskij 1961: 110ff.; Bondarko 1966; Bondarko, Verbickaja 1965]).

[82] It is for this reason that Trubetzkoy used the Russian terms *признаковый–беспризнаковый член* (see § 144, fn. 78). As noted above (fn. 81), from a phonetic standpoint, a feature of a marked member can be both negative and multidimensional; it can even be signalled by properties of neighboring sounds.

references; Vachek 1966: 61]). Recently, as noted above (cf. § 143, fn. 75), there has been a tendency to represent archiphonemes in positions of neutralization by allophones of the corresponding phonemes (see [Trnka 1958; Vachek 1966: 60–62]). Therefore, representatives of archiphonemes are now most often transcribed with the same symbols as the phonemes which they most resemble.

We can illustrate the evolution of these views with examples of a phonological transcription of the word *kir̃pdamas* 'while cutting': 1) /kir̃pdamas/ (Trubetzkoy's early position),[83] 2) /ⱪiⱤPdamaS/ (the later position of Trubetzkoy and other Praguians),[84] 3) /k̂ir̃bdamas/ (the current position of Praguians, especially Trnka and Vachek).

A transcription of the third type would also be quite acceptable to those phonologists who do not recognize archiphonemes, for example the descriptivists, or adherents of the Petersburg School. Also generally quite possible is the approach (and it may be the most realistic) according to which the representatives of archiphonemes in almost all cases would be considered the corresponding phonemes, and not just any sounds lacking phonemic status. Of course, if we wish to show actual distinctive units and contrasts, a transcription of the second type could be used, but this is poorly suited for systematic usage, especially for statistical studies.

The Moscow Phonological School goes its own way (we could say, a fourth way) here. In weak positions, its adherents "restore" the strong-position phoneme of every actual morpheme: [nʌgá] = <nagá>, if this is a form of the word *наг*, *нагóй* 'naked', but [nʌgá] = <nogá>, if this form is connected with *нóги* 'feet' (cf. also [rɔt] = <rot> ← *рта* 'mouth-GEN.SG', but [rɔt] = <rod> ← *рóда* 'kin-GEN.SG' [Reformatskij 1970: 28; Kuznecov 1970d: 476; Avanesov, Sidorov 1970: 254, 264ff.]). In those cases where it is not possible to restore

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[83] The phoneme /k/ is the unmarked member of the correlation /k/ : /k̂/, and /p/ and /s/ are the unmarked members of the correlations /p/ : /b/, /p/ : /p̂/, /s/ : /z/ and /s/ : /ŝ/, and therefore they are written here, although the sounds pronounced in the first two cases are closer to the marked members /k̂/ and /b/.

[84] /K/ denotes the archiphoneme of the correlation /k/ : /k̂/, represented here by [k̂]; /R/ is the archiphoneme represented by /r/ and /r̂/; /P/ is the archiphoneme of the correlation /p/ : /b/ (and /p/ : /p̂/, /b/ : /b̂/), represented here by the voiced [b]; /S/ is the archiphoneme of the correlation /s/ : /z/ (: /ŝ/ : /ẑ/), represented by the hard [s].

the phoneme in this way, when a so-called hyperphonemic situation arises (cf. § 143, fn. 75), so-called weak phonemes are used (for example, *коро́ва* <kɑróva> 'cow', *соба́ка* <sɑbáka> 'dog'). Usually these weak phonemes are not recorded in the inventory of phonemes, but there have sometimes been unjustified deviations from this principle (for example, [Švedova 1980: 76–78]).

As we see, the Moscow phonological transcription recalls in its main features a morphological (or, more precisely, a morphonemic) notation. Its foundations are close to the second interpretation, only here there is greater emphasis on, and respect for, morphonemic alternation. This is already a step in the direction of a morphonological or generative interpretation (see § 31, fn. 40; cf. also [Kasevič 1972: 153]).

§ 147. Correlations are usually named after their features. For example, oppositions of the Lithuanian type /p/ : /b/ = /t/ : /d/… form a voicing correlation, oppositions of the type /p/ : /p̂/ = /k/ : /k̂/…, a softness correlation, etc. The latter is often also called a timbre correlation, since softness, or palatalization, changes the timbre of a basic articulation, raising it (see, for example, [Jakobson 1962a: 153ff.; Čekman 1970: 9ff.]). Terms such as *series correlation*, and the like, are also used.

§ 148. Correlations exhibit great diachronic stability. If for some reason one member of a correlation changes, the other member generally changes in the same direction (cf. [Martine 1960: 106–107 et passim; Labov 1972: 118ff.; Steponavičjus 1975: 223–226 and references; 1982b: 12ff.]). This also explains the symmetry of many phonetic changes. In Lithuanian dialects, for example, vowels and diphthongs of the same height almost always change in the same way. Where we have *ę* in place of *i*, we will find *ǫ* in place of *u*; where *in* is pronounced in place of standard *en*, we will most likely find *un* in place of *an*; where East Baltic *ȩ̄* has changed into *ie*, we have *uo* in place of *ō̧*; where *ȩ̄* > *ęi*, *ō̧* > *ǫu*. If a dialect distinguishes, for example, *ę* and *i*-type sounds, it is highly likely that *ǫ* and *u* also contrast; if the opposition *ȩ̄* : *ie* is neutralized in certain cases, the opposition *ō̧* : *uɔ* is also most likely neutralized, etc. Similar examples can be found in many languages. Changes everywhere generally start with front vowels; back vowels later adjust themselves to their front counterparts (see, for example, [Bailey 1972: 29]).[85]

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[85] In the natural world as well, correlative events tend to change in more or less the same way (cf. [Darvinas 1959: 523]).

Consonantal correlations tend to change in a similar way. Suffice it to recall here the same development of the Baltic clusters *$t\underset{\hphantom{.}}{i}$ and *$d\underset{\hphantom{.}}{i}$ in various dialects, the same softening and affrication of *k and *g in Latvian, the same fate of *$p\underset{\hphantom{.}}{i}$ and *$b\underset{\hphantom{.}}{i}$.

f) CORRELATION BUNDLES

§ 149. In addition to pairs, larger groups of phonemes may stand in a correlative relation. In Sanskrit, four plosives with the same place of articulation are linked in such relations: /p/ : /pʿ/ : /b/ : /bʿ/ = /t/ : /tʿ/ : /d/ : /dʿ/ = /ṭ/ : /ṭʿ/ : /ḍ/ : /ḍʿ/ = /k/ : /kʿ/ : /g/ : /gʿ/ (cf. also /č/ : /čʿ/ : /ǯ/ : /ǯʿ/, transliterated *c*, *ch*, *j*, *jh*), for example: *pālam* 'watchman-ACC.SG' : *phālam* 'plowshare-ACC.SG': *bālam* 'boy-ACC.SG' : *bhālam* 'forehead-ACC.SG'. The oppositions in each group are neutralized, for example, word-finally: before a pause, the archiphonemes /P/, /T/, /Ṭ/, /K/ are represented by [p], [t], [t], [k], and before the initial vowel of a following word by [b], [d], [ḍ], [g]. Hence the voiceless non-aspirated consonants are the unmarked members of these oppositions, and the other consonants are the marked members. Markedness here is at two levels rather than one: firstly, aspirated consonants contrast with non-aspirated, and then voiced consonants contrast with voiceless. Thus it is as if the correlations of voicing and aspiration intersect. This is most clearly seen in the following tree diagram (see figure 8; the least-marked phonemes are shown on the left; the most-marked on the right).[86]
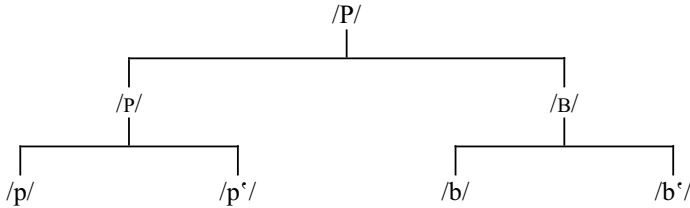
Figure 8. Correlation of voicing and aspiration in Sanskrit

Such a combination of several correlations is called a correlation group or a correlation bundle (Ger. *Korrelationsbündel* [Trubetzkoy 1977: 78–82], Ru. *пучок корреляций* [Trubeckoj 1960: 96–99; Martine 1960: 100; Reformatskij 1961: 111, 115]).

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[86] For similar examples from modern Indic languages, see [Zograf 1976: 156–157].

§ 150. The plosives of Ancient Greek are grouped in three-member correlation bundles: π /p/ : β /b/ : φ /pʽ/ = τ /t/ : δ /d/ : θ /tʽ/ = κ /k/ : γ /g/ : χ /kʽ/, cf. πάρος 'formerly' : βάρος 'weight' : φάρος 'sail', τεῖος 'so long, in the meantime' : δεῖος [δέος] 'fear, alarm' : θεῖος 'divine', κέρας 'horn' : γέρας 'donation' : χέρας 'hand-ACC.PL'. These correlation bundles are neutralized before all plosives and σ /s/, which has neither a voiced nor an aspirated correlate. The representatives of the archiphonemes /Π/, /T/, /K/ before plosives were conditioned by the voicelessness, voicing, or aspiration of the neighboring consonant: βλάβη 'harm, damage' : βλάπτω 'I do damage', γράφω 'I draw, I write' : γραπτός 'drawn, written', λέγω 'I gather' : λεκτός 'gathered', δέχομαι 'I accept, I receive' : δέκτος 'acceptable, agreeable', before σ only voiceless could occur: ἀμείβω 'I change' : ἀμείψω /ameípsō/ 'I will change', γράφω : γράψω /grápsō/ 'I will draw, I will write', λέγω : λέξω /léksō/ 'I will choose', δέχομαι : δέξω /déksō/ 'I will accept'. Since [p t k] appear before the phoneme /s/, which is indifferent to voicing and aspiration, the phonemes /p t k/ are the unmarked members of the correlation bundle, and /b d g/ and /pʽ tʽ kʽ/ are the marked members: /b/ = /p/ & /ᵛᶜᵉ/, /pʽ/ = /p/ & /ʽ/, etc. In one case the "markedness" goes in one direction, and in the other case, in the other direction. Hence what we have here is not a two-tiered opposition, but a triad, which is best illustrated not with a tree diagram, but as follows: (see, for example, [Trubetzkoy 1977: 78 = Trubeckoj 1960: 97; Reformatskij 1961: 111]; cf. [Vinogradov 1976: 303]):

$$/\pi/$$
$$\diagup \quad \diagdown$$
$$/\beta/ \; — \; /\varphi/$$
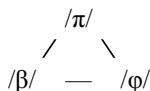
Of course, this triad can also be converted into a tree diagram (see figure 9):
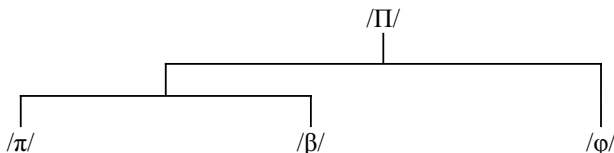
Figure 9. Tree diagram of labial plosives in Ancient Greek

At the first node the aspirate /φ/ separates and branches off to the right and the voiced /β/ separates at the second node. Furthest to the left is the unmarked member of the entire bundle, /π/. But since this is not quite a natural grouping, the alternative in figure 10 is also possible:
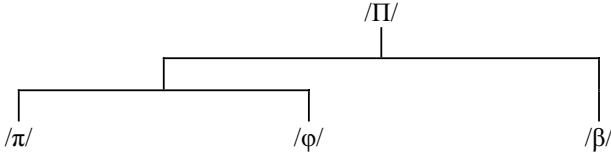
Figure 10. Another model of the Ancient Greek triad

In this case, /β/ contrasts first of all with the phonemes /π/ and /φ/ as voiced consonant to voiceless, and in the voiceless group, the aspirate /φ/ contrasts with /π/, which is unmarked in all respects. Ancient Greek does not permit us to answer the question of which alternative is more acceptable, but, keeping in mind that oppositions of the type /p/ : /b/ are more typical than /p/ : /pʻ/, at least for the languages of Europe, the first solution seems preferable: /φ/ (that is, /pʻ/) seems typologically more marked /β/ (/b/). Calculations of phoneme frequency would perhaps help in answering the question more concretely.

Similar consonant triads are also typical of other languages. Burmese, for example, has correlation bundles of the Greek type: /p/ : /b/ : /pʻ/ = /t/ : /d/ : /tʻ/ = /k/ : /g/ : /kʻ/, except that the affricates /č/ : /ǯ/ : /čʻ/ and even the fricatives /s/ : /z/ : /sʻ/ also belong here.[87] In Georgian triads, the place of the aspiration feature is assumed by glottalization, a secondary articulation of the vocal cords reminiscent of the "break" of Žemaitic broken tone (see, for example, [Čikobava 1967: 26]):[88]

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[87] It is generally believed that the Indo-European proto-language had similar triads (only with voiced aspirates): *p* : *b* : *bh* = *t* : *d* : *dh* = *k* : *g* : *gh* = *k̂* : *ĝ* : *ĝh* = *kᵘ* : *gᵘ* : *gᵘh*.

[88] The consonants /p t k/ are somewhat aspirated.

The least marked of the plosives are the voiced (!), and of the affricates, the voiceless non-glottalized [Melikišvili 1976: 72–76ff.; Melikishvili 1974: 91 and 93, fn. 12].

The affricates of this language, and the dorsal plosives together with corresponding fricatives, even form five-member correlation bundles:

/s/ — /c/   /š/ — /č/   /x/ — /k/
 ╱ ╲   ╲ = ╱ ╲   ╲ = ╱ ╲   ╲
/z/ — /ʒ/ — /cˀ/   /ž/ — /ǯ/ — /čˀ/   /ɣ/ — /g/ — /kˀ/

§ 151. The voiced and soft correlations of Lithuanian *S* and *T*-type consonants can be combined into four-member bundles:

/š/ — /ž/   /š/ — /ž/   /k/ — /g/   /p/ — /b/
 | | = | | = | | = | |
/š̫/ — /ž̫/   /š̫/ — /ž̫/   /k̂/ — /ĝ/   /p̂/ — /b̂/

These correlations are fully realized only before back vowels (in the position [—V^{back}]). Before front vowels and *R*-type consonants, the correlation of softness is neutralized, but the voicing correlation functions normally. Before *S* and *T*-type consonants and before a pause, correlations of both types are neutralized. The general unmarked members of these bundles are the hard voiceless /p t k…/; the most marked are without question the voiced soft consonants. Thus, for example, the correlation bundle for the labial plosives /p/ : /b/ : /p̂/ : /b̂/ is illustrated by the following tree diagram (see figure 11):
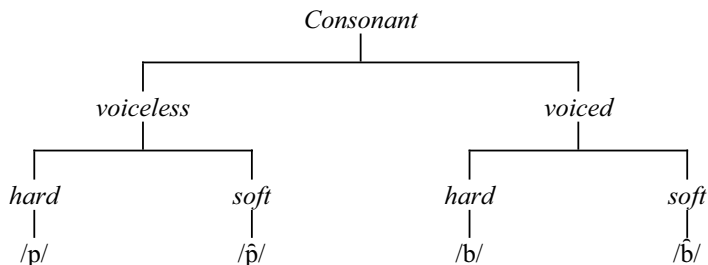
Figure 11. Correlation bundle for labial plosives

We could represent the relations among the members of this cor-relation bundle in various positions still more accurately in the following diagram (see figure 12; /P/ is the archiphoneme of the

opposition /p/ : /p̂/, /ʙ/ is the archiphoneme of the opposition /b/ : /b̂/, and /P/ is the archiphoneme of the entire correlation bundle; cf. [Avanesov 1956: 207; Perebyjnis 1970: 53]).

$$
\begin{array}{ccc}
/\text{p}/ & — & /\text{b}/ \\
| & & | \\
/\hat{\text{p}}/ & — & /\hat{\text{b}}/
\end{array} \quad / \quad [\text{—V}^{\text{u}}] \qquad (1)
$$

$$
/\text{P}/ \quad — \quad /\text{ʙ}/ \quad / \quad [\text{—}\genfrac{}{}{0pt}{}{\text{V}^{\text{i}}}{\text{R}}] \qquad (2)
$$

$$
/\text{P}/ \qquad / \quad [\text{—}\genfrac{}{}{0pt}{}{\genfrac{}{}{0pt}{}{\text{S}}{\text{T}}}{\#}] \qquad (3)
$$

Figure 12. Diagram of relations among members of a correlation bundle

It is especially easy to see from this diagram that the distinctive force of approximately the same sounds can be quite different, even in the same language. In positions of the first type (1), /p/ is much richer and more "powerful" from a phonological standpoint, since all three labial plosive phonemes contrast with it (among others). In the second type of position (2), the force of this consonant is far less, since here only a single labial plosive can contrast with it. In positions of the third type (3), no labial plosive contrasts with it any more; distinctive here are only those features which describe the archiphoneme /P/ of the entire correlation bundle and distinguish it from non-labial plosives and various non-plosive consonants. Thus, the data of even a single language show that a sound's phonological role and its weight are determined by its position in the system, and not by its physical properties.

g) NEUTRALIZATION AND PHONEME CLASSES

§ 152. The study of neutralization and correlative phoneme relations is significant in several respects.

First, it is important to examine neutralization carefully, since it plays a significant role in the evolution of phonological systems.[89]

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[89] "Диахроническая фонология немыслима без понятия нейтрализации" 'Diachronic phonology is unthinkable without the concept of neutralization' [Žuravlev 1972: 36]; cf. [Kuryłowicz 1960: 243ff. = Kurilovič 1962: 334ff.; 1965: 403–411]).

Nearly all phonological oppositions go through a stage of neutralization before disappearing completely, a period when the disappearing opposition is still preserved in certain positions.

Neutralization can also trigger various non-phonological processes in the development of a language: the intersecting of apophonic vowel series (see, for example, [Kuryłowicz 1968a: 257 et passim]), and non-systematic sound substitution—so-called analogical change (on which see [Kuryłowicz 1960: 66ff. = Kurilovič 1962: 92ff.; Anttila 1972: 83, 88–108]). If distinct grammatical units come to coincide in a position of neutralization, there often (but, of course, not always) arises a tendency, triggered by this ambiguity, to unify them, level them, in positions of relevance as well; or, on the contrary, to accentuate and polarize their contrast, even to shift this enhanced distinction to those meaningful units which once had a uniform or less distinctive expression (see [Kurilovič 1965: 408]. On the role of neutralization in the development of the vocalism of Lithuanian dialects, see [Girdenis 1975b (= Girdenis 2000c: 335f.)]).

§ 153. Neutralization is especially important because it allows us to extend, refine, and concretize the classification of phonemes, the basic framework of which is formed by an analysis of syntagmatic relations (see [Hjelmslev 1959: 85ff.; Muchin 1962: 61]).

Neutralization almost always reveals two types of phoneme classes: one class includes those phonemes which undergo neutralization; the other, those phonemes which form a position of neutralization. In standard Lithuanian, for example, the oppositions /a/ : /e/, /aˑ/ : /eˑ/ are neutralized after all consonants (cf. § 53, 59, 174),[90] and therefore these phonemes form a separate class of vowels, contrasting with the remaining phonemes. Also forming a class contrasting with other vowel phonemes is Russian /a ɔ/, whose position of relevance is only in stressed syllables. In Lithuanian, we are led to distinguish a relatively closed class of *S* and *T*-type consonants not only by their position in sequences, but also by the above-mentioned neutralization

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[90] The neutralization of these oppositions and their age is shown (in addition to other facts) by vowel alternations such as *plepéti* 'chatter-INF' : *pliópa* 'chatterbox'. Since only the "quantitative" alternations *e* : *ė* = *a* : *o* are possible, in the word *plepéti* we undoubtedly have an *e* fronted from *(')a* (cf. also Lith. *klẽvas* 'maple' = Latv. *kļavs* 'id.').

of oppositions of the type /k t p/ and /g d b/ before a pause and before consonants of *S* and *T*-subclasses. Moreover, only this neutralization definitively shows that /z ẑ/ and /ž ẑ̌/ are truly *S*-type, rather than *T*-type consonants. As we have seen (§ 135ff.), /s/ : /z/, /š/ : /ž/-type oppositions are neutralized, and [s], [š] represent their archiphonemes word-finally (for example, *be mãžo* 'nearly' : *bemà*[š] 'almost'). Members of different syntagmatic classes cannot stand in such a relationship.

Northeast Žemaitic (Telšiai) vowel assimilation, or vowel harmony, unites all non-low vowels into a single class, since oppositions of the type /ę/ : /i/, /ǫ/ : /u/ are neutralized before high vowels, and other vowels cannot undergo this neutralization. Separated out in turn from this class are /i u/, before which only /i u/-type vowels are possible. Thus these phonemes should be classified as follows: /(a : e) : ((ǫ : ę) : (u : i))/. Most marked in this system are /u i/, since they form a position of neutralization; the least marked are /a e/, which are completely indifferent to this neutralization.

In both the North Žemaitic dialect and the standard language, vowels further split into two classes: those vowels before which the correlation of consonant softness is realized, and those before which it is neutralized. Belonging to the first class are standard Lithuanian /a a· o· uo u u·/ and North Žemaitic /a ǫ u…/; the second class includes standard Lithuanian /e e· ę· ie i i·/ and North Žemaitic /e ę i…/. The marked members of the opposition are the second class, since the softness correlation is neutralized only before these (cf. § 144). The classification of dialectal vowels now looks like this: /(a : (ǫ : u)) : e : (ę : i))/, reflected in the following tree diagram (see figure 13).
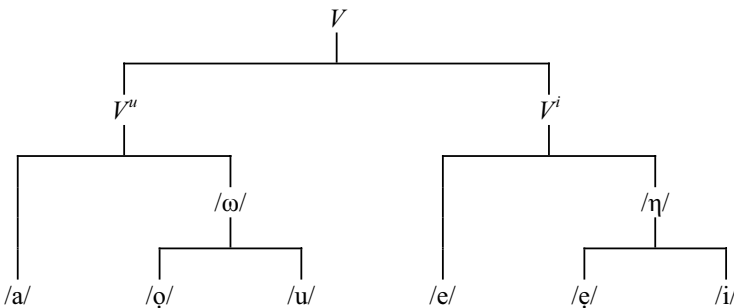
Figure 13. Tree diagram of North Žemaitic Telšiai vowel classification

The least marked (or, more accurately, fully unmarked) member of this system is /a/. In connected texts, this is therefore also the most frequent phoneme (for example, its frequency in North Žemaitic Telšiai texts is 13.09% of all phonemes [Girdenis 1981c: 24 (= Girdenis 2000c: 234)] and in the standard language, 10.46% [Karosienė, Girdenis 1994 (= Girdenis 2001: 28ff.)]).

§ 154. We have already seen that neutralization further divides each phoneme class into marked and unmarked members of an opposition. The neutralization of the voicing correlation divides the *S*-subclass into the unmarked members /s ŝ š ŝ̌/, and the marked members /z ẑ ž ẑ̌/ of the corresponding oppositions, and divides the *T*-subclass into the unmarked /p t k p̂ k̂/ and the marked /b d g b̂ ĝ/; neutralization, in turn, distinguishes in each subclass the unmarked members /s š/, /z ž/, /p k/, /b g/ of the softness correlation, and the marked members /ŝ š̌/, /ẑ ž̌/, /p̂ k̂/, /b̂ ĝ/.

But even this is not all. The consonants /s/, /ŝ/, /z/, /ẑ/ must be further distinguished from /š/, /š̌/, /ž/, /ž̌/, since oppositions of the type /ŝ/ : /š̌/ are neutralized before /č̂/, /ǯ̂/; the archiphoneme is represented here by [š̌], [ž̌], cf.: *vèsti* 'take, lead-INF' : *vè*[š̌]*čiau* 'take, lead-1SG.SBJV', *vèžti* (*vēža*) 'take (by vehicle)-INF' : *vè*[š̌]*čiau* 'take (by vehicle)-1SG.SBJV'. This neutralization is triggered only by /č̂/, /ǯ̂/, phonemes related to /š š̌ ž ž̌/-type sounds. These sounds are thus the marked members of the corresponding oppositions, and /s ŝ z ẑ/ are the unmarked members. The correlation mark is to be considered the palatal or double-peak (palato-alveolar) articulation of the tongue, characteristic of the marked members /š š̌ ž ž̌/; thus /š/ = /s/ & /˅/ (" ˅ " here denotes the palatal feature).

This analysis allows us to fully break down all of the consonant phonemes belonging to the *C* (i.e., non-*R*)-class, that is, to refine those classifications which we obtained earlier (see § 109 and 110).

The final classification appears as shown in figure 14.

Up through the node marked " 3 ," this tree diagram coincides with the ones presented above (§ 109 and 110).[91] The further branchings correspond to the following neutralizations (the right branch

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[91] We should add that the markedness of /p p̂ b b̂/ is also shown by the neutralization of the opposition /m/ : /n/ only before these phonemes: *sémk* 'draw (water)-2SG.IMP' : *sénk* 'grow old-2SG.IMP', *sémti* 'draw (water)-INF' :
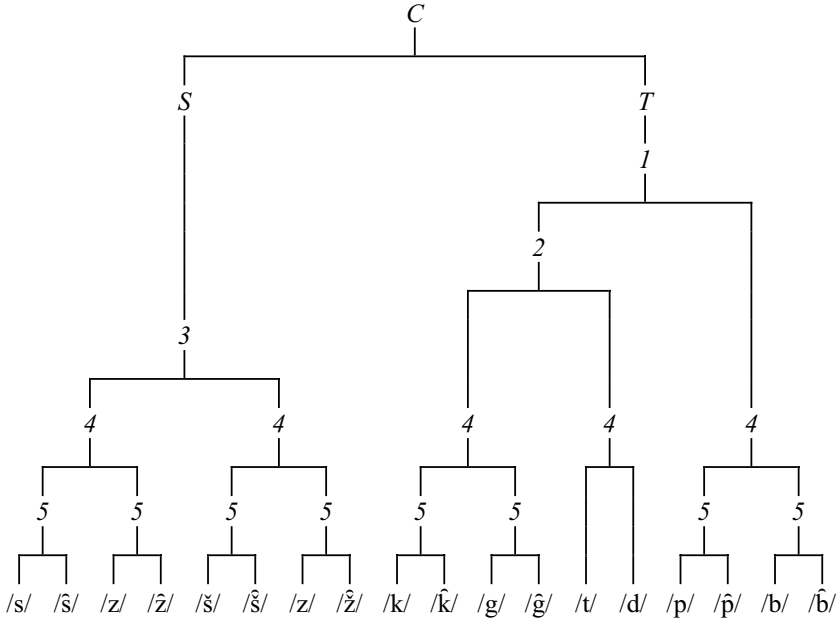
Figure 14. Classification of *C*-class consonants

is always the marked member; the left branch, the unmarked): 3, neutralization of /s/ : /š/-type oppositions (palatal correlation), 4, neutralization of the voicing correlation; 5, neutralization of the softness opposition. The correlation bundles just examined begin with node 4. The first two bundles are combined into a larger group beginning with node 3. We might note the complex correlation bundle /((s : ŝ) : (z : ẑ)) : ((š : š̂) : (ž : ẑ̌))/; the hierarchy of oppositions is shown by parentheses. The affricates, which are not reviewed here, present a similar relation.

If we take allophones of similar phonemes as representatives of archiphonemes in positions of neutralization, we can summarize even more simply the established phonemes and their relations. We will

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sénti 'grow old-INF' and *kri*-[ñ]-*ta* 'fall-3PRS' : *im̃ta* 'taken', *tri-ñ-ka* 'get confused-3PRS' : *im̃k* 'take-2SG.IMP', but *ki-m̃-ba* 'stick-3PRS', *susku-m̃-ba* 'have time-3PRS' (the [n] and [m] which are set off by hyphens are an expression of the same morpheme: the infix {-n-}). In compound words, this neutralization is optional; it is blocked by open juncture: [ŝé.n+b̂eññi̱s] 'bachelor' → <ŝé.m̂b̂eññi̱s>, [š°ún+bali̱s] 'poor entertainment' → <š°úmbali̱s>.

assign to the voiced class those consonants of the *S* and *T*-types which never appear word-finally, and to the voiceless class those consonants which are used in this position. The hushing sibilants will include those *S*-type consonants which occur before /č̃ ž̃/, and the hissing sibilants (that is, those with a single articulatory point, or dentals), those which do not appear in this position. Hard consonants will be those which never precede /e e· ę· ie i i·/, and soft consonants, those which do not occur word-finally, etc. Such phoneme characteristics are similar in form to those which we established according to syntagmatic relations.[92]

§ 155. It now suffices to find characteristic phonetic features for each category of phonemes thus established; all consonantal phonemes can then be described as simultaneous combinations of these features. In fact, we already know some of these features: they are the correlation marks distinguishing the marked members of an opposition from the unmarked members and corresponding archiphonemes. The phoneme /ž̂/, for example, can be broken down into the complex /s/, which forms the archiphoneme /S/ of the above-mentioned correlation bundle /((s : ŝ) : (z : ẑ)) : ((š : š̂) : (ž : ẑ̂))/ and these correlation marks: 'hushing-sibilant', 'voiced', 'soft' (abbreviated /ž̂/ = /s/ & /ˇ/ & /^{sk}/ & /ˆ/). It goes without saying that these correlation marks are simultaneously distinctive features of phonemes.[93] Thus, from neutralization there is a straight path to the distinctive features of phonemes and paradigmatic relations.

h) NEUTRALIZATION OF UNITS OF CONTENT AND CORRELATIONS

§ 156. Neutralization is not only a phonological phenomenon; units of the content plane often undergo neutralization as well (see, for example, [Trnka 1958: 866; Hjelmslev 1959: 83ff.; Martine 1969: 101–109]).

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[92] Such terms as *voiced–voiceless*, *hushing sibilant–hissing sibilant*, *soft–hard* (consonants) are introduced here only for convenience. The classification would remain exactly the same if we were to use completely arbitrary symbols for the classes (*p*-class : *b*-class, *š*-class: *s*-class, *l*-class: *r*-class, etc.). The phonetic terms here just denote classes obtained without relying on the physical properties of sounds.

[93] Vinogradov was apparently correct in claiming that only neutralization demonstrates the reality of distinctive features [Vinogradov 1976: 304].

A classic example of the neutralization of grammatical units is the Ancient Greek third person of the verb. The plural of this person is distinguished from the singular perfectly well if the sentence subject is a masculine or feminine noun, but coincides with the singular if the subject is neuter: (1) *ὁ ἄνθρωπος τρέχει* 'the person runs' : *οἱ ἄνθρωποι τρέχουσιν* 'the people run', but (2) *τὸ ζῷον τρέχει* 'the animal runs' : *τὰ ζῷα τρέχει* 'the animals run'. The third person singular form (in this case, *τρέχει*), which occurs with the neuter plural, is undoubtedly the unmarked member of the number opposition, and the plural form (*τρέχουσιν*) is the marked member. The neuter plural of the noun forms a position of neutralization for the opposition in question.

The neutralization of grammatical units is most often conditioned not so much by position, as by the broader context and situation. For example, a classroom of students can always be addressed *Gerbiamieji studentai!* 'dear students (masc.)', even when there is not a single male student. But the salutation *Gerbiamosios studentės!* 'dear students (fem.)' would be correct and serious only if there were no male student in the classroom. Thus the gender opposition is neutralized in certain cases; its unmarked member is masculine gender, and the marked gender is feminine. Incidentally, this can also be seen from the relative frequency of gender in connected texts: in Lithuanian social and political journalism, masculine nouns are approximately 1.5 times more frequent than feminine, and masculine gender-marking pronouns are twice as common as feminine [Žilinskene 1979: 10; Žilinskienė 1990: 170].

It goes without saying that such neutralizable oppositions of units of content can be considered correlations (see [Bulygina 1964: 103–110 and references]).

§ 157. Correlations are also characteristic of lexical and semantic linguistic units (cf. [Lyons 1977: vol. 1, 305–311]). These are neutralized particularly often; the marked members of such correlations are used only when absolutely required by the situation. We can point to these Lithuanian word pairs as an example: *avìs* 'sheep' : *ãvinas* 'ram', *šuõ* 'dog' : *kalė̃* 'female dog', *kiaũlė* 'pig' : *kuilỹs* 'boar', *žąsìs* 'goose' : *žą̃sinas* 'gander'. Lithuanian speakers would almost always say *Pamačiaũ bū̃rį aviũ* (*šunų̃, kiaũlių, žąsų̃*) 'I saw a flock of sheep (a pack of dogs / a herd of pigs / a flock of geese)' and only exceptionally, and then in a relatively difficult-to-imagine case, *Pamačiaũ bū̃rį avinų̃* (*kalių̃, kuilių̃, žąsinų̃*) 'I saw a flock of rams (a pack of female dogs / a herd of boars / a flock of ganders)'. Speakers would say the former even if the flock (pack, herd) has in fact noticeably more rams (female dogs, etc.). Thus, the unmarked members of these correlations are *avìs, šuõ, kiaũlė, žąsìs*, and the marked members, used only in special cases, *ãvinas, kalė̃, kuilỹs, žą̃sinas*.[94] Correlation bundles with

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[94] It should be noted that these relations are not as motivated as it may seem at first glance. For example, the unmarked member of the correlation *katė̃* 'cat' : *kãtinas* 'tomcat' is *katė̃* for many Aukštaitic speakers, but *kãtinas* for Žemaitic

one unmarked and two marked members are also fairly frequent: *arklỹs* 'horse' : *kumẽlė* 'mare' : *er̃žilas* 'stallion', where Lithuanian speakers would undoubtedly consider *arklỹs* the unmarked member.

Synonyms—words distinguished from one another only by so-called connotative meanings—are especially often grouped into correlation bundles. Some of these are unmarked (neutral),[95] others are positively marked, and still others are negatively marked: *kareĩvis* 'warrior, soldier' (unmarked) : *karžygỹs* 'epic hero' (positively marked) : *karéiva* 'warrior (ironic)' (negatively marked).

As we see, neutralization suggests for us once again the isomorphism of units of content and expression (cf. § 103 and 115).

§ 158. Syncretism—the identity of expression, or homonymy, of certain grammatical forms—should be distinguished from neutralization: Lith. *mùdu* 'we-1DU.NOM' = *mùdu* 'we-1DU.ACC', *výrai* 'man-NOM.PL' = *výrai* 'man-VOC.PL', Ru. *людéй* 'people-GEN.PL' = *людéй* 'people-ACC.PL', *óкна* 'window-NOM.PL' = *óкна* 'window-ACC.PL', Skt. *sūnoṣ* 'son-GEN.SG' = *sūnoṣ* 'son.ABL.SG', etc. But there is no categorical boundary between these two phenomena: the same fact can often be treated both as neutralization and as syncretism.[96]

i) SUMMARY REMARKS

§ 159. Having examined regular constraints on the distribution of phonemes and on phoneme oppositions, the following more important points should be recalled:

1. The regular failure to distinguish phonemes or entire classes of phonemes in certain positions is called neutralization. In many cases there is a cross distribution between members of a neutralizable opposition.

2. Positions in which all phonemes are distinguished are called positions of relevance (strong positions), and positions in which they are not regularly distinguished are called positions of neutralization (weak positions).

3. The shared features of members of a neutralizable opposition form archiphonemes, which have a distinctive function in positions of neutralization.

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speakers. So, on hearing the usual noise and caterwauling, Aukštaitic speakers will say *Susipjovė kãtės* 'The cats (fem.) were fighting', but Žemaitic speakers *Susipjovė katinaĩ* 'The cats (masc.) were fighting'. The first utterance seems comical to Žemaitic speakers; the second, to Aukštaitic speakers.

[95] This is the so-called dominant of a synonym series.

[96] In the basic theoretical work of glossematics, [El'mslev 1960b: 343ff.], the section on neutralization even has the subtitle "Syncretism."

4. The phoneme similar to the sound used in a position of neutralization which is not affected by adjacent sounds (word-final position, unstressed syllable, etc.) is the unmarked member of the neutralizable opposition; the phoneme which lacks a similar counterpart in this position is the marked member of the opposition. The unmarked member of the opposition coincides with the archiphoneme in its distinctive phonetic features.

5. The unmarked members of oppositions are almost always more frequent in connected speech; the marked members are less frequent. Oppositions of other phonemes are often neutralized only before marked members.

6. Proportional neutralizable oppositions form correlations which can combine into more complex units—correlation bundles. The feature by which the marked member is distinguished from the unmarked member is the correlation mark.

7. Neutralization, like syntagmatic phoneme relations, allows us to establish natural classes of phonemes.

8. Neutralization and correlative relations are characteristic not only of phonemes, but of units of linguistic content as well.

§ 160. In conclusion, we will make two more remarks.

1. All languages apparently have optional neutralization for many oppositions, especially in elliptical or reduced connected speech (see, for example, [Zabrocki 1965: 600–602]).[97] In the flow of speech, oppositions are usually realized only with the distinctness and consistency necessary for content to be understood correctly. Optional neutralization can also result from competing stylistic and sociolinguistic norms, and directly reflect the dynamics of a synchronic system (cf. [Weinstock 1981: 283–286]).

2. Neutralization is an important intermediate link between syntagmatic and paradigmatic phoneme relations. Like phonotactic rules (of syntagmatic relations), it restricts and regulates the distribution of

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[97] The Swedish psycholinguist Linell has convincingly shown that optional neutralization also occurs in emphatically distinct (*sharpened*, *elaborated*) pronunciation [Linell 1979: 55, 100 and references]. This should always be kept in mind in interpreting the results of phonetic experiments and commutation tests: they are, after all, always based on just such a pronunciation (so-called clear speaking style).

phonological units, and at the same time reveals such purely paradig-matic phenomena as marked and unmarked members of an opposition, correlations, and correlation marks. In singling out correlation marks, we have in fact already begun to analyze phonemes into distinctive features, that is, to treat them not as monolithic elements, but as simultaneous combinations of smaller elements.

4. PARADIGMATIC RELATIONS

a) GENERAL REMARKS

§ 161. As noted above (see § 88–89), paradigmatic relations, or oppositions, exist between those phonemes which can replace one another in the same positions, and therefore differentiate words or their forms. In addition to the above-mentioned examples, we can adduce here the following set of words distinguished by a single phoneme: *sùsti* 'grow mangy-INF' : *siùsti* 'send-INF' : *šùsti* 'stew-INF' : *pùsti* 'swell-INF' : *bùsti* 'wake up-INF' : *tùsti* 'stick together-INF' : *dùsti* 'choke-INF' : *kùsti* 'recover-INF' : *gùsti* 'get used to-INF' : *jùsti* 'feel-INF' : *rùsti* 'turn brown-INF'. The relations between their initial phonemes can be illustrated as follows:

$$/s\ ù\ ŝ\ t̂\ i/$$
$$/ŝ/$$
$$/š/$$
$$/p/$$
$$/b/$$
$$/t/$$
$$/d/$$
$$/k/$$
$$/g/$$
$$/j/$$
$$/r/$$

There is no essential difference between oppositions which dif-ferentiate words and oppositions which differentiate word forms; the same phonemes can distinguish both words and word forms. In stan-dard Lithuanian, for example, oppositions such as /aˑ/ : /uˑ/, /uˑ/ : /oˑ/, /t/ : /m/ distinguish the words *ą̃są* '(jug) ear-ACC.SG' : *ū̃są* 'mous-tache-ACC.SG', *kū̃rė* 'make (a fire); create-3PST' : *kórė* 'hang-3PST',

tárška 'rattle-3PRS' : *márška* 'sheet-NOM.SG' and the word forms *výrą* 'man-ACC.SG' : *výrų* 'man-GEN.PL' : *výro* 'man-GEN.SG', *vẽžat* 'take (by vehicle)-2PL.PRS' : *vẽžam* 'take (by vehicle)-1PL.PRS'. EAukšt. Utena /m/ : /n/ distinguishes the words *marî.n̂tæ.* "*marìnti*" 'exterminate-INF' : *narî.n̂tæ.* "*narìnti*" 'loop-INF' and the word forms *ruñ̃.ka.m* "*rañkoms, rañkomis*" 'hand-DAT/INS.PL' : *ruñ̃.ka.n* "*rañkon*" 'hand-ILL.SG'. In the Žemaitic dialects, even the oppositions /k/ : /g/ and /š/ : /ž/, for example, can have this double function: NŽem. *kộ.ł* "*kùlia*" 'thresh-3PRS' : *gộ.ł* "*gùli, gùla*" 'lie, lie down-3PRS', *šàl̂i* "*šʼạli*" 'freeze-2SG.PRS' : *žàl̂i* "*žalià*" 'green-NOM.SG.F' and *dèk* "*dèk*" 'burn-2SG.IMP' : *dèg* "*dẽga*" 'burn-3PRS', *vèš* "*vèš*" 'take, lead-3FUT' : *vèž* "*vẽža*" 'take (by vehicle)-3PRS'.

Nevertheless, certain oppositions more often distinguish derivational and grammatical meaning, rather than lexical. As noted above (§ 136), this is characteristic of the Lithuanian timbre correlation for consonants, which most often distinguishes words having the same root, but different derivational formations or grammatical forms: *plìko* 'bald-GEN.SG.M' : *plìkio* 'baldy-GEN.SG', *gražùs* 'beautiful-NOM.SG.M' : *gražiùs* 'beautiful-ACC.PL.M', *taisaũ* 'repair-1SG.PRS' : *taisiaũ* 'repair-1SG.PST', etc. In the North Žemaitic dialect, the opposition /ę/ : /i/ plays a similar role, since these phonemes, apart from rare exceptions, contrast only in endings: *brûol^e* "*brólio*" 'brother-GEN.SG' : *brûol̂^i* "*brólį*" 'brother-ACC.SG', *ná.šl^e* "*nãšlio*" 'widower-GEN.SG' : *ná.ŝl̂^i* "*nãšlį*" 'widower-ACC.SG'. Elsewhere, almost only [ę] is found, or else [ę] and [i] are in complementary distribution; in either case, the opposition is neutralized (see § 153). Such oppositions are sometimes called morphologized oppositions (see [Vachek 1964: 182 and references]).

More common are oppositions which distinguish only lexical meaning. For example, an opposition such as Hungarian /a/ : /e/ cannot distinguish word forms, since due to vowel harmony in affixes, it necessarily undergoes neutralization (cf. § 138). This type of opposition, where appropriate, could be called lexicalized (see [Vachek 1964: 182]).

Since both lexical and grammatical meaning belongs to the same content plane of language, the difference between morphologized and lexicalized opposition is not so important that it would be worth emphasizing in phonology with special terms. Such terms may perhaps be useful in morphonological studies.

b) OPPOSITIONS AND SYNTAGMATIC CLASSES

§ 162. The study of syntagmatic relations has shown that pho-nemes form true oppositions only when they belong to a single syn-tagmatic class, or paradigm.[98] Members of so-called indirect opposi-tions (for example, English /h/ and /ŋ/; see § 60) have a distinctive function only in the sense that they help form different expressions of units larger than the phoneme (for example, the word). Their relations are syntagmatic, rather than paradigmatic.

In Lithuanian, only indirect oppositions exist between any vowel and consonant phoneme. These are entirely incompatible phoneme classes. At first glance, it may seem that such word pairs as *avìs* 'sheep' : *švìs* 'dawn-3FUT', *surę̃s* 'build (of logs)-3FUT' : *sprę̃s* 'decide-3FUT' contradict this statement; these words, after all, seem to be distinguished only by the elements /a/ : /š/, /u/ : /p/. In fact, however, the first words of these pairs fully contrast with the second words as disyllabic to monosyllabic.[99] Hence it is words, rather than their phonemes, which are in paradigmatic relations here. Phoneme oppositions have an independent distinctive function only when words agree in the number and order of syllables and in prosodic features. When these conditions are absent, phonemes are in different positions (in this case, in different syllables), and therefore do not have an independent distinctive function (cf. [Šaumjan 1962: 73]).

Such is the case in many languages. Only the above-mentioned [r l m n]-type consonants (see § 101) form the rare exception; in some languages these can play the role of syllable nucleus, and thus contrast with vowels: Skt. *akṣas* 'axle' : *r̥kṣas* 'bear', *vākas* 'talking' : *vr̥kas* 'wolf', *viṣas* 'servant' : *vr̥ṣas* 'male; bull' (see also § 101).[100]

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[98] Panov uses this term only for classes of sounds whose members participate in general alternations [Panov 1967: 5]. But this is a very individual view (see also [Reformatskij 1970: 87–88]).

[99] For an unjustified opposing view, see [Perebyjnis 1970: 49–51 and 188], where vowel and consonant oppositions are even demonstrated on the basis of such "minimal pairs" as *аóрт* 'aorta-GEN.PL' : *торт* 'cake' : *аýл* 'aoul' : *гул* 'droning, buzzing'.

[100] But even in these languages (for example, Slovak, Czech) syllabic sono-rants are not used as the expression of independent words [Novák 1966: 130].

α) PARADIGMATIC RELATIONS AND DISTINCTIVE
FEATURES OF LITHUANIAN CONSONANTS

§ 163. The smallest paradigm of consonantal phonemes in Lithuanian is the syntagmatic *S*-subclass, occurring in syllable-initial [(#)—T]-type positions. In this class, only /s/ and /š/ contrast, or (exceedingly rarely) /z/ and /ž/, /ẑ/ and /Ẑ/. The consonants /s/ and /z/, /š/ and /ž/ and, all the more so, /s/ and /ŝ/, /š/ and /Ŝ/, etc., cannot contrast here, since before consonants of the *T*-subclass, their oppositions are neutralized. Thus, more precisely, there are only two archiphonemes which function here: /S/ and /Š/; the consonants /s z ŝ ẑ/ and /š ž Ŝ Ẑ/ are the representatives of these archiphonemes.

There are no reliable minimal pairs for which the consonants in question would contrast word-initially, but the reality of their opposition can be seen from examples of the type *spýgauti* 'scream-INF' : *špỹgą* 'fig (fam.)-ACC.SG', *staĩgūs* 'sudden-NOM.PL.M' : *štaĩ* 'here'. Lithuanian speakers would perceive a potential word **spygà* not as a variant of the word *špygà*, but most likely as a not-yet-heard "common gender" pejorative formed from *spiẽgti* 'squeal-INF' (cf. in addition *stùką** 'deceipt-ACC.SG' : *štùką** 'a piece-ACC.SG'). These oppositions are clearly shown by non-initial syllables: *kar̃-stų* 'become bitter-3SBJV' : *kar̃-štų* 'card (wool)-3SBJV', *kar̃-*[z]*da-vo* 'become bitter-3PST.FREQ' : *kar̃-*[ž]*da-vo* 'card (wool)-3PST.FREQ', *rì-ski-tės* 'roll-2PL.IMP.REFL' : *rì-ški-tės* 'tie-2PL.IMP.REFL' (on the syllable boundaries, see § 121–123).

To describe phoneme oppositions means to indicate their distinctive features. In this case, these features are dictated by the neutralization which occurs before /č/ and /Ẑ/, cf. *rì-sti* 'roll-INF' ≠ *rì-šti* 'tie-INF', but *rì-*[ŝ]*čiau* "*rìsčiau*" 'roll-1SG.SBJV' = *rì-*[Ŝ]*čiau* "*rìščiau*" 'tie-1SG.SBJV' (see § 154). The marked member of this opposition (or, more precisely, correlation), /Ŝ/ (likewise /Ẑ/), differs from the unmarked /ŝ/ (likewise /ẑ/) in the following articulatory properties (cf. [Vaitkevičiūtė 1957: 47–56]): a) a greater raising of the tip of the tongue, b) a second point of articulation, that is, a secondary raising of the mid-part of the tongue toward the hard palate, c) the absence of a characteristic lengthwise groove in the mid-part of the tongue. The first difference is especially easy to observe. In pronouncing the series of sounds [ŝ Ŝ ŝ Ŝ ŝ], we easily feel the tip of the tongue periodically rising to "the second floor" at the alveolar ridge and then descending

again to the "first floor" at the lower teeth. To the ear, [ŝ̌] seems lower, [ŝ] higher. Based on their auditory impression, Jablonskis called [š ž]-type consonants "hushing" sibilants and [s z] "hissing" sibilants.

These phonetic properties, which determine one another and are inextricably linked, are the true distinctive features of the oppositions in question. But for the sake of convenience and simplicity, we usually select from such complexes some single characteristic and thereafter consider only this characteristic a distinctive feature. A feature selected in this way is in fact just a conventional label,[101] signalling the presence of an entire complex (see, for example, [Fant 1970: 52; Melikišvili 1976: 126–131; Romportl 1970: 18; 1977: 240; Džaparidze 1979: 102 et passim; Kodzasov 1982: 99, 103–106]). Functioning as actual distinctive features are only complexes of phonetic properties (including intrinsic prosodic phenomena and features of neighboring segments [Bondarko 1979: 25]), sometimes more complex, sometimes simpler. A distinctive feature is therefore essentially just as much an abstraction as a phoneme [Vinogradov 1976: 302].

In selecting a "candidate" for distinctive features (that is, for their "label"), arbitrariness is greatly reduced if we follow certain objective criteria: we can take into account relations and features of other oppositions; we can experimentally isolate a property which has a major influence on comprehending (or recognizing) speech, etc. But it is probably impossible to avoid arbitrariness completely.

It is most convenient to consider as distinctive features of the opposition /ŝ/ : /ŝ̌/ (and /z/ : /ž/, /s/ : /š/, /ẑ/ : /ẑ̌/, etc.) the palato-alveolar articulation of /ŝ̌/ (and /š/, /ž/, /ẑ̌/) and the dental articulation of /ŝ/ (and /s/, /z/, /ẑ/). The presence of two points of articulation (/ŝ̌ š ẑ̌ ž/), contrasting with a single point (/ŝ s ẑ z/), can be considered a non-essential feature, since in this position, and in general in the *S*-subclass, there is no phoneme which would be distinguished by a single-point palato-alveolar articulation. The corresponding auditory (impressionistic) features would be "hushing sibilant" (/ŝ̌ š ẑ̌ ž/) and "hissing sibilant" (/ŝ s ẑ z/).

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[101] Therefore some linguists (for example, the American linguist Hill [Hill 1972: 243]) have reasonably suggested calling such features classificatory, rather than distinctive.

§ 164. Another quite limited paradigm of consonantal phonemes is found in the position [(#)S—R]. Here the *T*-subclass of consonants /k/ : /t/ : /p/ and (quite exceptionally) /g/ : /d/ : /b/ contrast (see § 109): *skránd*ą 'sheepskin coat-ACC.SG' : *spránd*ą 'nape of the neck-ACC.SG', *straksḗti* 'skip-INF' : *spragsḗti* 'crackle-INF'. A soft [p̂] appearing in this position represents the archiphoneme of the opposition /p/ : /p̂/ and has no independent distinctive function: *strìgtas* 'bait; carrion' : *s*[p̂]*rìgtas* 'fillip'. Soft [t̂], as we know, is only an allophone of /t/. There are apparently no minimal pairs with the opposition /t/ : /k/, but the reality of the opposition is shown by words of the type *skrãbalas* 'wooden bell' : *stràkalas* 'fidget'.

An analysis of syntagmatic relations (see § 110, 154) has shown that these consonants are grouped in the hierarchical order /p b/ : (/k g/ : /t d/); /p b/ forms a relatively independent set, syntagmatically contrasting with the set /k g t d/, and next the /t d/ set is separated from /k g/, characterized by the freest distribution. It now suffices to assign to each group an appropriate phonetic property, and we will obtain a hierarchically-ordered microsystem of distinctive features characteristic of the *T*-subclass of consonants.

The consonants /p b/ differ from the other members of the *T*-subclass in their labial (or more precisely, bilabial) articulation. In producing them, the lips form a tight occlusion, which is suddenly removed. In articulating the other members of this paradigm, the occlusion is formed with the tongue rather than the lips: /t d/ are articulated with the tip of the tongue raised against the upper teeth or alveolar ridge (cf. *stràkalas* 'fidget', *strìgti* 'stick-INF'), and /k g/ with the back part of the tongue pressed against the soft palate. Therefore, /p b/ have the distinctive feature "labial," and /k g t d/ have the opposite feature "non-labial." The consonants /t d/ are distinguished from /k g/ by the distinctive feature "apical," contrasting with the feature "dorsal," or simply "non-apical." At first glance the features "dental"–"non-dental" may seem more convenient, since we have all but assigned them already to oppositions of the type /s/ : /š/. But we cannot choose "dental," since /t d/ have alveolar allophones found in [—r]-type positions: [stràkałas] "*stràkalas*" 'fidget', [ŝt̂r̂i̭·pas] "*strỹpas*" 'rod' (see § 59 and 181). We can only consider as distinctive features those phonetic properties which are common to all allophones of a phoneme.

The syntagmatic classification and hierarchy presented above suggest that distinctive features are organized in a similar hierarchical order. Thus, first the labials /p b/ contrast with the non-labials (linguals) /t d k g/ (1), and then within the non-labial set, the apical /t d/ contrast with the non-apical (dorsal) /k g/ (2).

This classification can be illustrated with the same tree diagram used in examining sequences of these phonemes with *R*-class phonemes (§ 110). Only now we can say that the first node (1) corresponds to the distinctive feature pair "labial"–"non-labial" ("lingual"), and the second node (2) to the feature pair "apical"–"non-apical" ("dorsal"). Further classification and distinctive features are shown by the neutralization of the voicing correlation, weakly represented in this position (cf. *aĩ-strą* 'passion-ACC.SG' : *žaĩ-zdrą* 'furnace-ACC.SG'). The correlation marks are at the same time also distinctive features (see § 155 and 160). Thus /g/ and /k/, /d/ and /t/, /b/ and /p/ contrast as "voiced"–"voiceless" ("non-voiced") consonants.

Our tree diagram now appears as follows (see figure 15; the right branches correspond to positive features; the left to negative).
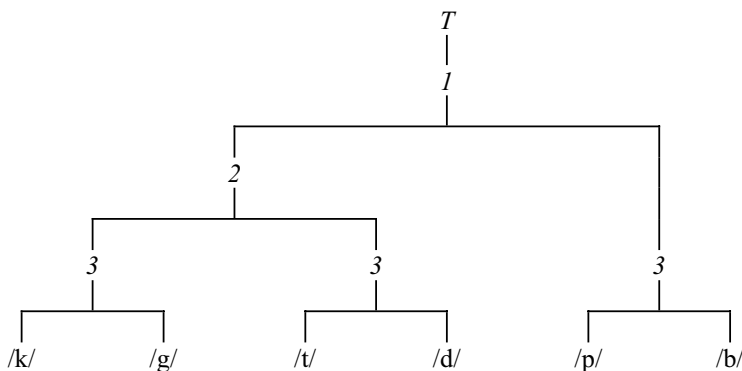
Figure 15. Classification of consonants of the *T*-subclass

The tree diagram is interesting in that it shows at the same time both distinctive features of phonemes and their phonotactic properties. Those consonants which have the "labial" feature are not used in onset clusters before /v/, but can appear before /j/. Non-labial consonants with the distinctive feature "apical" cannot precede /l/ in initial onset clusters; the dorsal consonants which contrast with these can precede

all *R*-class consonants except /j/. The consonantal opposition based on the features "hard"–"soft" (3) is realized only before vowels and sonorants; elsewhere it is neutralized (that is, "disappears") and only the archiphonemes, indifferent to voicing, have distinctive function. This disappearance of features in certain positions also accounts for their low position in the general hierarchy of syntagmatic relations; the more positions of neutralization there are, the lower this position.

§ 165. In the position [(#)—R], consonants of the *S* and *T*-subclasses form a single paradigm, the entire *C* class: *svarùs* 'weighty' : *švarùs* 'clean' : *tvarùs* 'stable, steady' : *dvarùs* 'estate-ACC.PL' (cf. *žvalùs* 'cheerful', *gvaĩbti* 'faint-INF'), *žlùgti* 'fail-INF' : *plùkti* 'flow-INF' : *blùkti* 'fade-INF', *slégti* 'press-INF' : *plékti* 'grow mouldy-INF', *plẽsti* 'widen-INF' : *blẽsti* 'go out-INF' : *klẽsti* 'prosper-3PRS', *klaũs* 'ask-3FUT' : *glaũs* 'close (ranks)-3FUT'. Of the *C*-type consonants, only hard and soft do not contrast here; their opposition is neutralized before consonants (*žlùgti* = /žlùKti/, *žliùgti* = /žl̂ùKti/; cf. § 136, 150 and table 14).

This paradigm differs from the earlier one in two regards. First, the phonemes /s/ and /z/, /š/ and /ž/ (more precisely, the archiphonemes /S/ : /Z/, /Š/ : /Ž/, which are indifferent to hard and soft), contrast here: *sveñbti* 'ache-INF': *zveñbti* 'buzz-INF', *šliaũkti* 'brush off-INF' : *žliaũgti* 'gush-INF'. These oppositions do not require new distinctive features, since they differ in the same voicing feature as the second paradigm, /p/ : /b/, /t/ : /d/, /k/ : /g/. Secondly, all *S*-subclass members contrast here with members of the *T*-subclass. In describing their paradigmatic relations, it suffices to establish the features common to both subclasses.

In comparing the articulatorily and auditorily most similar members of the *S* and *T*-subclasses, for example, /s/ and /t/, /z/ and /d/, /š/ and /k/, /ž/ and /g/, we see that in pronouncing *S*-type sounds, the speech organs are brought quite close together, but do not form a tight occlusion; from beginning to end, air can flow through a gap formed at the place of articulation (at the teeth or alveolar ridge), producing characteristic turbulence. The stricture is overcome by forcing air through the gap. In pronouncing consonants of the *T*-subclass, the speech organs form a tight occlusion at the place of articulation (the lips, soft palate, and teeth or alveolar ridge). In suddenly releasing

the main or secondary stoppages,[102] the air abruptly escapes from the mouth, producing a sound reminiscent of an explosion.

Based on the manner of stricture, we could therefore call members of the *S*-class slit sounds or narrowed sounds, and members of the *T*-class stopped sounds or occlusive sounds. But more usual are the terms fricative (*S*) and plosive (*T*), suggesting sounds according to the manner (or occlusive effect) of articulation. From a phonological standpoint, the choice of terms is, of course, irrelevant. Whichever term we choose, they will nevertheless only be labels for a complex aggregate of articulations. Henceforth, we will follow the traditional approach—consonants of the *S* and *T*-subclasses are distinguished by the distinctive feature pair "fricative"–"plosive" ("non-fricative"). Since these features distinguish the largest syntagmatic classes, they need to occupy the highest position in the hierarchy of paradigmatic relations.

Thus consonants in the [(#)—R] position differ firstly in the distinctive features "fricative" (/s z š ž/)–"plosive" ("non-fricative") (/t d k g p b/). On the basis of frequency and the theory of so-called universal markedness (see, for example, [Chomsky, Halle 1968: 412; Postal 1968: 190; Gamkrelidze 1978: 32; Jakobson, Waugh 1978: 32]), the fricatives can be considered marked: although /s/ is extremely frequent, the fricatives in general are less frequent than the plosives [Karosienė, Girdenis 1993: 33 (= Girdenis 2001: 70)].

The fricatives further split into the "dentals" /s z/ and the "palato-alveolars" /š ž/, and each of these groups into voiced (/z/ and /ž/) and non-voiced (voiceless) (/s/ and /š/), etc. Additional distinctive features of the plosives and the hierarchy of their paradigmatic relations have already been examined (see § 164).

In addition to the consonants examined above, a few rare words may have /č̑ ž̑/, /č ž/ or even /ĉ ẑ/, /c ʒ/ in the position in question: *čmìkis* 'strike (of a whip)', *čvìktelėti* 'strike-INF', *džvìkti* 'stick together-INF', *cvaksė́ti* 'knock, tap-INF'. All examples of this type are either onomatopoeic or borrowings, and therefore belong to the margins of language. We could assign to this set of consonants a special

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[102] We have in mind nasal (faucal) and lateral allophones of plosives, for example, *putnóti* [pᵒutn̥ᵒóti̯] 'call chickens-INF', *putlùs* [pᵒutl̥ùs] 'plump', *liū̃dnas* [l̑ᵒū·dn̥as] 'sad', *atlùpti* [atl̥ùp̑ti̯] 'tear off-INF', *vedlỹs* [v̑ed̑l̑ì·s] 'leader'.

distinctive feature "affricate," distinguishing them from other plosives (that is, consonants of the *T* class, cf. § 120), or treat /č̂ ʒ̂ č ʒ ĉ ʒ̂ c ʒ/ as sounds intermediate between plosives and fricatives, that is, having both the features "plosive" and "fricative" (cf. [Steponavičjus 1979: 154; 1982a: 72–73 (table 7)]).

§ 166. In the position [T—V], only consonants of the *R*-class contrast: *tvãnas* 'flood' : *trãnas* 'drone'; *tveñkti* 'dam up-INF' : *treñkti* 'strike-INF'. Nearly all possible oppositions are realized after /k/: *kraĩkas* 'litter' : *klaĩkas* 'horror', *kriõkti* 'wheeze-INF' : *kliõkti* 'gush-INF', *krãpas* 'dill' : *knãpas* 'one who stumbles' : *kvãpas* 'smell', *klóti* 'spread-INF' : *knóti* 'bark (a tree)-INF' (cf. also *pláuti* 'wash-INF' : *pjáuti* 'cut-INF', *kmỹnas* 'caraway' : *klỹnas* 'wedge'). Before back vowels, a timbre correlation is possible: *plùskė* 'a kind of small fish' : *pliùskė* 'billet', *kan-trùs* 'patient-NOM.SG.M' : *kan-triùs* 'patient-ACC.PL.M', *pu-tnùs* 'plump-NOM.SG.M' : *pu-tniùs* 'plump-ACC.PL.M'.

Syntagmatic relations (see § 110) allow us to divide the *R*-class as follows: /(n : m) : ((r : l) : (v : j))/ or, more precisely, /((n : n̂) : (m : m̂)) : (((r : r̂): (l : l̂)) : ((v : v̂) : j)))/. Without going into a finer analysis, we can assign to these classes the following pairs of distinctive features: 1) "nasal" /m m̂ n n̂/–"non-nasal" /l r v j/, 2) "fricative" /v j/[103]–"non-fricative" (liquid) /l r/.

According to place of articulation and active speech organs, the consonants /v v̂/ and /m m̂/ are labial, and the /n n̂/ and /j/, which contrast with them, are non-labial (or lingual). We cannot characterize the phonemes /n n̂/ as apical or dental, since (though not in this position) they can also be realized as dorsal (velar) allophones [ŋ ŋ̂] (see § 56–58).[104] For the phonemes /l l̂/ and /r r̂/, we can use the distinctive features of /s/ and /š/-type phonemes: "dental" (/l l̂/)–"alveolar" (/r r̂/) or "double-peak" (/l l̂/)–"single-peak" (/r r̂/). The consonants /l l̂/ have two points of articulation, dental and velar; in pronouncing them, the

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[103] In some Russian dialects, the opposition /v̂/ : /j/ is neutralized or even dephonologized (see [Kasatkin 1966]). This undoubtedly shows the extreme closeness of phonemes and corresponding sounds of this type.

[104] Nor can we consider the phonemes /m m̂/ bilabial, since they have the labiodental allophones [ɱ ɱ̂], for example: *lìmfa* [l̂ɨ̂ɱfa] 'lymph', *Kròmvelis* [króɱ̂v̂el̂is] 'proper name Cromwell'. Finally, even [p p̂] can be pronounced as labiodental sounds, for example in the words *apvalùs* 'round', *apvýlė* 'disappoint-3PST'.

tip of the tongue forms a tight occlusion against the teeth, and the dorsal or mid part of the tongue is raised to the soft or hard palate; air exits through the lowered sides (or one side) of the tongue. The consonants /r r̂/ are articulated with the tip of the tongue periodically forming and removing one or two, sometimes three brief occlusions (that is, vibrating) at the alveolar ridge. However, /r r̂/ are also properly perceived when the uvula, rather than the tongue, is trilled, and therefore it appears that the trilled manner of articulation is more important here than place of articulation. If this is the case, we should rather assign to the opposition /l l̂/ : /r r̂/ the distinctive feature "trilled" (/r r̂/)–"non-trilled" (/l l̂/). However, if we view distinctive features only as conventional labels signalling true phonetic features, we could just as well select the not-so-unique feature pair "dental"–"alveolar." In doing so, of course, we should not forget that the alveolar member of this class is pronounced as a trilled consonant.

The distinctive features needed for this latest paradigm are "soft"–"non-soft" ("hard"). This is the already familiar feature of the timbre correlations /l/ : /l̂/ = /r/ : /r̂/ = /n/ : /n̂/, etc. (see § 136 and fn. 65). The consonant /j/ in general does not participate in this correlation, and /v/ : /v̂/ and /m/ : /m̂/ contrast only in non-initial syllables: *er-dvùs* 'spacious-NOM.SG.M' : *er-dviùs* 'spacious-ACC.PL.M', *į-sa-kmùs* 'peremptory-NOM.SG.M' : *į-sa-kmiùs* 'peremptory-ACC.PL.M'.

We have thus obtained the following distinctive features for *R*-class consonants: 1) "nasal"–"non-nasal," 2) "fricative"–"non-fricative," 3) "labial"–"non-labial," 4) "dental"–"alveolar" ("non-dental"), 5) "soft"–"non-soft" ("hard"). These features, except for the second, all differentiate consonants of other types as well. This is a positive characteristic of the chosen feature system: distinctive features are more valued the more phonological units they characterize and distinguish, and, of course, the more realistically and simply they reflect the physical qualities of sounds representing phonemes.

§ 167. Still another partial consonant paradigm is formed in the position [S—V], where consonants of the *T* and *R*-type are possible: *spãrą* 'rafter-ACC.SG' : *stãrą* 'gopher-ACC.SG' : *skãrą* 'shawl-ACC.SG': *svãrą* 'weight-ACC.SG', *spúogą* 'pimple-ACC.SG' : *slúogą* 'load-ACC.SG' : *sliúogą* 'mudslide-ACC.SG' : *srúogą* 'skein-ACC.SG', *spìrti* 'kick-INF' : *stìrti* 'grow stiff-INF' : *skìrti* 'distinguish-INF' : *svìrti* 'bend-INF', *stíegti* 'thatch (a roof)-INF' : *sríegti* 'screw-INF'. This is

not a random accumulation of phonemes: these consonants all form a common auditory class, contrasting with fricatives (cf. § 105, fn. 17). Before back vowels in the position [S—V], a timbre correlation is also possible: *slúogas* 'load' : *sliúogas* 'mudslide', likewise *dra-skaũ* 'tear-1SG.PRS' : *dra-skiaũ* 'tear-1SG.PST', *lai-škũ* 'letter-GEN.PL' : *lai-škiũ* 'rancid-GEN.PL', *du-slùs* 'voiceless-NOM.SG.M' : *du-sliùs* 'voiceless-ACC.PL.M', *mi-šrùs* 'mixed-NOM.SG.M' : *mi-šriùs* 'mixed-ACC.PL.M', *nuo-žmùs* 'fierce-NOM.SG.M' : *nuo-žmiùs* 'fierce-ACC.PL.M'.

Up to this point, we have examined only oppositions among phonemes belonging to the *T* and *R*-classes, that is, those like *spãras* : *svãras*, *stíegti* : *sríegti*, etc. A distinctive feature for these classes is intuitively easy to understand. Consonants of the *T*-type are fully non-musical sounds; they are true noises and rustlings, which only occasionally (in the case of /g d b/) have a small admixture of pitch. Of all consonants, the *R*-type consonants /l r v j n m/ are closest to pure musical sounds. In producing these, the vocal cords vibrate, but the noises formed in the mouth are not distinct: the airstream exits without greater obstruction. In pronouncing /v j/, the main passageway is sufficiently free; in pronouncing /r/, this passageway is periodically opened; in pronouncing /n m/ and /l/, the air exits freely along a secondary path (through the nose or along the sides of the tongue).

If all consonants are pronounced with roughly equal effort, members of the *R*-class are far more sonorous and easily heard. For this reason, they are called resonants or sonorants (from Lat. *sonorus* 'sonorous, loud').[105] The term *sonant* is also used (from Lat. *sonans* 'sounding', see [Zinder 1979: 112–113 et passim]), but it is somewhat ambiguous, since it is often used only for syllabic sounds of the [l r n m]-type (especially in Indo-European studies).

Sonority could serve as a common distinctive feature of *R*-type consonants, contrasting with the non-sonorous, or obstruent nature, of all other consonants. Moreover, the fact that sonorants are syntagmatically and phonetically closest to vowels suggests that they form an intermediate class; consequently, they either have both features "vocalic" and "consonantal," or they have neither feature. But such a solution is somewhat suspect, since, after all, the members of the

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[105] On the sonority of [j] and [v]-type sounds in other languages, see also § 108 (fn. 29) and [Avanesov 1956: 186; Padlužny 1969: 96].

R-class in Lithuanian do not occupy positions typical of vowels: they are never syllable nuclei. For Sanskrit, Czech, Slovak, or Serbo-Croatian, this approach is quite acceptable, since in these languages such sounds can also function as vowels (see § 101 and § 162).

Otherwise, the members of the paradigm in question contrast just as in other positions: sonorants as in the [T—V]-type position, and non-sonorants (plosives) as in [S—R] and [(#)—R]-type positions. Only here, of course, the timbre correlation mark "soft"–"non-soft" ("hard") is added, which is neutralized in the previous positions: *dra-skaũ* : *dra-skiaũ*, *nuo-žmùs* : *nuo-žmiùs*.

§ 168. We finally come to the basic position [(#)—V], in which all consonants function as a single paradigm: *sùs* 'become mangy-3FUT' : *siùs* 'go mad-3FUT' : *šùs* 'stew-3FUT' : *žùs* 'perish-3FUT' : *pùs* 'rot-3FUT' : *bùs* 'be-3FUT' : *tùs* 'clump together-3FUT' : *dùs* 'choke-3FUT' : *kùs* 'recover-3FUT' : *kiùs* 'wear out-3FUT' : *gùs* 'get used to-3FUT' : *čiùs* 'grow quiet-3FUT' : *džiùs* 'dry-3FUT' : *jùs* 'you-ACC.PL' : *mùs* 'we-ACC.PL' : *rùs* 'turn brown-3FUT'. Strictly speaking, all consonants are fully possible only before back vowels (that is, in [(#)—V^u]-type positions), since before front vowels (in the position [(#)—V^i]) the softness correlation is neutralized, and the corresponding archiphonemes are represented by consonants close to the soft ones.[106]

In this position, all consonantal features have a distinctive function. Here as well, the basis for oppositions is formed by features which characterize syntagmatic phoneme classes. When phonemes occupy a position characteristic of their syntagmatic class, the features become automatically dependent on that position; they become, as they say, irrelevant, or redundant (cf. [Sigurd 1968: 462]), and therefore rules for the structure of sequences are sometimes called redundancy rules (see, for example, [Stanley 1967]). When members of different syntagmatic classes find themselves in the same position, the features of the syntagmatic classes function as basic distinctive features of the corresponding phoneme classes.

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[106] Before /i· ie/, they coincide almost completely with the realizations of soft phonemes, and before /i e ę· e·/ they depend very much on the origin of the speaker, or even the speaker's parents. For example, speakers with a "Suvalkija" dialectal background pronounce in the second case intermediate semi-soft consonants; they fully soften only [k g], and in part [š ž] (cf. § 143 and references).

Distinctive features which coincide with features of a syntagmatic class can be illustrated with the following minimal pairs.

(1) "Sonorant"–"non-sonorant" (members of the *R* and *C*-classes contrast): *jùsti* 'feel-INF' : *siùsti* 'go mad-INF', *laũks* 'wait-3FUT' : *zaũks* 'sob-3FUT', *leñkti* 'bend-INF' : *žeñgti* 'step-INF', *rãgas* 'horn' : *žãgas* 'haystack', *vã-rio* 'copper-GEN.SG' : *vã-žio* 'sleigh-GEN.SG', *rievẽ* '(tree) ring' : *žievẽ* 'crust', *jaũsti* 'feel-INF' : *kiaũsti* 'languish-INF', *jáunu* 'put into disorder-1SG.PRS' : *džiáunu* 'hang to dry-3PRS', *kal-và* 'hill' : *kal-bà* 'speech', *vìrti* 'boil-INF' : *bìrti* 'fall, pour-INF', *mal̃dą* 'prayer-ACC.SG' : *bal̃dą* 'knock-ACC.SG', *ki-miùs* 'hoarse-ACC.PL.M' : *ki-biùs* 'adhesive-ACC.PL.M', *nãro* 'diver-GEN.SG' : *dãro* 'do-3PRS', *nìrti* 'dive-INF' : *dìrti* 'flay-INF', *lùpti* 'peel-INF' : *dùbti* 'become hollow; sink-INF', *leñkti* 'bend-INF' : *deñgti* 'cover-INF', *rantýtas* 'notched' : *dantýtas* 'toothed', *reñgti* 'prepare-INF' : *deñgti* 'cover-INF'.

(2) "Fricative"–"non-fricative" (members of the *S* and *T*-subclasses contrast): *sùkti* 'twist-INF' : *tùkti* 'grow fat-INF', *sil̃pti* 'grow weak-INF' : *til̃pti* 'fit-INF', *šovà* 'bolt' : *kovà* 'struggle', *šiùrti* 'bristle-INF' : *kiùrti* 'become full of holes-INF', *šìtas* 'this' : *kìtas* 'other', *šùsti* 'stew-INF' : *pùsti* 'blow-INF', *šìrmas* 'gray' : *pìrmas* 'first', *zỹkti* 'hum-INF' : *dỹkti* 'become spoiled-INF', *zìlinti* 'cut with a dull knife-INF' : *dìlinti* 'use up by rubbing-INF', *žalià* 'green-NOM.SG.F' : *galià* 'power', *žeĩsti* 'wound-INF' : *geĩsti* 'desire-INF', *žùdo* 'kill-3PRS' : *bùdo* 'wake up-3PST', *žẽbras* 'mottled' : *bẽbras* 'beaver'. Also belonging to this group are oppositions of fricative consonants and the corresponding affricates (3): *sir̃pti* 'ripen-INF' : *cir̃pti* 'chirr-INF', *šiùpti* 'become frayed-INF' : *čiùpti* 'grasp-INF', *žiáuną* 'jaw-ACC.SG' : *džiáuną* 'drying (tr.)'.[107]

The fricative consonants [f f̂], [x x̂] and [h ĥ],[108] found only in words of foreign origin, can also contrast with plosives: *fãktas* 'fact' :

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[107] The stress of this participle is already an accentological archaism, and the minimal pair is therefore not fully reliable.

[108] It is interesting that in Lithuanian dialects, [f] is most often perceived as an optional variant of [p] marking expressive function, indicating that a word belongs to the elevated layer of the lexicon: NŽem. *afal̂čînậ* "*apelsìnaĩ*" 'oranges', *fộ.l̂kà* "*pòlka*" 'polka', *fudrà* "*pudrà*" 'powder' (a pronunciation of this sort is more characteristic of pretentious speakers of the older generation). On similar phenomena in other languages, see, for example, [Vachek 1968: 63; Alieva et al. 1972: 41].

pãktas 'pact', *chalvà* [xałvà] 'halva' : *kalvà* 'hill' (cf. also *hãlę* 'hall-ACC.SG' : *gãlią* 'power-ACC.SG', *fotogrãfų* 'male photographer-GEN.PL' : *fotogrãfių* 'female photographer-GEN.PL', *kazãchų* 'male Kazakh-GEN.PL' : *kazãchių* 'female Kazakh-GEN.PL'). But they do not belong to the syntagmatic *S* class, since they are used in positions of *T*-type plosives: *sferà* 'sphere', *scholãstika* 'scholastics', *frãzė* 'phrase', *chròmas* 'chrome'. If only because of this, these consonants should be considered marginal elements, not belonging to the syntagmatic classes of the core, native system (see § 108, fn. 32, also [Daneš 1966; Romportl 1966: especially 108; Linell 1979: 182, 195–197]). The phonologists of the "old" Prague School called such sounds syn-chronic foreignisms;[109] and the descriptivists, members of a secondary (coexistent) system (see, for example, [Fries, Pike 1949]; cf. also [Harris 1963: 9; Lightner 1971]). The marginal nature of these phonemes is most clearly shown by their very low frequency (cf. [Svecevičjus 1966; Karosienė, Girdenis 1993 (= Girdenis 2001: 64ff.)]; cf. [Perebyjnis 1970: 34–46, 205]). Marginal elements also include various consonants used only in onomatopoeic words or in calling animals, like the labial trilled sonorant pronounced in "words" of the type *tprùka* 'sound used in calling a cow', *tprukùtė* 'id. (dim.)', *tprũ* 'whoa', the *ca cà*-type sucking affricate [dental click] [ʇ] of interjections, etc. These, of course, are even further removed from the system's core than the above-mentioned [f], [x] or [h] [Trubetzkoy 1977: 205f. = Trubeckoj 1960: 255].

    In the position [(#)—V], as elsewhere, labial and non-labial (4) plosive (*T*-type) consonants contrast: *póvas* 'peacock' : *kóvas* 'rook; March', *pìlti* 'pour-INF' : *kìlti* 'rise-INF', *puřkšti* 'sprinkle-INF' : *tuřkšti* 'dabble (of a duck in water)-INF', *pìlti* 'pour-INF' : *tìlti* 'grow quiet-INF', *bùsti* 'wake up-INF' : *gùsti* 'get used to-INF', *bìrti* 'fall, pour-INF' : *gìrti* 'praise-INF', *bùsti* 'wake up-INF' : *dùsti* 'stifle-INF', *bìrti* 'fall, pour-INF' : *dìrti* 'flay-INF', likewise (5) non-labial apical and dorsal: *tàs* 'that' : *kàs* 'who, what', *tìš* 'become sodden-3FUT' : *kìš* 'stick in-3FUT', *dãvęs* 'having given' : *gãvęs* 'having received', *dìrti* 'flay-INF' : *gìrti* 'praise-INF'. Additionally, in exceptional cases, affricates (6) can contrast with simple plosives here: *kiùrinti* 'make

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[109] Trubetzkoy [Trubetzkoy 1977: 205 = Trubeckoj 1960: 255] speaks directly of foreign sounds.

full of holes-INF' : *čiùrinti* 'dirty-INF', *kiùrti* 'become full of holes-INF' : *čiùrti* 'become dirty-INF', *tapnóti* 'tap-INF' : *capnóti* 'drip-INF', *tir̃pti* 'melt-INF' : *cir̃pti* 'chirr-INF'.

Nasal sonorants and non-nasal consonants (7) contrast in such words as *našùs* 'productive; fruitful-NOM.SG.M' : *lašùs* 'drop-ACC.PL', *gi-niaũ* 'drive (cattle)-1.SG.PST' : *gi-liaũ* 'deeper', *nìkti* 'undertake speedily-INF' : *lìkti* 'leave-INF', *nãgas* 'claw' : *rãgas* 'horn', *niũkti* 'mumble-INF' : *riũkti* 'sob-INF', *nìkti* 'undertake speedily-INF' : *rìkti* 'make mistakes-INF', *máigyti* 'crumple-INF' : *láigyti* 'gambol-INF', *dė-mių̃* 'spot-GEN.PL' : *dė-lių̃* 'leech-GEN.PL', *mýgti* 'press-INF' : *lýgti* 'haggle over-INF', *mãkaras* 'stick for beating' : *vãkaras* 'evening', *midùs* 'mead' : *vidùs* 'inside', *jùkti* 'get mixed, blended-INF' : *niùkti* 'be gloomy-INF'. The features "fricative"–"non-fricative" (8) have a distinctive function in the minimal pairs *gi-jaũ* 'recover-1SG.PST' : *gi-liaũ* 'deeper', *gijà* 'thread' : *girià* 'forest', *vaĩkas* 'child' : *laĩkas* 'time', *vaikýti* 'chase-INF' : *raikýti* 'slice-INF', *žavių̃* 'charming-GEN.PL' : *žalių̃* 'green-GEN.PL'. Labial–non-labial (9) fricative sonorants contrast in such cases as *stó-viu* 'stand-1SG.PRS' : *stó-ju* '(take a) stand-1SG.PRS', *stó-vi* 'stand-2SG.PRS' : *stó-ji* '(take a) stand-2SG.PRS'; labial–non-labial nasals (10) in the words *mãras* 'plague' : *nãras* 'diver', *gi-miaũ* 'be born-1SG.PST' : *gi-niaũ* 'drive (cattle)-1SG.PST', *miẽšti* 'dilute-INF' : *niẽžti* 'itch-3PRS'; dentals–alveolars (11): *lópė* 'patch up-3PST' : *rópė* 'turnip', *va-liaũ* 'clean-1SG.PST' : *va-riaũ* 'drive (cattle)-1SG.PST', *lýti* 'rain-INF' : *rýti* 'swallow-INF'. Further features are already known from the survey of neutralization and correlations (see § 135–136, 143–146). These are palato-alveolar–dental fricative non-sonorants (12): *šálti* 'freeze-INF' : *sálti* 'malt-INF', *šiaurùs* 'rough-NOM.SG.M' : *siaurùs* 'narrow-ACC.PL.M', *šèkit* 'here you are!' : *sèkit* 'watch-2PL.IMP', *žeñgti* 'step-INF' : *zeñgti* 'buzz-INF', *žìlinti* 'make grey-INF' : *zìlinti* 'cut with a dull knife-INF', voiced–voiceless non-sonorants (13): *zaũkti* 'sob-INF' : *saũkti* 'sing (with prolonged voice)-INF', *zir̃gti* 'snivel-INF' : *sir̃gti* 'be ill-INF', *žalià* 'green-NOM.SG.F' : *šalià* 'alongside', *žiaurùs* 'cruel-NOM.SG.M' : *šiaurùs* 'rough-NOM.SG.M', *žiẽbti* 'light-INF' : *šiẽpti* 'bare one's teeth-INF', *bū́ti* 'be-INF' : *pū́ti* 'rot-INF', *bylà* '(court) case' : *pylà* 'pouring rain', *darýba* 'formation' : *tarýba* 'council', *der̃lius* 'harvest' : *ter̃lius* 'sloven', *galéti* 'be able-INF' : *kaléti* 'be imprisoned-INF', *pi-giù* 'cheap-INS.SG.M' : *pi-kiù* 'pitch-INS.SG', *geĩstas* 'desired' : *keĩstas* 'strange'; finally, soft–hard

(non-soft) consonants (14): *ža-viùs* 'charming-ACC.PL.M' : *ža-vùs* 'charming-NOM.SG.M', *ra-miùs* 'calm-ACC.PL.M' : *ra-mùs* 'calm-NOM. SG.M', etc. (see § 136 and fn. 29).

§ 169. Thus the entire system of consonantal paradigmatic relations has taken shape, described by the following pairs of distinctive features:

1) "sonorant"–"non-sonorant" ("obstruent"), 2) "nasal"–"non-nasal," 3) "fricative"–"non-fricative," 4) "affricate"–"non-affricate," 5) "labial"–"non-labial," 6) "apical"–"non-apical," 7) "palato-alveolar"–"non-palato-alveolar," 8) "voiced"–"voiceless," 9) "soft"–"hard" ("non-soft").

Every consonant can now be defined as a combination of these features (the dash here means minus): /p/ = /"−sonorant" & "−fricative" & "−affricate" & "+labial" & "−voiced" & "−soft"/, /ẑ/ = /"−sonorant" & "+fricative" & "+palato-alveolar" & "+voiced" & "+soft"/, etc. Every phoneme is always distinguished from every other phoneme by at least one feature, and no phoneme has a feature which would not distinguish it from at least one other phoneme. Other properties of sounds representing phonemes can be derived from these features by general rules. For example, /"+son" & "−nas" & "−fric" & "+alv"/ → ["+trill"], /"−son" & "−vce"/ → ["+tense"], etc.[110]

§ 170. Complexes of distinctive features defining each phoneme, or in other words, forming their phonological content (Ger. *Phonemgehalt*, *phonologischer Gehalt* [Trubetzkoy 1977: 59], Ru. *фонологическое содержание* [Trubeckoj 1960: 73]) are most conveniently presented in so-called phoneme matrices, borrowed from information theory (cf. [Švėgžda 1980: 46, figure 4.3])—tables in which the columns correspond to phonemes and the rows to distinctive features. When a phoneme has a positive distinctive feature, we mark a plus at the intersection of the row and column; when it has a negative feature, a minus. If a feature is in general lacking in a phoneme, or irrelevant, we mark the intersection of row and column with a zero (cf. [Čerri, Challe, Jakobson 1962: 286–287]).

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[110] On the relativity of the concepts of relevant and irrelevant features, see, for example, [Achmanova 1966: 5; Fretheim 1981: 299]. Contemporary phonology generally does not reject any features; it only establishes their hierarchy (cf. [Panov 1967: 163–164]).

The matrix for Lithuanian consonants would be as follows (see table 16; for technical reasons the symbols here for hard phonemes mark both hard and soft phonemes).

Table 16. Phoneme matrix for the consonants of standard Lithuanian

No.	Distinctive features	Phonemes																			
		k	*g*	*t*	*d*	*p*	*b*	*c*	*ʒ*	*č*	*ǯ*	*s*	*z*	*š*	*ž*	*l*	*r*	*j*	*v*	*n*	*m*
1	sonorant (non-sonorant)	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	+	+	+	+	+
2	nasal (non-nasal)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	−	−	−	−	+	+
3	fricative (non-fricative)	−	−	−	−	−	−	−	−	−	−	+	+	+	+	−	−	+	+	0	0
4	affricate (non-affricate)	−	−	−	−	−	−	+	+	+	+	0	0	0	0	0	0	0	0	0	0
5	labial (non-labial)	−	−	−	−	+	+	0	0	0	0	0	0	0	0	0	0	−	+	−	+
6	apical (non-apical)	−	−	+	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	palato-alveolar (dental)	0	0	0	0	0	0	−	−	+	+	−	−	+	+	−	+	0	0	0	0
8	voiced (voiceless)	−	+	−	+	−	+	−	+	−	+	−	+	−	+	0	0	0	0	0	0
9	soft (hard)	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	0	±	±	±

This classification can be illustrated by the following tree diagram (see figure 16).

If we compare the left side of the tree diagram (beginning with the second node) with the tree diagram obtained in studying the syntagmatic relations and neutralizations of consonants (see § 154), we see that, apart from the affricates, which were not considered there, they differ only in the place of the fricatives /s ŝ z ẑ š ŝ̌ ž ẑ̌/. However, this is pure coincidence, explained by the fact that in the previous tree diagram, the basic consonant classes are arranged in the order in which phonemes appear in sequences, whereas here we are following the usual order in phonology and all positive features branch to the right.

Thus the tree diagram, and in general the system of distinctive features, well reflects both the syntagmatic and paradigmatic relations
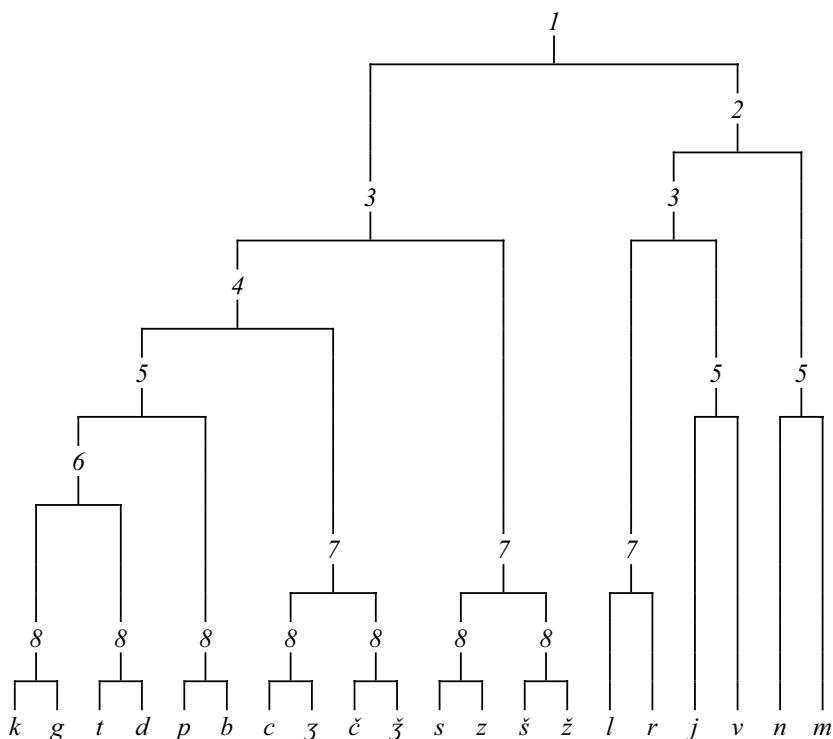
Figure 16. Tree diagram of consonant classification
(for the meaning of the numbers, see table 16; right branches correspond
to positive features, left branches to negative).

of consonantal phonemes. It also shows the correlations and correlation bundles characteristic of the Lithuanian system. The softness correlation is characteristic of phonemes contrasting in feature pair 9 (not shown in this tree diagram), the voicing correlation in feature pair 8, hushing sibilants in feature pair 7; beginning with feature 7, correlation bundles combine the correlations of hushing sibilant (7), voicing (8), and softness (9). Beginning with feature 8, correlation bundles combine correlations of voicing (8) and softness (9). Neutralization itself can be concisely defined as follows: feature pair 9 is distinctively used only in the position $[—V^u]$, pair 8 in the positions $[—\frac{V}{R}]$ (cf. [Ivanov 1962: 168]).

An archiphoneme can now be characterized as a phoneme which is not fully specified. For example, the specification for the final

consonant of the word *tàs* 'that' would be: "−sonorant" (−1) & "+fricative" (+3) & "−palato-alveolar" (−7). At this point, the specification breaks off, since the features of voicing (8) and hardness–softness (9) have no distinctive function word-finally. The specification for the second consonant in the word *vèsčiau* [v̂ệŝĉæu] 'take, lead-1SG.SBJV' would break off still earlier, having only the features "−sonorant" (−1) and "+fricative" (+3), since before /ĉ/ neither feature 7, 8, or 9 has a distinctive function; a voiceless, palato-alveolar, palatalized (soft) articulation appears here automatically.

β) DISTINCTIVE FEATURES OF VOWELS IN STANDARD LITHUANIAN

§ 171. The paradigmatic relations and distinctive features of vowels in standard Lithuanian can be described as follows.

The vowel system, as we have seen (see § 100), consists of the phonemes /i i· ę e e· a a· o· u u·/ (vowels of uniform articulation) and /ie uo/ (vowels of changing articulation, cf. § 83). Besides these, in words of foreign origin (sometimes also in Lithuanian "non-traditional" proper names, cf. *Nijòlė*),[111] a weakly rounded [ɔ] is also found: *jònai* 'ions', *škòtas* 'Scot', *tòstas* 'toast'; like [f f̂ x x̂ h ĥ] (see § 168), it undoubtedly belongs to the margins of the phonological system.

In words of foreign origin, some speakers of standard Lithuanian also pronounce a close [ẹ][112] (usually only in stressed syllables, but cf. [Pakerys 1978: 21]), for example, [akad̂ệm̂ijæ] "*akadèmija*" 'academy', [m̂ệtras] "*mètras*" 'meter', [t̂ệkstas] "*tèkstas*" 'text', or even—quite improperly—[akad̀èm̂ijæ], [mètras], [tèkstas] (with hard [d], [m], [t] etc.). This is an optional sound, since according to the traditional Suvalkija norm a simple short [e], the same as in forms of the type *sèkti* 'watch-INF', *vèžtų* 'take (by vehicle)-3SBJV', is pronounced in its

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[111] The categorical requirement to pronounce a long /o·/ in such names (cf. also *Aldonà*, *Aldònas*, etc.]) is now old-fashioned; a long vowel is not pronounced here in any dialect which has securely preserved quantity oppositions (see, for example, [Keinys 1976: 101]).

[112] This sound is considered a fully independent phoneme in, for example, the first academy grammar of Lithuanian (see [Ulvydas 1965: 48–49, 51], cf. also [Vaitkevičiūtė 1961: 24–25; Mikalauskaitė 1975: 17–18; Pakerys 1978: 21; 1986: 38–39 et passim]). For a criticism of this view, see [Kazlauskas 1966: 75].

place. Due to this optionality and other peculiarities of usage, [ẹ] (and even more so [ε]) should be considered a "Janus" phoneme (cf. § 66), or a combination of the phoneme /e/ and a sociolinguistic "prosodeme" (that is to say, a sociolinguistic variable). This "prosodeme" performs an expressive function: it shows that the word belongs to an elevated style and that the speaker is demonstrating an actual or imagined high social status. The sound [ẹ] should not be considered a true (even if marginal) phoneme, since its purpose is not distinctive. Nor do its optional usage and special expressive nuance allow us to treat it as a normal phoneme. In the best case, it is only a phoneme of certain urban sociolects.

§ 172. Based on their relations with consonants, vowel phonemes split into two syntagmatic classes, or paradigms. Before the vowels /i i· ẹ· ie e e·/ only soft (or at least softened) consonants occur; the softness correlation is neutralized before these. Before the vowels /u u· o· uo/ (and also [ɔ]), both hard and soft consonants can occur; thus, these vowels form a position of relevance for the softness correlation. The first paradigm (/i i·…/) can be denoted by the symbol V^i, and the second (/u u·…/) by V^u.

It is well known that the members of the first paradigm (V^i) differ from those of the second paradigm in that, in producing them, the entire tongue advances toward the front of the mouth, its tip approaching the lower teeth, and the mid-part of the tongue is more or less raised toward the hard palate. The members of the second paradigm (V^u) are realized by two types of allophones. After a pause or a hard consonant, "pure" back allophones are used (see [Vaitkevičiūtė 1961: 24, 32–39; Ulvydas 1965: 48, 53–56; Mikalauskaitė 1975: 21–22]). In pronouncing these, the tongue is retracted towards the throat (the pharynx), the tip of the tongue moves away from the lower teeth, and the back of the tongue is raised more or less toward the soft palate. After soft consonants and /j/, the so-called fronted allophones [u̇ u̇· u̇o ȯ·] are found. At the beginning of their pronunciation, the tongue is well advanced, but then generally pulls back to the position of the basic allophones [Vaitkevičiūtė 1961: 44]. Hence these allophones are not uniform, and are somewhat reminiscent of diphthongs, or more precisely diphthongoids—vowels of changing articulation reminiscent of diphthongs (Gk. *δίφθογγον* 'diphthong', *εἶδος* 'appearance').

Based on these properties, we can assign the distinctive feature "front" to vowels of the V^i set, and "back" to vowels of the V^u set. Since vowels of the V^u set are the unmarked members of the oppositions /u/ : /i/, /o·/ : /ẹ·/, etc. (cf. § 144), we might use in place of the feature "back" the more neutral and (considering the fronted allophones [ù], [ù·], etc.) perhaps even more accurate term "non-front." We will, of course, also include among these non-front vowels /a a·/, which are quite often realized as central allophones and optional variants (cf. [Mikalauskaitė 1975: 22]); short /a/ is especially often realized with central variants (a narrow transcription would require that we write it as [a] and distinguish it from the clearer back [ɑː]). The phonemes /a a·/ contrast with /e e·/ only in the position [#—] and (if we treat [t̂ d̂] as allophones of /t d/) after /t d/, cf. *ą̃sq* '(jug) ear-ACC.SG' : *ẽsq* 'be-PRS-AP.N.PL.M', *tãko* 'path-GEN.SG' = /tã·ko·/ : *tẽko* 'fall to-3PST' /tẽ·ko·/, *takù* 'path-INS.SG' : *tekù* 'marry-1SG.PRS' (on the relationship between /a/ and /e/ see also § 59, 143).

Examples of the opposition can easily be found in inflectional morphemes: *galì* 'be able-2SG.PRS' : *galiù* 'be able-1SG.PRS', *tõlį* [t̥õ·l̂i·] 'distance-ACC.SG' : *tõlių* [t̥õ·l̂°ù·] 'distance-GEN.PL', *laukìnė* 'wild-NOM.SG.F' : *laukìnio* 'wild-GEN.SG.M', *gailíes* 'repent-2SG.PRS. REFL' : *gailiúos* 'repent-1SG.PRS.REFL'. In other positions they are far less frequent: *išpúolė* 'fall out-3PST' : *užpúolė* 'attack-3PST', *ýdos* 'vices' : *ū̃dos* 'fishing rods', *éda* 'eat-3PRS' : *óda* 'skin', *ẽsq* 'be-PRS-AP.N.PL.M' : *ą̃sq* '(jug) ear-ACC.SG'.

Thus, the two main vowel classes would be:
I. Front vowels: /i i· ẹ· ie e e·/.
II. Non-front vowels: /u u· o· uo a a·/.

§ 173. All non-front vowels, except for /a a·/, have yet another feature, at least at the beginning of their articulation: in producing them, the lips are rounded and somewhat protruded (for labiograms, see [Vaitkevičiūtė 1961: 26; Ulvydas 1965: 48–49]). In producing front vowels, on the other hand, the lips are pressed against the teeth and their edges are drawn to the side; in pronouncing /a a·/ the lips are quite relaxed, neutral. Thus the vowels /u u· o· uo/ are rounded, or labialized, while /i i· ẹ· ie e e· a a·/ are unrounded, or non-labialized.

These features are quite significant. If, for example, we were to attempt to maintain a normal tongue position in pronouncing [u·] but

keep the lips as if pronouncing [i·], we would get the sound [ɯː], quite foreign for Lithuanian, which no one would perceive as a variant of the phoneme /u·/. If in pronouncing [a·] we were to protrude the lips as if pronouncing [u·] or [o·], we would get /ɔ·/, which most Lithuanian speakers would probably perceive as a variant of the phoneme /o·/. Rounded [i· ẹ·] are perceived as the foreign sounds [yː øː], or as demonstrating a corresponding emotional tonality (see § 17).[113] Thus lip-rounding is an important phonetic property, helping distinguish certain non-front vowels from front vowels. But this property cannot be considered a distinctive feature, since it is not common to all members of the class /a a· o· uo u u·/. If we were to choose the feature "rounded"–"unrounded," [a] and [a·] would find themselves in the same class as /e e· ie ẹ· i i·/, although from a functional standpoint they cannot belong to this class, since they do not soften preceding consonants. In choosing these features, the symmetry of paradigmatic relations would also break down:[114] we would have four phonemes more in the unrounded class than in the rounded class.

Nevertheless, lip-rounding cannot be completely dismissed: it is quite an important secondary feature, reinforcing the oppositions of front and non-front vowels.

§ 174. The vowels /a/ and /e/, /a·/ and /e·/ are distinguished from other vowels in that they are in complementary distribution in all positions except [#—] and perhaps [^t_d—] (cf. § 53). After hard consonants, only [a a·] are possible, and after soft consonants, only [e e·]. Out of context, most speakers of standard Lithuanian cannot distinguish by ear such words as *gilès* 'acorn-ACC.PL' : *giliàs* 'deep-ACC. PL.F', *gìlę* 'acorn-ACC.SG' : *gìlią* 'deep-ACC.SG.F' (see [Kazlauskas 1967: 238; 1968c and references]). This can also be seen from the rhymes of classical Lithuanian poetry:[115] Vincas Mykolaitis-Putinas,

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[113] In speaking very tenderly and affectionately, Lithuanian speakers may labialize all sounds, pronouncing, for example, the words *mažýtė mergýtė* 'little girl' approximately [m°åž̊ũ·î̯°ö· m̊°ȭî̊°g̊°ũ̃·î̯°ö·].

[114] One must agree with Steblin-Kamenskij [1964] that symmetry in and of itself is not a definitive argument for phonological decisions, but it should not be ignored, unless there are good reasons for doing so.

[115] On the importance of rhymes for phonology, see [Trubetzkoy 1938: 137– 138; Ivanov 1962: 143; Panov 1967: 59; Linell 1979: 92] (but cf. [Jakobson, Waugh 1979: 50, 277 and references]).

for example, rhymes not just *girià* 'woods' : *vakarè* 'in the evening' (*Keleivis* 'The traveler'), *rūkuosè* 'in the mist' : *dvasià* 'spirit' (*Bijau nakties* 'I fear the night'), but also *téises* 'rights-ACC.PL.' : *baĩsios* 'terrible-NOM.PL.F' (*Teisėjui* 'To the judge'), *stalẽlio* 'table (dim.)-GEN.SG' : *karãliai* 'kings' (*Lėlių baladė* 'Ballad of the dolls'), *deñgia* 'covers' : *padánge* 'the-heavens-INS.SG' (*Pailsau* 'I am weary'), *gãliai* 'power-DAT.SG' : *kẽlią* 'road-ACC.SG' (*Didžiojo Spalio garbei* 'In praise of Great October'). Thus, the oppositions /a/ : /e/, /a·/ : /e·/ are truly neutralized, and they are connected by correlative relations.[116]

It would be possible to speak of a neutralization of the oppositions /a/ : /a·/, /e/ : /e·/ in stressed non-final syllables as well, cf. *rastùs* 'found-ACC.PL.M' ≠ *rą̃stus* 'log-ACC.PL', but *rą̃stas* 'found-NOM.SG.M' ≈ *rãstas* 'log-NOM.SG',[117] *trèš* 'rot-3FUT' ≠ *trẽš* 'fertilize-3FUT', but *patrẽšęs* 'having fertilized' ≈ *patrẽšęs* 'having rotted'. However, we would then have to consider not just the phonetic positions of the sounds in question, but also their morphological positions, since oppositions of the type *ràstų* 'find-3SBJV' : *rą̃stų* 'log-GEN.PL', *trèšti* 'rot-INF' : *trẽšti* 'fertilize-INF', *ràktų* 'pick (at)-3SBJV' : *rãktų* 'key-GEN.PL' are possible. Nevertheless, these facts show the very close connection between /a/ and /a·/, /e/ and /e·/, nearly a correlation.

The phonemes /a e/ and /a· e·/, connected by correlative relations, form a relatively independent class, contrasting with all other vowel phonemes. Their oppositions are shown by such examples as *ràstų* 'find-3SBJV' : *rùstų* 'turn brown-3SBJV', *kaĩpas* 'corner' : *kuĩpas* 'crooked', *vèsti* 'lead-INF' : *vìsti* 'breed-INF', *péntis* 'butt (of an axe)' : *pìntis* 'tinder-fungus', *tãpė* 'paint-3PST' : *tũpė* 'sit (of a

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[116] For a somewhat different view, see [Vaitkevičiūtė 1961: 36; Ulvydas 1965: 55]. But even here the neutralization of /a/ : /e/ is recognized, at least in the position [Ĉ—i̦].

[117] For some speakers, especially from Suvalkija, such word pairs as *rãstas* : *rą̃stas*, *patrẽšęs* : *patrẽšęs* are not entirely homonymous. The second word in each pair is pronounced with a somewhat longer and more open vowel, which (as Jonas Kabelka attests) may also be somewhat nasalized. Thus we could speak of oppositions of a long /a·/ and /e·/ and a half-long /a./ and /e./ [Girdenis 1971a: 205 (= Girdenis 2000b: 349)]. But this issue has not been thoroughly studied, and therefore we will continue to follow the conventional codified vowel system. Nevertheless, it should by no means be forgotten that there are significant problems here (see also [Kazlauskienė 1996] and references, especially [Bacevičiūtė 1998 = 2001: 126ff.]).

bird)-3PST', *skãbė* 'nibble, pluck-3PST' : *skõbė* 'hollow, gouge-3PST', *sãkė* 'say-3PST' : *suõkė* 'jug (of a nightingale)-3PST', *grę̃žti* 'bore-INF' : *grį̃žti* 'return-INF', *réžti* 'strain-INF' : *réžti* 'cut-INF', *švę̃sti* 'celebrate-INF' : *šviẽsti* 'shine-INF'. These oppositions play a role in distinguishing word forms in, for example, *sẽnę* 'old woman-ACC.SG' : *sẽnį* 'old man-ACC.SG' : *sẽnė* 'old woman-NOM.SG', *tą̃* 'that-ACC.SG.M/F' : *tõ* 'that-GEN.SG.M' : *tuõ* 'that-INS.SG.M' : *tų̃* 'that-GEN.PL.M/F'.

The vowels in question differ from others in their open articulation and low tongue position. With regard to tongue height, /a aˑ/ are the most open and lowest of all the back (and in general, all) vowels, and /e eˑ/ are the most open and lowest of all the front vowels. Therefore, based on the low tongue position, we can assign to the phonemes /a aˑ e eˑ/ the distinctive feature "low"; all other vowels have the feature "non-low." The fact that in pronouncing /e eˑ/ the tongue is raised a bit higher than for /a aˑ/, at least at the beginning of the pronunciation, is meaningless here;[118] distinctive features are not absolute, but relative. Based on tongue position, /e eˑ/ are the lowest of all the front vowels, and should therefore be considered low. Moreover, /a/ and /e/, /aˑ/ and /eˑ/ must necessarily receive the shared distinctive feature characterizing their archiphonemes /A/, /Aˑ/, which function in positions of neutralization (that is, after consonants).

Our vowel system is now split into the following classes:
I. Front vowels:
    1) low: /e eˑ/,
    2) non-low: /i iˑ ie ęˑ/.
II. Non-front vowels:
    1) low: /a aˑ/,
    2) non-low: /u uˑ uo oˑ/.

The non-front, non-low vowels (II 2-subclass) also have the above-mentioned secondary feature of lip-rounding (see § 173). We could say that this necessary phonetic feature of Lithuanian emerges on its own from the combination of distinctive features "non-front" and "non-low" (just as the velar articulation of the phoneme [ŋ] emerges from the velar articulations of a following /k/ or /g/; see § 178).

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[118] For different views on this, see [Vaitkevičiūtė 1961: 30–31; Ulvydas 1965: 49, 51–52; Girdenis, Žulys 1973: 206 (= Girdenis 2000b: 375); Mikalauskaitė 1975: 21].

§ 175. Of the non-low vowels, /u uˑ/ and /i iˑ/ clearly stand apart, since they are grouped in the pairs /u/ : /uˑ/ and /i/ : /iˑ/, close in articulation, which have a distinctive function: *skùsti* 'shave-INF' : *skústi* 'report on-INF', *trìs* 'three-ACC' : *trỹs* 'three-NOM'. The vowels /oˑ uo ęˑ ie/ do not form such pairs. We therefore need to distinguish a separate subclass of paired non-low vowels, contrasting with all other non-low vowels: *výsti* 'fade-INF' : *vésti* 'cool-INF', *tį̃sti* 'stretch (intr.)-INF' : *tiẽsti* 'stretch (tr.)-INF', *kū̃jų* 'hammer-GEN.PL' : *kójų* 'foot/leg-GEN.PL' : *kúojų* 'roach (fish)-GEN.PL', likewise *sẽnį* 'old man-ACC.SG' : *sẽnė* 'old woman-NOM.SG', *šį̃* 'this-ACC.SG.M' : *šiẽ* 'this-NOM.PL.M', *tų̃* 'that-GEN.PL' : *tõ* 'that-GEN.SG.M' : *tuõ* 'that-INS.SG.M'.

The vowels /u uˑ i iˑ/ of this subclass differ from others in their close articulation and greatest degree of tongue height. In producing /oˑ ęˑ/, the mouth is more open and the tongue is somewhat lower; in producing /uo ie/, the speech organs initially occupy a position similar to that for /uˑ iˑ/, but then shift smoothly a position close to the articulation of [æ], [ɔ] or even [a], [a]. We can therefore assign to the phonemes /u uˑ i iˑ/ the distinctive feature "high," contrasting with the feature "non-high." The non-high articulatory nature of /oˑ ęˑ/ is self-evident; in the case of /uo ie/, it can be seen more clearly only in the mid and final phase of articulation (see the palatograms, [Vaitkevičiūtė 1961: 26–28, 32–35]). The vowels /oˑ uo ęˑ ie/ are non-low and non-high.[119]

The class of non-low non-high phonemes can be further divided based on the distinctive feature pair "gliding" ("diphthongal")–"non-gliding" ("uniform"), somewhat recalling the consonantal features "affricate"–"non-affricate": /uo ie/ are clearly sounds of variable

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[119] Their exceptional closeness is shown by listening experiments [Girdenis 1978b (= Girdenis 2000c: 340f.)] and such rhymes of classical poetry as *spiẽgė* 'squeal-3PST' : *bejẽgė* 'helpless-NOM.SG.F' (*Klajūnas* 'The wanderer', V. Mykolaitis-Putinas), *viẽšo* 'public-GEN.SG.M' : *pléšo* 'tear-3PRS' (*Sielvarto sesei* 'To a sister in grief'), *raliúoja* 'warble-3PRS' : *kójų* 'feet-GEN.PL' (*Saulėlydžio kely* 'On the sunset path'), *užúodžiu* 'smell-1SG.PRS' : *žõdžių* 'word-GEN.PL' (*Atsiminimas* 'Memory'), *iš miẽgo* 'from sleep' : *bėgo* 'run-3PST' (*Močiutė* 'Grandmother', Salomėja Nėris), *skriaudõs* 'offense-GEN.SG' : *nepavaduõs* 'take the place of-3FUT.NEG' (*Žandarai išvežė mokytoją* 'The police have taken away teacher'), *žaizdóti* 'wounded-NOM.PL.M' : *vaizdúoti* 'portray-INF' (*Dėdės* 'Uncles'), *žydė̃s* 'bloom-3FUT' : *širdiẽs* 'heart-GEN.SG' (*Alyvos* 'Lilacs').

(gliding) articulation (see § 171; cf. also [Smoczyński 1975; 1978; Steponavičjus 1982a: 74]).

>   We now have the following vowel classes:
>   I. Front vowels:
>   1) low: /e e·/;
>   2) non-low:
>   a) high: /i i·/,
>   b) non-high:
>   α) gliding: /ie/,
>   β) non-gliding: /ę·/.
>   II. Non-front vowels:
>   1) low: /a a·/;
>   2) non-low:
>   a) high: /u u·/,
>   b) non-high:
>   α) gliding: /uo/,
>   β) non-gliding: /o·/.

§ 176. Low and high vowels must be further divided into two subclasses: /a e u i/ and /a· e· u· i·/. First, their oppositions have a distinctive function: *trèsti* 'rot-INF' : *trę̃šti* 'fertilize-INF', *mès* 'throw-3FUT' : *mẽs* 'we', *ràstų* 'find-3SBJV' : *rą̃stų* 'log-GEN.PL', *kàs* 'who, what; dig-3FUT' : *ką̃s* 'bite-3FUT', *dìdis* 'big' : *dỹdis* 'size', *trìs* 'three-ACC' : *trỹs* 'three-NOM', *pùsti* 'swell-INF' : *pū̃sti* 'blow-INF', *siùs* 'become rabid-3FUT' : *sių̃s* 'send-3FUT'. This opposition very often distinguishes grammatical forms: *var̃le* 'frog-VOC.SG' : *var̃lę* 'frog-ACC.SG', *várna* 'crow-NOM.SG' : *várną* 'crow-ACC.SG', *nósis* 'nose-NOM.SG' : *nósys* 'nose-NOM.PL', *tur̃gus* 'market-NOM.SG' : *tur̃gūs* 'market-NOM.PL'. Secondly, in stressed syllables, vowels of the second type are equivalent to tautosyllabic two-member sequences of the type *VR* (that is, to the mixed diphthongs /ar/, /al/, /am/, etc.), since, like these, they form the basis for an opposition of pitch accent (see § 241–244).

Since /a· e· u· i·/ behave in a syllable just like biphonemic sequences, they can be assigned the quantitative distinctive feature "long," and the vowels /a e u i/ the opposite feature "short" ("non-long"). In many cases /a· e· u· i·/ are indeed pronounced longer than their short counterparts. But quantity is not the only distinguishing feature of these oppositions, since, for example, /u/ and /u·/, /i/ and /i·/ are also qualitatively different. In producing /i·/ and /u·/ the tongue is

raised higher and the lips are more tensed, while for /i/ and /u/ the tongue is lower and the lips and other speech organs are relaxed (see, for example, [Vaitkevičiūtė 1961: 26–28, 30–33, 36–37; Pakerys 1982: 95–103 and references]; cf. [Weinstock 1981]). We can characterize this distinction most simply with the feature "tense" (/i· u·/)–"lax" (/i u/).

It is not difficult to be persuaded, even without experiments, that tenseness is a highly important feature. In singing, for example, the vowel /i/ of the word *dìdis* might be drawn out longer than the vowel /i·/ of the word *dỹdis*, but we would still perceive it as "short," as long as the singer maintains the characteristic qualitative difference: a less tensed articulation. It might be assumed through introspection and instrumental studies that the above-mentioned word pairs *ràstų* : *rą̃stų*, *várna* : *várną* also differ not only in vowel duration, but also in articulatory tension; in pronouncing /a/ the speech organs are seemingly more relaxed, while in pronouncing /a·/ they are quite a bit more tensed. It was long believed that this was the case. However, Pakerys [1975; 1982: 96–103] has shown, in reliable original experiments, that qualitative features (that is, tenseness) define only the oppositions /u/ : /u·/ and /i/ : /i·/, while the oppositions /a/ : /a·/ and /e/ : /e·/ depend more on quantity (that is, length or shortness). Similar results have been obtained by Swedish and German phoneticians [Hadding-Koch, Abramson 1964: 106 et passim; Weiss 1977]. Thus there is a certain complementary distribution between the features of tenseness and duration (see table 17): where tenseness plays a decisive distinguishing role, quantity is irrelevant, and where quantity plays this role, tenseness is irrelevant.

Table 17. Distribution of the features of tenseness and quantity in standard Lithuanian

Features	Vowel types	
	low	high
tense		+
long	+	
lax		+
short	+	

This shows that the features "tense" and "long" should be considered variants of a single distinctive feature, and "lax" and "short"

should be considered combinatory variants of another distinctive feature. What we call these features is not all that important, since, as has been noted repeatedly (for example, § 120, 163), such terms are only conventional labels, representatives of an entire complex of distinctive features. Tradition and the relatedness of /aˑ eˑ uˑ iˑ/-type vowels to biphonemic sequences (see § 241–244 and 255) would seem to support the ordinary feature pair "long"–"short" (cf. [Pakerys 1982: 103]), although, of course, the opposite choice is also possible (for example, [Svecevičjus 1964: 18; Kazlauskas 1966]). The second alternative may find motivation in a certain inconvenience in using prosodic terms.[120]

In choosing the features "long"–"short," the vowel classification is completed, since the final classes each contain only a single element.

Our classification now appears as follows:
I. Front vowels:
    1) low:
           α) long (tense): /eˑ/,
           β) short (lax): /e/;
    2) non-low:
      a) high:
           α) long (tense): /iˑ/,
           β) short (lax): /i/;
      b) non-high:
           α) gliding: /ie/,
           β) non-gliding: /ęˑ/.
II. Non-front vowels:
    1) low:
           α) long (tense): /aˑ/,
           β) short (lax): /a/;
    2) non-low:
      a) high:
           α) long (tense): /uˑ/,
           β) short (lax): /u/;
      b) non-high:
           α) gliding: /uo/,
           β) non-gliding: /oˑ/.

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[120] On attempts to treat this opposition as prosodic, see § 248, fn. 56.

If we were to consider the [ɔ] found only in international words as a normal phoneme, the subclass II 2 b β (that is, /oˑ/) would need to be further divided according to the already available distinctive features long (/oˑ/)–short (/ɔ/). However, as noted above (§ 171), it is best to assign it, together with [f f̂], [x x̂], [h ĥ], and [t̂ d̂] (cf. *tiùlis* 'tulle', *Diumà* 'Dumas', *tiulénti* 'produce the sound of a gosling'), to a subclass of marginal (secondary) phonological units. We could consider the non-phonetic property "foreign" as a tentative distinguishing feature of these.

§ 177. Based on the distinctive features established we can set up the following matrix of vowel phonemes (see table 18).

Table 18. Matrix of vowel phonemes of standard Lithuanian (version I)

No.	Features	Phonemes											
		/e/	/eˑ/	/i/	/iˑ/	/ẹˑ/	/ie/	/a/	/aˑ/	/u/	/uˑ/	/oˑ/	/uo/
1	front (non-front)	+	+	+	+	+	+	−	−	−	−	−	−
2	low (non-low)	+	+	−	−	−	−	+	+	−	−	−	−
3	high (non-high)	0	0	+	+	−	−	0	0	+	+	−	−
4	gliding (non-gliding)	0	0	0	0	−	+	0	0	0	0	−	+
5	long (short)	−	+	−	+	0	0	−	+	−	+	0	0

The following tree diagram illustrates this phoneme classification (see figure 17).

As shown by Pakerys's psycholinguistic study [1971; 1974a] based on Lithuanian poetry rhymes, a tree diagram of this sort also nicely shows the auditory (psychoacoustic) similarity of vowels.[121] For example, those sounds which are distinguished only by features 4 and 5 can occur in stressed syllables of classical rhymes. In post-tonic rhyme syllables, front vowels usually agree with front vowels, and back vowels with back vowels, etc. Thus, on the basis of poetry rhymes, and using the so-called hierarchical grouping method, Pakerys has established a credible auditory classification of vowels,

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[121] On the psychoacoustic properties of sounds and methods of analysis, see, for example, [Fischer-Jørgensen 1967; Ungeheuer 1965; 1968; Łobacz 1981]; on the significance of such research for phonology, [Hammarström 1966: 27].
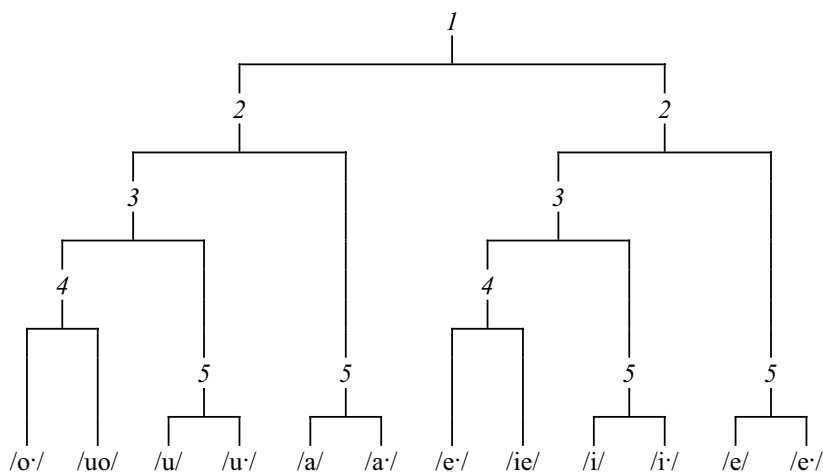
Figure 17. Tree diagram of the vowel phonemes of standard Lithuanian (version I)

which almost fully coincides with the one seen here. Nearly the same results have also been obtained by special listening experiments (cf. [Girdenis 1978b (= Girdenis 2000c: 340f.); Kačiuškienė 1984 and references]).

Phonetic vowel properties which are important for perception, but not included in the inventory of distinctive features can be derived by general rule, for example: /"+vocalic" & "−front" & "−low"/ → ["+rounded"], /"+vocalic" & "+front" & "+low"/ → ["+mid-low"], /"+vocalic" & "+low" & "+long"/ → ["+tense"].

§ 178. The established vowel classification nevertheless has one shortcoming, which will become clear when we begin to examine prosodic phenomena.

As noted above (see § 176 and 241–244), certain Lithuanian vowels play the same role in stressed syllables as *VR*-type sequences. Such vowels are not just the above-mentioned /aˑ eˑ uˑ iˑ/, but also /oˑ uo ęˑ ie/. According to the above classification, only the first four vowels share the feature long; /oˑ uo ęˑ ie/ are indifferent to this feature (see the zeroes in line 5 of table 18). Therefore, if we accept this classification, we will need to base the prosodic properties of a syllable not on some common distinguishing feature, but directly on a list of phonemes which are equivalent to diphthongs. This very much diminishes the significance and explanatory power of the classification.

It is not difficult to overcome this problem: it suffices to move the distinctive feature pair "long"–"short" to the beginning of the list, and restructure the matrix accordingly (see table 19). After this operation, all long vowels are immediately distinguished from short vowels and form a separate class, correlating with *VR*-type sequences in the syllable.

Table 19. Matrix of vowel phonemes of standard Lithuanian (version II)[122]

No.	Features	Phonemes											
		/e/	/e·/	/i/	/i·/	/ę·/	/ie/	/a/	/a·/	/u/	/u·/	/o·/	/uo/
1	long (short)	−	+	−	+	+	+	−	+	−	+	+	+
2	front (non-front)	+	+	+	+	+	+	−	−	−	−	−	−
3	low (non-low)	+	+	−	−	−	−	+	+	−	−	−	−
4	high (non-high)	0	0	(+)	+	−	−	0	0	(+)	+	−	−
5	gliding (non-gliding)	0	0	0	0	−	+	0	0	0	0	−	+

The tree diagram changes accordingly (see figure 18).

As we see, the features all remain the same, only now they not only distinguish phonemes, but also single out and characterize their major functional classes and subclasses. It is therefore reasonable to say that this classification (and feature hierarchy) has greater explanatory power. In some respects, it better explains even properties of certain phoneme variants. For example, open vowels close to [ǫ ę] (cf. § 66) are sometimes optionally pronounced in place of [u i]. The first analysis does not "provide for" such variants, but in this classification they are quite normal, since a more precise tongue height for /u i/ is now unspecified; what is important is that they not be low. The features "high"–"non-high" are not essential for them (see the zeroes in line 4 of table 19).

§ 179. This circuitous path toward a more adequate solution clearly shows that the only effective phoneme classification and distinctive feature system and hierarchy is one which permits a more

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[122] The features noted in parentheses distinguish /u/ and /i/ only from the marginal phonemes <ɔ>, <ę> (more precisely, <e/ę>; see § 189, fn. 130).
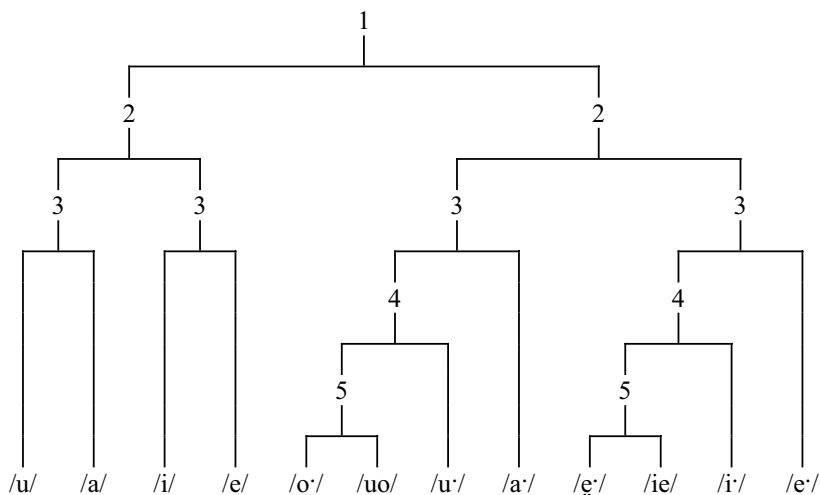
Figure 18. Tree diagram of the vowel phonemes of standard Lithuanian
(version II)

consistent and simpler description of the relations between all phono-
logical units and the functioning of the entire phonological system.
When purely phonetic criteria contradict phonological criteria, when
their observance leads to a more cumbersome description of syntag-
matic and, in general, functional relations, pure phonetics must yield
to phonology. Phonology, like contemporary linguistics in general, is
first and foremost a study of relations.[123] Sounds and their physical
properties are only a concretization and materialization (or, to use a
favorite term of semanticists, a phonetic interpretation) of these rela-
tions.

The same could be said of other areas of a linguistic system. For
example, in identifying and explaining grammatical categories, we
first need to follow their syntactic functions and positions and their
paradigmatic interrelations, rather than semantic criteria (which in
grammar occupy a place similar to phonetic criteria in phonology).

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[123] Here we have in mind the methodological, rather than ontological, aspect
of linguistic theory. Language is not, of course, only a network of pure relations,
but the surest and most productive path to its true structure is through relations
(see also § 96).

c) OTHER CRITERIA AND CONSIDERATIONS IN ESTABLISHING AND GROUPING DISTINCTIVE FEATURES

§ 180. We identify the paradigmatic relations and distinctive features of Lithuanian following these criteria and considerations:

1) We look for phonetic properties which would be common to all members of a single syntagmatic class, and distinguish these from members of other classes;

2) We propose as distinctive features distinguishing properties of members of correlations or correlation bundles;

3) We select phonetic properties common to all phonemes involved in the neutralization of certain oppositions;

4) We find properties distinguishing those phonemes which belong to the same syntagmatic classes and do not undergo neutralization;

5) We consider as inessential and therefore ignore those phonetic properties which distinguish optional or combinatory variants of phonemes, rather than phonemes themselves;

6) We maintain the view that the higher the position of a distinctive feature in a hierarchy of paradigmatic relations, the larger the syntagmatic classes characterized and distinguished by that feature; at the lowest level are distinctive features of neutralized oppositions, since archiphonemes functioning in positions of neutralization lack these.

§ 181. Of these criteria, the most universal is the fifth. Those who investigate any language should reject those phonetic features which distinguish phoneme variants, rather than independent phonemes.

For example, standard Russian has only five vowel phonemes: /i e a ɔ u/. But the sounds representing them are far more numerous. In stressed syllables alone one can hear long and short vowels, reminiscent of Lithuanian long and short vowel phonemes; often alongside a relatively pure [ɔ] there is a diphthongoid [ᵘɔ], similar to the Lithuanian gliding phoneme /uo/. However, neither long–short, nor gliding–non-gliding articulations are distinctive features in Russian, since these properties distinguish optional variants of the same phonemes, and therefore even in the best case can only have an expressive, rather than distinctive, function: [sʹíːɫə] and [sʹíɫə] (*сúла* 'strength'), [dúːmətʹ]

and [dúmət′] (*думать* 'think-INF'), [mᵘɔ́žnə] and [mɔ́žnə] (*можно* 'can') are the same words, since they have the same referential meaning.

The same can also be said regarding allophonic features. Even without going into the finer details, we can easily observe in Russian at least two clear allophones of every vowel phoneme, characterized by these phonetic properties:

/i/ { [i] – "front," "high," "unrounded"
       [ы] – "non-front," "high," "unrounded"

/u/ { [u] – "non-front," "high," "rounded"
       [ü] – "front," "high," "rounded"

/a/ { [a] – "non-front," "low," "unrounded"
       [æ] – "front," "low," "unrounded"

/ẹ/ { [ẹ] – "front," "mid," "unrounded"
       [ɛ] – "non-front," "mid," "unrounded"

/ɔ/ { [ɔ] – "non-front," "mid," "rounded"
       [ɔ̈] – "front," "mid," "rounded"

The allophones [i], [ü], [æ], [ẹ], [ɔ̈] occur after, and especially between, soft consonants (for example: *пи́ли* 'drink-3PL.PST', *лю́ди* 'people', *пять* 'five', *петь* 'sing-INF', *тёть* 'aunt-GEN.PL'); the allophones [ы], [u], [a], [ɛ] ([ə]), [ɔ] occur after hard consonants and (except for an initial consonant) after a pause (for example: *пыл* 'ardor', *луг* 'meadow', *дать* 'give-INF', *э́тот* 'this', *тот* 'that').

Glancing over the list of features, we see that the phonetic feature pair "front"–"non-front" can never serve as a distinctive feature of the oppositions /i/ : /u/, /e/ : /ɔ/, since it distinguishes only allophones of these phonemes. The true distinctive features of these oppositions are "rounded"–"unrounded," since only they are common to all allophones of the corresponding phonemes; they remain after both hard and soft consonants. All allophones of /i/ and /e/ are unrounded, and all allophones of /u/ and /ɔ/ are rounded.

This is also the situation in those eastern and southern Lithuanian dialects in which /a/ and /e/ (/æ/) no longer contrast (cf. § 59, table 6), and in which the phonemes /i/, /i·/, /ẹ·/ have the non-front allophones [ɨ], [ы·], [ɛ·], etc., and the phonemes /u/, /u·/, /ɔ·/ have the

nearly front allophones [ù], [ù·], [ɔ̀·], etc., cf. SAukšt. *k̂ȧ̃ũ.ʰ̩·* "*kiaũlę*" 'pig-ACC.SG', *lẽ·kę·* "*lẽkė*" 'fly-3PST', EAukšt. Utena *dur̃ù* "*duriù*" 'stab-1SG.PRS', *gal̂ù* "*galiù*" 'be able-1SG.PRS'. Here as well, the distinctive feature of the oppositions /u/ : /i/, /u·/ : /i·/, /ɔ·/ : /ę·/ may be just lip-rounding, rather than tongue advancement (that is, the features "rounded"–"unrounded," rather than "front"–"non-front"; cf. [Avanesov 1956: 88]). This is especially clear in the Kupiškis dialect, where [à] and [ę], [à·] and [ę·] have become allophones of the same two phonemes (/e/ and /e·/): *sȧ.nɑs* "*sẽnas*" 'old' : *ŝ̩.n̂i.s* "*sẽnis*" 'old man', *bȧ́ga* "*béga*" 'run-3PRS' : *b̩̂·ĝi* "*bégi*" 'run-2SG.PRS' (cf. also [Kosienė 1978: 37–38; Girdenis 1979a (= Girdenis 2000c: 348)]).

Occasionally, however, certain rare optional variants must be ignored. In many North Žemaitic dialects, for example, the phonemes [k g] are sometimes optionally pronounced [x γ] before plosives and also (somewhat less often) between vowels: *ràktâ·* "*rãktai*" 'keys' → <ràxtâ·>, *łáugdâ.ms* "*láukdamas*" 'while waiting' → <łáuγdâ.ms>, *sakâ·* "*sakaĩ*" 'say-2SG.PRS' → <saxâ·>, *išâ.ug^a* "*išáugo*" 'grow up-3PST' → <išâ.uγ^a> (Telšiai). If these are taken into account, we would have to reject such typical consonantal features as "fricative"–"plosive."

§ 182. Changes in distinctive features (or the nature of an opposition) play a large role in a language's development, and are therefore referred to in diachronic phonology by the special term rephonologization (or transphonologization) (see [Jakobson 1962: 209–212; Stepanov 1966: 235; Postovalova 1978: 108–109; Steponavičjus 1976: 242–243; 1982b: 40–41]). Thus, in comparison with standard Lithuanian and the East Baltic proto-language, a rephonologization of oppositions of the type /u/ : /i/ has taken place in the southern and eastern dialects of Lithuanian: tongue advancement features have been replaced by lip-rounding features. This is very typical of phonological systems which have a timbre correlation (that is, which distinguish hard and soft consonant phonemes).

Rephonologization (or transphonologization) is distinguished from dephonologization—the loss of an opposition (cf. the above-mentioned merger of /a/ and /e/ in Lithuanian dialects) [Jakobson 1962: 205–207; Stepanov 1966: 233; Postovalova 1978: 108–109; Steponavičjus 1973: 165; 1982a: 40], and from phonologization—the transformation of allophones into independent phonemes [Jakobson 1962: 207–209; Stepanov 1966: 234–235; Postovalova 1978: 108–116; Steponavičjus 1975: 243; 1982a: 41–42] (cf. Russian /t′/ in cases of the type *быть* 'be-INF', which arose from a softened allophone of the phoneme /t/ with the disappearance of the reduced vowel *ь*, which had conditioned this softness; on similar phenomena in Lithuanian dialects, see [Girdenis 1983a (= Girdenis 2000c: 290ff.)]).

§ 183. The other criteria are suitable only for languages in which a finer syntagmatic classification of phonemes is possible.

If a language distinguishes only vowel and consonant syntagmatic classes, and has practically no neutralization, we can motivate only the most elementary distinctive feature pair "vocalic"–"consonantal" or "vocalic"–"non-vocalic" on the basis of these criteria. Other features must be sought, guided only by purely phonetic, logical, or other non-phonological considerations (cf. also § 185).

Since sounds have a great many varied physical (acoustic and articulatory) properties, we cannot establish a single and necessary system of distinctive features for such languages. Even if the same distinctive features were selected, the question of their hierarchy would remain unanswered. If we arrange a hierarchy in one way, we will have one kind of model of paradigmatic relations; if we arrange it differently, we will have a different sort of model; and if a third way, still another different model. We can find the number of possible models by applying the formula $m = P!$, where m is the number of the models, P is the number of paired distinctive features, and $!$ is the factorial (i.e., the product of $1 \cdot 2 \cdot (\ldots) \cdot (P–1) \cdot P$).

§ 184. Let us take as an example the most impoverished of all known consonantal systems, Hawaiian /ʔ h p k w m n l/ (see § 102).[124] Recall that there are no consonant clusters in this language, and therefore a syntagmatic classification of these phonemes is impossible.

Let us assume that it is generally accepted and entirely clear that /ʔ h/ contrast with the remaining phonemes as glottals to non-glottals, /p k ʔ/ as plosives to non-plosives, /m n/ as nasals to non-nasals, /p m w/ as labials to non-labials; that is, all phonemes are identified by these distinctive feature pairs: "glottal"–"non-glottal," "plosive"–"non-plosive," "nasal"–"non-nasal," "labial"–non-labial."

In changing the hierarchical order of these features, we can obtain ever-differing models of paradigmatic relations, illustrated by completely different tree diagrams.

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[124] This system is even poorer than the "universal" typological minimum established by Skalička [1967: 73]. It is true that recent literature (for example, [Roach 2002: 89f.]) mentions systems which completely contradict Skalička's theoretical reasonings; one of these has only eleven phonemes, the other as many as 141. The "maximum" seems particularly improbable; this seems to be the result of an incomplete phonological analysis.

1. If we choose the order in which the features have just been listed, we obtain the following picture of paradigmatic relations (see table 20).

Table 20. Matrix of Hawaiian consonant phonemes (model I)

No.	Features	Phonemes							
		/ʔ/	/h/	/p/	/k/	/m/	/n/	/w/	/l/
1	glottal (non-glottal)	+	+	–	–	–	–	–	–
2	plosive (non-plosive)	+	–	+	+	–	–	–	–
3	nasal (non-nasal)	0	0	0	0	+	+	–	–
4	labial (non-labial)	0	0	+	–	+	–	+	–

The following is a tree diagram of this classification (see figure 19).
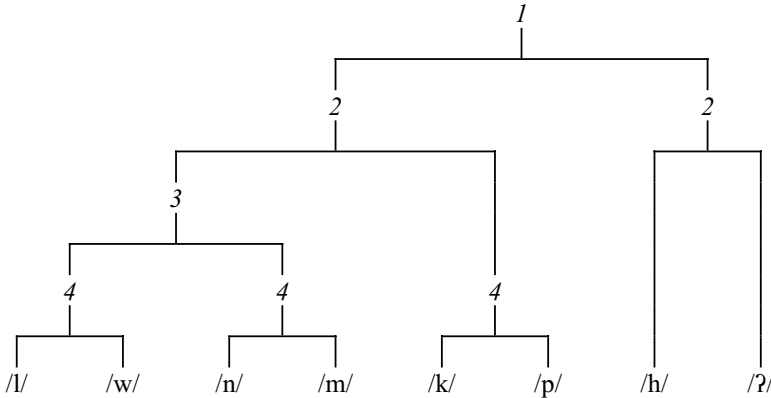
Figure 19. Tree diagram of Hawaiian consonant phonemes (model I)

2. Let us arrange the features in the opposite order: 1) "labial"–"non-labial,"   2) "nasal"–"non-nasal,"   3) "plosive"–"non-plosive," 4) "glottal"–"non-glottal." The consonant matrix will now appear as follows (see table 21).

Table 21. Matrix of Hawaiian consonant phonemes (model II)

No.	Features	Phonemes							
		/ʔ/	/h/	/p/	/k/	/m/	/n/	/w/	/l/
1	labial (non-labial)	–	–	+	–	+	–	+	–
2	nasal (non-nasal)	–	–	–	–	+	+	–	–
3	plosive (non-plosive)	+	–	+	+	0	0	–	–
4	glottal (non-glottal)	+	+	0	–	0	0	0	–

The tree diagram (see figure 20) is now quite unlike the first one.
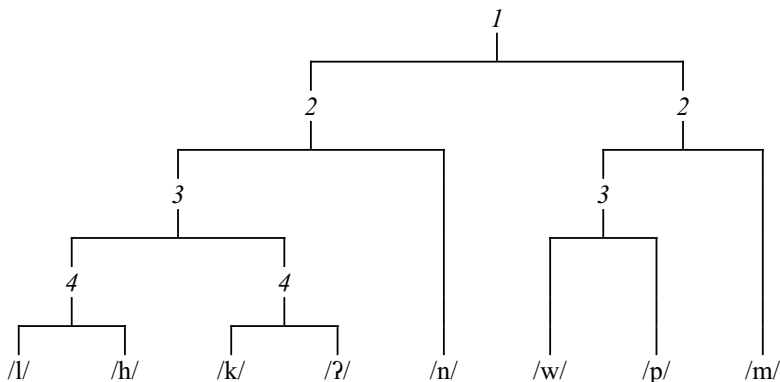
Figure 20. Tree diagram of Hawaiian consonant phonemes (model II)

3. We will obtain still another system if we arrange the features in this order: 1) "plosive"–"non-plosive," 2) "glottal"–"non-glottal," 3) "labial"–"non-labial," 4) "nasal"–"non-nasal." The phoneme matrix would turn out as follows (see table 22).

Table 22. Matrix of Hawaiian consonant phonemes (model III)

No.	Features	Phonemes							
		/ʔ/	/h/	/p/	/k/	/m/	/n/	/w/	/l/
1	plosive (non-plosive)	+	−	+	+	−	−	−	−
2	glottal (non-glottal)	+	+	−	−	−	−	−	−
3	labial (non-labial)	0	0	+	−	+	−	+	−
4	nasal (non-nasal)	0	0	0	0	+	+	−	−

The tree diagram (see figure 21) now differs from both the first and the second.

Still other models of this consonant system are possible (the total number of models is 4! = 1·2·3·4 = 24).

§ 185. There are no arguments which would lead us to prefer any one model out of all possible groupings and models. Nevertheless, the choice of a model does not need to be subjective, even in such extreme cases.

First, we can turn for help to the data of language typology, giving priority to those solutions supported by the phonological systems of many languages. In particular, related languages of somewhat differing structure should be taken into account. Secondly,
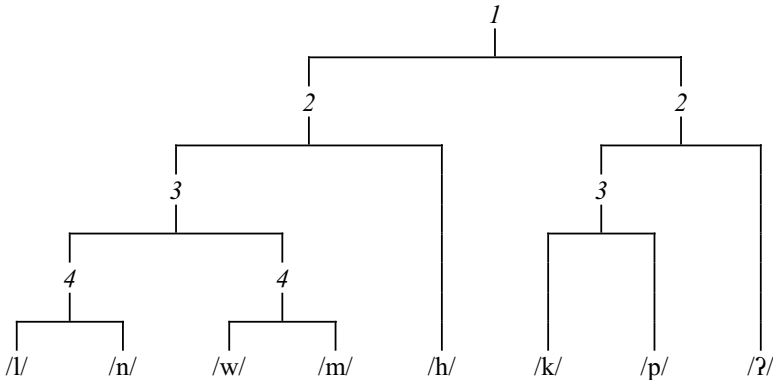
Figure 21. Tree diagram of Hawaiian consonant phonemes (model III)

studies of phoneme frequency can be of great value in such cases (see, for example, [Širokov 1961; Klyčkov 1962; 1984]). For example, knowing that unmarked members of oppositions are usually more frequent than marked members (see § 144), we can confidently assign positive distinctive features to less frequent phonemes and negative features to more frequent phonemes. Thirdly and finally, the number of possible interpretations can be greatly reduced by listening (psycho-acoustic) experiments, and also by studying various euphonic devices of folkloric and individual poetic works—rhymes, alliteration, asso-nance—combined with appropriate techniques for evaluating the results statistically (§ 176 and references, and also [Horálek 1965: 366]). Such studies would reveal auditory properties of phonemes perceived by members of a speech community themselves and the classes which, as noted above (see § 177), are close to those natural classes of phonemes revealed by syntagmatic relations. Occasionally in identify-ing and grouping distinctive features, the above-mentioned principle of grammatical expediency (§ 59) is taken into consideration (for example, [Palková 1967]). Even diachronic works, especially those on diachronic typology, can be valuable (for example, works such as [Serebrennikov 1974]; cf. [Kurath 1957: 114; Labov 1966: 103]).[125]

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[125] Noteworthy in this regard are Foley's attempts [Foley 1970; 1977] to establish a universal hierarchy of phoneme features based on their relative dia-chronic stability. The actual results which he has obtained thus far are neither very new, nor quite original (see, for example, [Brakel 1980: 178 et passim]), but the research direction itself seems quite promising (cf. [Klyčkov 1984]).

Only at the very last stage of research can we refer to the data of instrumental phonetics. We assign instrumentally obtained character-istics to phonemes and phoneme classes which have already been iden-tified and classified (cf. [Hammarström 1966: 27; Panov 1979: 44]).

§ 186. With this in mind, we must very carefully and soberly assess armchair phonological research, conducted on the basis of texts of limited scope (so-called corpora) transcribed by others, or on the basis of traditional phonetic descriptions. Most often these are tenta-tive constructions, presenting one of several equally valid or invalid options.[126] Especially suspect are works of this type devoted to entire families of previously little-studied languages.

d) MODELS AND TYPES OF PARADIGMATIC RELATIONS

§ 187. The most versatile model of paradigmatic relations is the above-mentioned tree diagram. It is quite convenient first of all because it is suitable for a wide range of phonological (and not just phonological) systems; it allows them to be visualized and interpreted according to the same principles, and therefore highlights commonali-ties and differences among various systems. But what most increases the value of the tree diagram is that it does not differ in form from dia-grams illustrating syntagmatic relations of various linguistic units.[127] No other model so clearly shows the close connections between the syntagmatic and paradigmatic plane of a phonological system, and so nicely reveals the isomorphism of various areas of a linguistic system. Especially informative are the tree diagrams of those phonological systems in which syntagmatic classes are also paradigmatic classes. These models are also convenient in that they coincide structurally with the hierarchical diagrams of listening experiments (see, for example, [Pakerys 1974a: 45–46 and references]).

Tree diagrams do have certain shortcomings, however. First, they impose a hierarchical order of distinctive features, even when there is in fact no such order (cf. § 184). Second, they are not as

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[126] Among these, unfortunately, are also some works on Lithuanian phonol-ogy (for example, [Matthews 1958; Schmalstieg 1958; Kazlauskas 1966]).

[127] The diagrams of stratificational linguistics (for example, [Lamb 1966: 9ff.; Lockwood 1972a: 32ff.]) are only a more complex version of tree diagrams.

visually clear and convenient as some other models; they always need to be supplemented by phoneme matrices.

§ 188. Distinctive feature tables, borrowed from classical phonetics, are models of paradigmatic relations which are more visual and compact than tree diagrams. The columns represent certain features (tongue advancement for vowels, lip-rounding, place of articulation for consonants), and the rows, other features (tongue height for vowels, manner of articulation for consonants, etc.).

For example, we can present the phonological system of standard Lithuanian vowels in the following table (see table 23; marginal phonemes are given in brackets " < > "). In terms of content, it is fully isomorphic with the matrix (table 19) presented in § 178 and the tree diagram, but far surpasses these in visual clarity.

Table 23. Vowel system of standard Lithuanian

Tongue height			Duration			
			long		short	
			front	non-front	front	non-front
non-low	high		/iˑ/	/uˑ/	/i/	/u/
	non-high	gliding	/ie/	/uo/		<ɔ>
		non-gliding	/ẹˑ/	/oˑ/		
low			/eˑ/	/aˑ/	/e/	/a/

The Lithuanian consonant system can be illustrated in the following table (see table 24).[128]

In comparison with tree diagrams, such tables better show a language's characteristic correlations and correlation series, but on the other hand, it is not as easy to see how many and what sort of distinctive features a certain phoneme has. Nor is the isomorphism of paradigmatic and syntagmatic relations as obvious. However, if we turn the table 90°, we can see that the phoneme classes are arranged approximately in the same order in which they occur in onset clusters; the harmony is disturbed only by the affricates, which come between /s š/ and /k t p/-type consonants. Nor does the position of foreign elements in the table show syntagmatic relations.

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[128] This, we can say, is the Lithuanian system in general: dialectal consonantism may differ from it only in minor points (cf. [Girdenis, Zinkevičius 1966: 141 (= Girdenis 2000b: 46f.); Zinkevičius 1978: 19]).

Table 24. Consonant system of Lithuanian

Manner of articulation			Place of articulation			
			labial	non-labial		
				apical		non-apical
				dental	palato-alveolar	
non-sonorant	fricative		\<f\> — \<f̂\>	/s/ — /ŝ/ | /z/ — /ẑ/	/š/ — /ŝ̌/ | /ž/ — /ẑ̌/	\<x\> — \<x̂\> | \<h\> — \<ĥ\>
	non-fricative	affricate		/c/ — /ĉ/ | /ʒ/ — /ʒ̂/	/č/ — /č̂/ | /ǯ/ — /ǯ̂/	
		plosive	/p/ — /p̂/ | /b/ — /b̂/	/t/ — \<t̂\> | /d/ — \<d̂\>		/k/ — /k̂/ | /g/ — /ĝ/
sonorant	nasal		/m/ — /m̂/	/n/ — /n̂/		
	non-nasal	fricative	/v/ — /v̂/	/j/		
		non-fricative		/l/ — /l̂/	/r/ — /r̂/	

§ 189. Based on tree diagrams, and especially tables, we can create quite simple two-dimensional models of phonological systems. Models such as triangles, quadrangles, and trapezoids are particularly popular for vowel systems. The vowel systems themselves are often called triangular, quadrangular, etc. (see, for example, [Trubetzkoy 1977: 87ff. = Trubeckoj 1960: 107ff.]).[129]

    The two-dimensional model is quite easily obtained. We agree, for example, that front or unrounded vowels are written in a column on the left, and non-front (back) or rounded vowels on the right; high vowels are written in a row at the top, and low vowels on the bottom, and in the middle rows, vowels of mid tongue height (in order of increasing aperture).

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    [129] There are also quite simple linear systems, whose members contrast only in tongue height (see [Trubetzkoy 1977: 87–88 = Trubeckoj 1960: 108–109; Kumachov 1967: 145; Lomtatidze 1967a: 103; 1967b: 125; Kumachov, Šagirov 1979: 134–135; Alarcos Llorach 1975: 60]).

Assuming these conventions, we can represent the Lithuanian vowel system as the following quadrangle (cf. [Trost 1965; Girdenis 1966a (= Girdenis 2000b: 309f.); Smoczyński 1978]):

/ī̆/   /ū̆/
/ie/   /uo/
/ę̄/   /ō/
/ę̆/   /ą̄/

If we wish to highlight long and short vowel oppositions, we can split this model into two quadrangles:[130]

/iˑ/   /uˑ/   /i/   /u/
/ie/   /uo/
/ęˑ/   /oˑ/   <ɔ>
/eˑ/   /aˑ/   /e/   /a/

The usual model of standard Russian vocalism in stressed syllables is a triangle:

/i/   /u/
     /e/   /o/
          /a/

This model is the most common across various languages (see, for example, [Hockett 1955: 85; Crothers 1978: 104, 117, 128 et passim]), except that /i/ and /u/, /e/ and /o/ most often contrast not as "rounded"–"unrounded," but as "front"–"back" (or, more precisely, as "front unrounded"–"back rounded"); the low vowel in these systems has neither a front nor a rounded counterpart. Such triangular systems are found, for example, in the Polynesian languages, mentioned several times above (see § 102), and also in contemporary Spanish, cf. [Alarcos Llorach 1975: 146], Georgian [Čikobava 1967: 26] and the Attic dialect of Modern Greek [Kibrik 1962: 83]. The Latin system differed only in that long and short vowels still contrasted (see [Tronskij 1960: 75]):

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[130] Vowel systems are most often represented in this way in diachronic and dialectal works, since long and short vowels rarely develop in parallel (see, for example, [Čekman 1979: 179ff.]).

It should be noted here that in recent borrowings, some speakers of standard Lithuanian use a short mid vowel [ę̆] (or [ę]), which because of its optional nature should be considered a marginal "Janus" phoneme <e/ę̆> (cf. § 66; see also [Ambrazas 1985: 19; 1997: 23 (= Girdenis 2001: 207)]).

$$/\breve{\bar{\imath}}/ \qquad\qquad /\breve{\bar{u}}/$$
$$/\breve{\bar{e}}/ \qquad /\bar{o}/$$
$$/\breve{\bar{a}}/$$

Such a system would also have existed in late Proto-Indo-European (after the so-called laryngeals merged with neighboring vowels; [Semeren'i 1980: 47]).

Modern Italian no longer distinguishes long and short vowels, but instead has a double series of mid-vowel phonemes [Lichem 1970: 53; Muljačić 1972: 26]:

$$/i/ \qquad\qquad /u/$$
$$/e/ \qquad\qquad /o/$$
$$/\varepsilon/ \qquad /\mathrm{o}/$$
$$/a/$$

Also quite frequent are triangular vowel systems in which not only front and back vowels contrast, but also front rounded and unrounded vowels (cf. [Crothers 1978: 100ff.]). The simplest example here would be the Mongolian vowel system mentioned by Trubetzkoy:

$$/i/ \qquad /\ddot{u}/ \qquad /u/$$
$$/e/ \quad /\ddot{o}/ \quad /o/$$
$$/a/$$

Among the more familiar languages, a contrast of front rounded and unrounded vowels is found, for example, in German, French, Danish, Swedish, Norwegian, and Icelandic: Ger. *Kiel* [kiːl] 'keel' : *kühl* [kyːl] 'cool', *lesen* ['leːzən] 'read-INF' : *lösen* ['løːzən] 'solve-INF', Dan. *hilde* ['hilə] 'fetter-INF' : *hylde* ['hylə] 'shelf', *gærde* ['g̊ɛːʁə] 'fence' : *gøre* ['g̊æːʁə] 'do-INF'.

The "middle" members of such systems can in fact be central vowels; this is the situation, for example, in Romanian, which has this vowel triangle (see [Vasiliu 1962: 86; Augerot 1969: 471]; here [î] ≈ [ы], [ă] ≈ [ə]):

$$/i/ \qquad /\hat{\imath}/ \qquad /u/$$
$$/e/ \quad /\breve{a}/ \quad /o/$$
$$/a/$$

The simplest example of a vowel system is perhaps the vocalism of Classical Arabic (see [Grande 1972: 383]):

$$/\breve{\bar{\imath}}/ \qquad /\breve{\bar{u}}/$$
$$/\breve{\bar{a}}/$$

It is true that numerous and varied allophones seem to compensate for an impoverished phonemic inventory here: the phoneme /a/ can be realized as [a ä å æ], /i/ as [i ɨ e ə], /u/ as [u ü o], etc. The word *mušabbadatin* 'prominent-GEN.PL', for example, is pronounced [mošäb'bädätin], *ṣirāṭa* 'road-NOM.PL' [ṣɨ'raːṭå], etc.

Generally speaking, from a typological standpoint, triangular systems are especially frequent; quadrangular systems are far less common (cf. [Crothers 1978: 101–102]. For a universal outline of the "development" and relations of different vowel systems, see [Stepanov, Ėdel'man 1976: 276ff.]). This is undoubtedly so because it is difficult to distinguish front and back articulations in low vowels (cf. [Fischer-Jørgensen 1981: 209]). Nor do these open pronunciations lend themselves well to lip-rounding, since a rounded articulation does not accord well with the openness of the mouth. Therefore, there is most often only a single low vowel.

Trubetzkoy (and occasionally Jakobson, see [Jakobson 1962: 224–225; Jakobson, Waugh 1979: 51]) depicted vowel triangles and quadrangles as if rotated 180°. For example, the above-mentioned Mongolian vowel system appears in his works as follows (see [Trubetzkoy 1977: 89ff. = Trubeckoj 1960: 112ff.]):

$$\begin{array}{ccc} & a & \\ e & \ddot{o} & o \\ i & \ddot{u} & u \end{array}$$
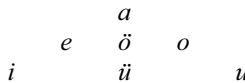
His system for Lithuanian vowels is this [Trubetzkoy 1929: 55]:

Vowels of high intensity		Vowels of low intensity	
ā	ē	a	e
o	ė		
ů	ë		
ū	y	i	u

The graphemes *ů ë* here denote /uo ie/ (cf. [Girdenis 1970b: 17; 1977: 192 (= Girdenis 2000c: 86)]).

Kazlauskas tended to indicate front vowels in a right-hand column and back vowels to the left, but he represented vowel height in the usual way. Let us compare his reconstructed East Baltic vowel system [Kazlauskas 1962] (cf.: [Mažiulis 1965: 56; 1970: 16–17]):

$$
\begin{array}{cccc}
\bar{u} & \bar{\imath} & u & i \\
\bar{o}_1 & \bar{e}_1 & o & e \\
\bar{o}_2 & \bar{e}_2 & &
\end{array}
$$

Finally, a model such as this is also possible:

$$
\begin{array}{ccc}
i & & \\
 & e & \\
 & & a \\
 & o & \\
u & &
\end{array}
$$

Here the vowel triangle agrees with an acoustic picture of the vowel system obtained by representing the values of the first two spectral formants in the first quadrant of a coordinate system (see, for example, [Čikobava 1967: 26; Muljačić 1973: 115–116]).

Of course, there is no essential difference between one visual representation of a system or another, but for this very reason it is best to adhere to traditional, generally accepted conventions.

It is more difficult to represent consonant systems with two-dimensional models, since these phonemes are usually far more numerous than vowels, and their relations are not as simple and symmetrical. However, such models are possible in principle; we simply need to be clear about where we will indicate what type of phoneme (see, for example, [Ambrazas 1985: 34; 1997: 29 (= Girdenis 2001: 215)]). It is quite common to depict certain consonant subsystems as two-dimensional models (see the correlation bundles presented in § 151).

§ 190. Phonological systems can be represented quite nicely in three-dimensional models. The first to use these was apparently the German phonetician Jörgen Forchhammer (see [Ungeheuer 1962: 22–24]). In the period 1960–1970, they were very popular with Soviet phonologists (see, for example, [Piotrovskij 1960; 1966; Evdošenko 1963; Mel'nikov 1966; Padlužny 1969: 129 and 201; Perebyjnis 1970: 54–55]).[131]

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[131] For a criticism of these models (in many respects unfounded), see [Voronkova 1981: 84 and especially 71–72]. The fact that some tend to make a fetish of such models does not mean that they are generally unsuitable. Observing certain conventions, we can convey even quite subtle nuances of phonetic and phonemic relations with three-dimensional models (see, for example, [Girdenis 1967b: 142, 199 ≈ Girdenis 2000b: 126, 158]).

The following, for example, could serve as a three-dimensional model of the vowel system of standard Lithuanian (see figure 22).
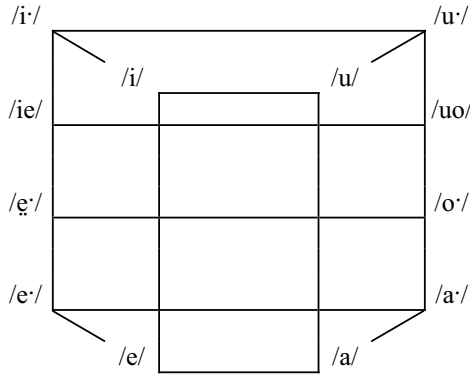
Figure 22. Three-dimensional model of the vowel system of standard Lithuanian

The top plane of this figure shows the high vowels /i·–u·–u–i/, the bottom plane, the low vowels /e·–a·–a–e/, the left plane the front vowels /i·–i–e–e·/, the right plane the back vowels /u–u·–a·–a/, the front plane the short vowels /i–u–a–e/, and the rear plane the long vowels /i·–u·–a·–e·/.

Three-dimensional models can also nicely illustrate paradigmatic relations of consonant phonemes, especially subsystems of these phonemes linked by proportional oppositions. Here is what a three-dimensional model of Sanskrit plosives would look like (see figure 23; cf. § 149).
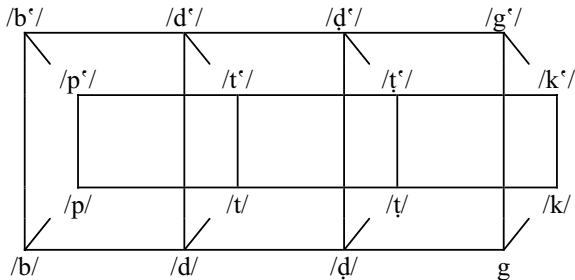
Figure 23. Three-dimensional model of Sanskrit plosives

At the top of the model we have the aspirated consonants; at the bottom, non-aspirated. The rear plane shows voiced consonants; the

front plane, voiceless. The first vertical section depicts labials; the second, dentals; the third, cerebrals (retroflex consonants); and the fourth, velars (dorsals). These sections also show the already-familiar correlation bundles.

Three-dimensional models can also depict entire phonological systems. However, they are not as simple and straightforward as tree diagrams or two-dimensional models, and apparently for this reason are not all that common in phonological studies.

e) THE BINARY DISTINCTIVE FEATURE SYSTEM AND PRINCIPLES OF DICHOTOMOUS PHONOLOGY

α) ORIGIN AND ASSUMPTIONS

§ 191. In examining syntagmatic relations, we necessarily obtained binary divisions of phoneme classes: one class always had a certain positional characteristic and the other class did not. For example, characteristic of the *R*-class (sonorants) is that in onset clusters, its members only occur directly before vowels, while other consonants can occur elsewhere; vowels are those phonemes which can form the nucleus of a syllable, while consonants are those phonemes which cannot, etc.

Since we assigned distinctive features first of all to syntagmatic phoneme classes, we also had to group them according to the same principle: one class always received a positive feature and the other a negative feature. As a result, the features were grouped in certain binary pairs (from Fr. *binaire* 'binary' ← Lat. *bini* 'two each; a pair'), for example: "sonorant"–"non-sonorant" ("obstruent"), "fricative"–"non-fricative," etc. We also had to group members of neutralizable oppositions (correlations): the marked members received positive features and the unmarked members, negative features. Even the ordering of the features "gliding"–"non-gliding" ("uniform") of the oppositions /ẹ·/ : /ie/, /o·/ : /uo/ is not completely arbitrary, although they do not undergo neutralization. In this case, statistics for these phonemes indicate the marked and unmarked members: in connected speech, /ẹ·/ is twice as frequent as /ie/, and /o·/ is eight times as frequent as /uo/ (cf. § 144, and also Appendix 4 and [Karosienė, Girdenis 1993 (= Girdenis 2001: 64ff.)]).

Thus, if in examining paradigmatic relations we take into account syntagmatic phoneme relations and the effects of neutralization, all oppositions can and must be considered binary and privative: one member has a certain positive distinctive feature, while the other lacks it (or has its complement, its diametric opposite).

This principle is the so-called dichotomous basis for phonology (from Gk. διχοτομέω 'I cut in half, I divide in two').

Despite the strong criticism that this theory has received (see, for example, [Martine 1960: 101–102; Reformatskij 1961; Lomtev 1965; Kuznecov 1966; Revzin 1970]), it has been accepted by many phonologists and by linguists generally.[132] Quite a few works have appeared which are based on the dichotomy principle or at least apply certain of its technical methods (see, for example, [Muljačić 1972: 26–27; 1973: 61ff.; Alarcos Llorach 1975: 76–86, 178–179]; for a critical survey, see [Širokov 1965]; on its further development, see [Toporov 1966; Padlužny 1969; Perebyjnis 1970; Lekomceva 1972; Panov 1979: 56–68; Steponavičjus 1979; 1982a: 13–35; Klyčkov 1984]).[133]

§ 192. The main theses of dichotomous phonology had already been already formulated before the Second World War by the celebrated theoretician of the Prague Linguistic Circle, Roman Jakobson. In 1938, he officially expressed for the first time the idea that the great variety of phonological oppositions, presented with particular clarity in the works of Trubetzkoy,[134] can be described and interpreted by a

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[132] The attempt to follow an alternative ternary principle (for example, [Lekomceva 1966]) was doomed from the start, since most oppositions are surely not ternary and cannot be converted into these.

[133] Almost all Lithuanian phonological research is close to this approach (for example, [Kazlauskas 1966; Girdenis 1967b (≈ Girdenis 2000b: 89–160); 1971b (= Girdenis 2000b: 211ff.); 1975a; Plakunova 1967; 1968; Pakerys 1974a; Kosienė 1978]; cf. also the theoretical works of Steponavičius, mentioned in the main text).

[134] In Trubetzkoy's *Grundzüge der Phonologie* [Trubetzkoy 1977: 60–69 = Trubeckoj 1960: 74–85] the following types of oppositions are distinguished: 1) based on a relation with an entire system of oppositions: bilateral and multilateral, proportional and isolated; 2) based on interrelations among members of an opposition: privative, equipollent and gradual. Forming a special set are neutralizable oppositions (a correlation is a concrete case of these; see [Trubetzkoy 1977: 69–78 = Trubeckoj 1960: 85–96]).

Bilateral oppositions exist between phonemes whose shared features are characteristic only of those two phonemes, for example Lith. /t/ : /d/ (the Lithuanian

rather small number of binary acoustic or auditory features (for the initial formulations of the principles, see [Jakobson 1962: 272ff.; 280ff.]; cf. [Ivanov 1962; Fischer-Jørgensen 1975: 145ff.]). This theory acquired its final form in the post-war years in the the works of Jakobson and his colleagues (see [Jakobson, Fant, Halle 1972; Jakobson, Halle 1962]; also in Russian: [Jakobson, Fant, Challe 1962: Jakobson, Challe 1962]; see also [Čerri, Challe, Jakobson 1962]).[135]

As an obvious example, Jakobson adduces standard Turkish vocalism, which consists of eight phonemes: /i æ ɨ a y œ u ɔ/ [Jakobson 1962: 302–303; Jakobson, Waugh 1979: 146–148] (cf. also [Glison 1959: 236; Dmitriev 1960: 15; Mel'nikov 1966]). If we consider the relation between each pair of these phonemes as an opposition, we would need to recognize the possibility of twenty-eight phoneme oppositions. If we adopt the binary principle and segment

system does not have any other apical plosives). The shared features of multilateral oppositions also characterize other oppositions, for example Lith. /b/ : /g/ (there are other voiced plosives in the system). Proportional refers to those oppositions whose members are related in the same way as members of any other opposition, and isolated refers to those oppositions where the relations of the members do not characterize any other opposition. The Lithuanian opposition /t/ : /d/ is proportional (cf.: /t/ : /d/ = /k/ : /g/, etc.), while the opposition /s/ : /j/ is isolated.

Privative oppositions are those in which one of the members has a positive feature which the other lacks (cf. § 145). Members of an equipollent oppositions are equivalent in this regard, cf. Lith. /j/ : /v/. Gradual refers to oppositions in which the members differ in the degree of the same articulatory feature, cf. /i/ : /e/ : /æ/ (the vowels here differ in degree of openness and tongue height).

For an alternative classification of features proposed by representatives of the Moscow Phonological School, see [Reformatskij 1961: 114–116 and references]. Cf. also [Pauliny 1966: 123–124 et passim; Klyčkov 1984], where it is convincingly demonstrated that an analysis of the effects of neutralization and phonostatistical data allows us to convert gradual and equipollent features into privative ones.

An analysis of the syntagmatic and paradigmatic relations of Lithuanian phonemes automatically seems to distinguish these preliminary types of oppositions: 1) correlations and correlation bundles, 2) syntagmatically motivated oppositions, 3) statistically motivated oppositions, 4) typologically motivated oppositions (see § 144, fn. 79), 5) non-motivated oppositions. The latter class is empty, which is apparently the case in many languages.

[135] On the views of Lithuanian linguists regarding this phonological approach, see fn. 133.

the phonemes into distinctive features, only three oppositions remain: 1) "close" (/i ɨ y u/)–"open" (/æ a œ ɔ/), 2) "front" (/i æ y œ/)–"back" (/ɨ a u ɔ/), 3) "rounded" (/y u œ ɔ/)–"unrounded" (/i ɨ æ a/).

Not all phoneme classes and systems are so ideally symmetrical, and therefore, in addition to binary oppositions, we almost always encounter oppositions of several members (especially ternary, that is, three-member oppositions, cf. Lith. /k/ : /t/ : /p/). But Jakobson and others showed that even these oppositions can be made binary, if articulatory features are replaced by auditory or acoustic features. Thus in many languages, the plosives form a /k t p/-type triad, based on place of articulation; the system of nasal sonorants may be similar, cf. Eng. /ŋ n m/. Acoustic experiments and observations of the auditory impression produced by sounds show that such sounds as [k] differ from [t p]-type sounds in their greater salience: if we pronounce all these sounds with the same effort, [k] will be heard better than [p] or [t]. [ŋ] contrasts with the consonants [n m] in a similar way, and in the fricative obstruent set [š s f], [š] is the most salient. [t], in turn, differs from [p], [n] from [m], and [s] from [f], in their higher timbre. Differing in a similar way are [t] : [k], [n] : [ŋ], [s] : [š]: the left member of these pairs likewise seems to be of higher timbre than the right member. These triads can therefore be characterized by the following tentative pairs of binary auditory features: 1) "salient"–"non-salient," 2) "high"–"low." The consonants [k ŋ š] contrast with other consonants of their classes as more salient sounds to less salient, and [t n s] contrast with other members of their classes as higher to lower. Our triads have thus been split into two binary oppositions.

Comparing these consonant oppositions with corresponding vowel oppositions, we are struck by their great similarity: the same relations also exist between the most typical vowels, [a i u]. The vowel [a] is the most salient and thereby differs from the less salient [i u]; [i] in its higher timbre is clearly distinguished from [u]. Thus we can create quite analogical triangles for vowels and some consonants:

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/i/ — /u/        /t/ — /p/         /n/ — /m/         /s/ — /f/
  \  /      =      \  /       =      \  /       =      \  /
  /a/              /k/               /ŋ/               /š/
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§ 193. These and similar facts were the best proof that the binary principle allows us to reduce the number not just of oppositions, but of

distinctive features themselves, since the acoustic and auditory impression produced by certain differing articulations proved to be, if not quite uniform, at least very similar. For the first time, the similarity of vocalic and consonantal phonological systems became clear; it turned out that their principal oppositions are essentially the same, and are based on the same distinctive features. Moreover, it was immediately noticed that the auditory and acoustic distinctive features of many languages are very close.

On the basis of these observations, and likewise careful studies of phonetic development and degradation among children and aphasics (people suffering from certain speech deficits), Jakobson concluded that the phonological systems of all languages can be described by a quite limited number of universal (that is, of general significance and appropriate for all languages) binary distinctive features. He expanded this principal thesis and refined it in the post-war years, collaborating with specialists in acoustic phonetics and information theory.

The result of this research is a universal analytic phonetic "alphabet," consisting of a dozen or so binary phonetic features. In the opinion of the authors, these features would suffice to describe all phonological systems.[136]

Many features were named according to the image which the corresponding phonetic properties produce on a spectrogram; some retained their traditional auditory (impressionistic) or even articulatory terms. In all feature descriptions, the authors showed both their acoustic and articulatory characteristics, but emphasized everywhere that acoustic properties are more important than articulatory ones.

The creators of dichotomous phonology were also the first to introduce matrices and tree diagrams as the most versatile models for phonological systems.

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[136] Phonologists have generally disputed not the principle itself, but the number and nature of the features. Of such works, we should first of all mention [Fant 1964; Ladefoged 1967: 50ff.; 1973; 1975: 240–267], and also the numerous studies done in the generative approach ([Chomsky, Halle 1968: 298–329] and others; cf. [Širokov 1965: 96, 97; Bondarko, Zinder 1966: 10–14; Gaprindašvili 1970; Džaparidze 1979; Steponavičjus 1979; Kodzasov 1982]). Jakobson himself remained true to his own system up to the end; see his final major work, written together with Waugh [Jakobson, Waugh 1979] (cf. the review, [Fischer-Jørgensen 1981]).

β) SOME REMARKS CONCERNING RESEARCH
ON THE ACOUSTIC PROPERTIES OF SOUNDS

§ 194. Contributing greatly to the theory of binary distinctive features were the development and achievements of acoustic phonetics.

Already in the pre-war period, phonologists had raised the correct idea that distinctive features should be acoustic, since, after all, people perceive and learn sounds on the basis of their acoustic effect, rather than their articulatory properties.[137] However, they were forced to contradict themselves and rely on articulatory sound features, since at the time there were not yet any instruments which would allow them to easily obtain reliable acoustic characteristics of sounds. It is true that they could have used oscillograms; certain mathematical methods (for example, Fourier analysis)[138] had already made it possible, using oscillograms, to establish comparatively accurate parameters of sound spectra (that is, sound qualities), especially vowels. But this was achieved only at the cost of very time-consuming calculations. Work was also done with sets of tuning forks, and with various resonators and their highly demanding systems. Even under these conditions, researchers learned much about the acoustic nature of speech sounds; especially noteworthy here is the work of Karl Stumpf. But more extensive acoustic research on various languages was out of the question.

§ 195. The situation changed fundamentally after the war with the invention of a speech-sound spectrum analyzer, or spectrograph,[139]

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[137] The first to write about the priority of acoustic features with regard to articulatory features was Baudouin de Courtenay (cf. [Šaradzenidze 1980: 60]). This priority was adopted theoretically (but far from always in practice), even proclaimed, by the Prague Linguistic Circle (see [Tezisy 1960: 72]; cf. [Trubetzkoy 1977: 82–63 = Trubetzkoy 1960: 101–102]); Sapir's view was similar [Sapir 1949: 46, fn. 3 = Sepir 1993: 60, fn. 3]. In seeking to overcome the conflict between acoustic and articulatory aspects of phonology, there have been attempts to return to contemporary linguistics Baudouin de Courtenay's nearly forgotten concept of *kinakema* (cf. [Boduėn de Kurtenė 1963: vol. 2, 326–327]), a sort of synthesis of articulatory and acoustic distinctive features [Plotkin 1979; 1982 and others].

[138] Interestingly, the sound-signal spectrum obtained with computers is in fact based on the Fourier analysis method.

[139] On the principles of how these devices operate and their capabilities see, for example, [Fant 1964: 217ff.; Flanagan 1968: 170–176; Jassem 1973: 165–

a device which separates complex sound waves, converted by microphone to electrical vibrations, into simple component vibrations and permits quantitative characteristics of these vibrations—frequency, intensity, and duration—to be observed on a screen and captured on motion-picture film or on special paper. The images of acoustic properties obtained in this way are called spectrograms.

A more detailed description of the spectral characteristics of sounds and the operating principles of a spectrograph would take us too far from phonology. Here it should simply be recalled that on a spectrogram so-called formants correspond to qualitative differences among vowels and sonorants (see, for example, [Ladefoged 1996: 94ff. et passim; Grigor'ev 1962]). These are zones in which certain frequencies are enhanced, and which depend on resonating chambers formed in the mouth and, in part, the nose, and their interrelations (see [Ungeheuer 1962; Grigor'ev 1962: 114; Fant 1964: 39, 114, 202; Ferrero 1974]). The phonological characteristics and distinctive features of sounds of this type are determined by the first two formants (abbreviated F1 and F2); other formants (F3, F4, etc.) generally convey only expressive information or individual voice properties (cf. [Romportl 1968; Zinder 1979: 176]).

The spectrum of vowels depends to a considerable degree on the individual speaker and the shape and size of the speaker's vocal tract.[140]

182; Zinder 1979: 23–25, 170–179] (cf. also the discussion on methods for processing spectrographic data: [Piotrovskij 1960; Nork, Murygina, Blochina 1960; Kibrik 1962; Piotrovskij, Podlužnyj 1966]).

Spectral analysis of sounds has for many years been conducted in Lithuania as well. Work was long done using a standard Sona-Graph 7029-A spectrograph (Kay Electric Co.), and especially the 55-channel KPI-69 spectrum analyzer belonging to the Experimental Phonetics Laboratory (now part of the Department of Baltic Studies—TRANS.) at Vilnius University and constructed by the Kaunas Polytechnical Institute. We are currently switching to computer analysis, since all functions of a spectrogram and even a speech synthesizer are easily "imitated" by special computer programs (on the principles and methods of such analysis, see [Ladefoged 1996: 152ff.]). In Lithuania, the KALBAME 'We talk' system of P. Kasparaitis and V. Undzėnas is most often used, as well as the PRAAT program, created by the Dutch scholars P. Boersma and D. Weenink and still being refined, which Dr. Boersma kindly allowed us to use.

[140] An individual voice can in fact also be defined by the concrete values of the first two formants (F1 and F2); cf. [Caliński, Jassem, Kaczmarek 1970;

But there always remain certain quite constant relations: [i]-type vowels have a very high second formant and a very low first formant; both formants of [u]-type vowels are relatively low; the first formant of [a]-type vowels is quite high and the second relatively low, not much removed from the first. For example, the long vowels of standard Lithuanian and the North Žemaitic dialect, as pronounced by male voices, have approximately the following basic formants[141] (see table 25; for clarity, the values of F1 have been rounded to the nearest 10 Hz and the values of F2 for the standard language have been rounded to the nearest 100 Hz).[142]

The spectral characteristics of vowels are closely associated with articulatory properties; much has been written on this in the literature on acoustic phonetics (for example, [Hockett 1955: 200; Glison 1959: 295; Haugen 1962; Ungeheuer 1962: 87; Fant 1964: 114; Romportl 1968: 18; Ferrero 1972: 11ff.; Jassem 1973: 192, 211; Podlužnyj 1980: 31–32]). If we plot the F1 values for North Žemaitic vowels on the *y*-axis of the third quadrant of a coordinate system and the F2 values on the *x*-axis, we obtain a picture of the vowel system (see figure 24) which coincides almost ideally with the usual vowel triangle reflecting their articulatory properties.[143]

Jassem 1968; 1973: 211]; on the effect of rate of speech on formants, see, for example, [Shearme, Holmes 1962; Łobacz 1976: especially 213].

[141] The measurements were performed at the Vilnius University Experimental Phonetics Laboratory, with Regina Kliukienė and Violeta Sakevičiūtė partici-pating.

[142] Greater accuracy would have been meaningless, since the analysis was done with a KPI-69-type spectrograph (see fn. 139), the low-pass filter range of which was 75 Hz and the high-pass filter range 150 Hz. In evaluating the results, it should not be forgotten that the F2 values for long rounded back vowels ([u·], [o·], etc.) are not very reliable (cf. [Ungeheuer 1968: 183; Iivonen 1970: 62]).

It should be noted here that the table presents averages calculated from large arrays. The results of the analysis of Žemaitic vowels were checked with a speech synthesizer at the Minsk State Institute of Foreign Languages (МГПИИЯ) by Bronius Svecevičius; speakers of the dialect identified the synthesized vowels quite well (see [Girdenis 1974: 169, fn. 16 (= Girdenis 2000b: 291, fn. 16)]).

[143] Long vowels are marked with a circle; short vowels with a black dot.

Approximately the same picture has been obtained by other researchers of stan-dard Lithuanian and its dialects (for example, [Svecevičjus 1964; Plakunova 1967; 1968; Girdenis 1974: 169 (= Girdenis 2000b: 291); Kačiuškienė 1982: 42–43]).

Table 25. Values of F1 and F2 for standard Lithuanian and the North Žemaitic dialect [144]

Language/dialect	Vowel	F1 (Hz)	F2 (Hz)	$C\cdot 1000$	T	Vowel	F1 (Hz)	F2 (Hz)	$C\cdot 1000$	T
Standard Lithuanian	[iˑ]	250	2400	709	1150	[i]	400	1900	794	500
	[ẹˑ]	450	2100	799	650					
	[æˑ]	750	1600	897	350	[e]	550	1700	848	250
	[aˑ]	900	1200	959	700	[a]	750	1300	923	350
	[oˑ]	550	800	944	750	[ɔ]	600	1100	913	500
	[uˑ]	300	600	829	1100	[u]	450	900	898	650
North Žemaitic dialect	[iˑ]	370	2330	763	960	[i]	310	2180	746	870
	[eˑ]	480	1940	816	460	[ẹ]	510	1810	831	320
	[eˑ]	670	1690	876	360	[e]	660	1730	870	390
	[aˑ]	660	1160	916	480	[a]	690	1320	964	370
	[ǫˑ]	490	1060	889	450	[ǫ]	500	1150	945	350
	[uˑ]	390	750	901	860	[u]	440	870	816	690

      We can see from this diagram that the first formant reflects the aperture and height of vowel articulation and the second formant represents tongue advancement (that is, the place of maximal tongue height, or more precisely, the resonating chamber formed between the place of tongue height and the lips).
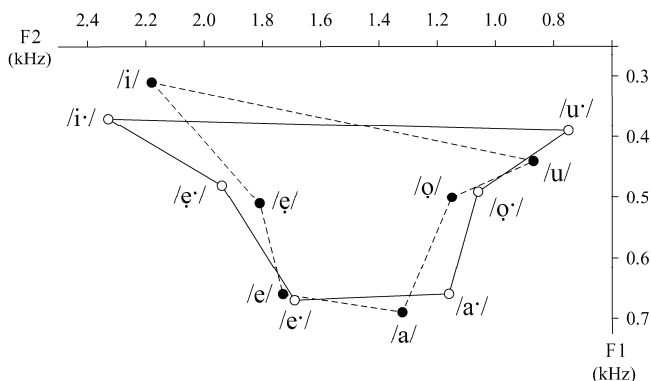
Figure 24. Spectral characteristics of North Žemaitic vowels

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[144] The table gives two important indices: compactness ($C\cdot 1000$; calculated according to Piotrovskij's formula [Piotrovskij 1960: 29]), and tenseness ($T = |F1 - 500| + |F2 - 1500|$, cf. § 200 and [Jakobson, Fant, Challe 1962: 176, 204–205]).

Of the consonants, only the sonorants have a clear formant structure, but even among these there are some (like [m] and [n]) which are properly distinguished only on the basis of certain spectral characteristics of neighboring vowels (cf. [Flanagan 1968: 290–291]). Obstruent spectra are formed by continuous frequency zones which can vary in duration, height, and intensity; the spectrum of [š], for example, is lower and far more intense than the spectrum of [s]. Plosive quality is more accurately shown not by brief bursts of spectral noise, but by the beginning or end of neighboring vowel formants: some consonants shift these in one direction, other consonants in another direction (see, for example, [Hockett 1955: 206–207; Mal'mberg 1962: 384–385; Delattre 1963: Frąckowiak-Richter 1970; Magno-Caldognetto 1979: 54; Jakobson, Waugh 1979: 93–94]).[145]

The very fact that some phonemes can be realized only by features of transitional regions of neighboring vowel segments clearly shows that the relations between phonological units and corresponding stretches of the speech signal are neither simple nor direct. Moreover, it has been convincingly demonstrated by reliable experiments that, for example, sounds having a fully identical spectral structure can be perceived differently if their phonetic surroundings differ (see [Ladefoged 1967: 103ff.; 1973]; cf. also [Nork, Murygina, Blochina 1962: 50; Fant 1964: 23–24; Fant 1970: 52–57; Jakobson, Waugh 1979: 48–49 et passim; Fischer-Jørgensen 1981: 205]); the reality of acoustic allophones has also been demonstrated (cf. [Jassem 1973: 112–118]). Furthermore, in most cases speech contains less acoustic information than would be needed for accurate identification of phonemes, but this goes unnoticed, since all of what is actually missing is reconstructed on the basis of context and the content of an utterance (see [Garnes, Bond 1977]).

Acoustic phonetics thus confirms rather than refutes the main postulate of classical functional linguistics: that phonological linguistic units are not absolute, but relative.

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[145] Some phoneticians recognized this even before the invention of the spectrograph (see, for example, [Junker 1938: 244], where it is claimed that [k t p]-type sounds create certain abrupt changes in vowel quality called *Anbruch*).

γ) BINARY DISTINCTIVE FEATURES

§ 196. The distinctive feature system established by Jakobson and his collaborators (Halle, Cherry, Fant and others) consists of twelve pairs of complementary or contradictory (opposite) phonetic characteristics, divided into sonority and tonality features.[146] Most of the features (nine) are assigned to the first group; the remaining three form the second group.

The sonority features are related to such prosodic properties as sound intensity and duration, and are defined by the amount of energy and its concentration in the spectrum. Tonality features are related to a sound's prosodic pitch, and depend on the frequency of formants or formant zones.

Let us examine these features in turn, without going into details, which can easily be found in the literature.

§ 197. The following pairs are assigned to sonority features: 1) "vocalic"–"non-vocalic,"   2) "consonantal"–"non-consonantal," 3) "compact"–"diffuse,"   4) "tense"–"lax,"   5) "voiced"–"voiceless," 6) "nasal"–"oral,"   7) "continuant"–"discontinuous,"   8) "strident"– "mellow," 9) "checked"–"unchecked."

Some of these terms have their ordinary meaning. These are first of all "voiced"–"voiceless" and "nasal"–"oral," but in works on dichotomous phonology they are defined acoustically as well as articulatorily. Voiced sounds, for example, are characterized by the presence of periodic vibrations in the low-frequency zone (the so-called zero formant, F0). The distinguishing property of nasal sounds is the dispersion of spectral energy over a broader frequency zone.

§ 198. Close to their usual meanings are also the features "vocalic"–"non-vocalic" and "consonantal"–"non-consonantal." The acoustic expression of the feature "vocalic" is distinct formants, contrasting with formants which are indistinct or completely absent. All vowels and nearly all sonorants have this feature, while most consonants lack it.

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[146] For a more detailed acoustic and articulatory characterization of these, see [Jakobson, Fant, Halle 1972: 18–42 = Jakobson, Fant, Challe 1962: 177–210; Jakobson, Halle 1962: 484–486 = Jakobson, Challe 1962: 254–258; Jakobson, Waugh 1979: 84–153] (cf. also [Fant 1964: 203–216; Muljačić 1973: 82–123; Panov 1979: 50–59]). Henceforth this literature will be indicated only when absolutely necessary.

The acoustic characteristic of the feature pair "consonantal"–"non-consonantal" is low overall spectral energy, contrasting with greater energy. Articulatorily speaking, these features are formed by the presence or absence of a clear point of articulation. All consonants, except for the so-called glides—[h j w]-type sounds—have the positive feature "consonantal." Hence, vowels are sounds which have the features "vocalic" and "non-consonantal"; obstruents are sounds with the features "non-vocalic" and "consonantal"; the sonorants [l m n r] have the features "vocalic" and "consonantal," and [h j w] are "non-vocalic" and "non-consonantal."

§ 199. The third pair of features, "compact"–"diffuse," corresponds to the above tentative auditory property "salient"–"non-salient." Characterizing the spectrum of compact sounds is a concentration of energy in a comparatively narrow central part of the spectrum, whence the feature's name. The spectral energy of diffuse sounds is dispersed in the non-central part of the spectrum; its formants are often quite distant from each other. For example, the first and second formants of the compact vowels [aˑ æˑ] are relatively close to the center of the spectrogram, which is 1000 Hz (see their compactness index of $C\cdot1000$, presented in § 195 table 25 and § 208); the first formant of the diffuse vowels is further removed from this frequency. The more compact vowels are, the lower their articulatory height; diffuse vowels are articulatorily high.

Compact consonants are those in which the main place of articulation is in the back or mid area of the mouth, that is, sounds of the type [k g], [k̂ ĝ], [š ž], as well as the so-called liquids ([l r]-type sounds). Diffuse consonants are produced with a relatively closed mouth, that is, their main place of articulation is in the front of the vocal tract.

Since many languages have vowels of three, rather than two, heights, this feature pair is often divided into two separate pairs: "compact"–"non-compact" and "diffuse"–"non-diffuse." Mid vowels are then defined with the features /"−compact" & "−diffuse"/.

§ 200. The fourth feature pair, "tense"–"lax," together with quantitative features, differentiates the Lithuanian vowel phonemes /iˑ/ : /i/, /uˑ/ : /u/, for example (cf. § 176 and references).

The formants of tense vowels are more distinct than those of lax vowels and further removed from a neutral position, considered to be

the spectrum for an [ə]-type vowel (its characteristics for a male voice are approximately F1 = 500 Hz, F2 = 1500 Hz, F3 = 2500 Hz; the female voice equivalents are 550, 1650, 2750 Hz [Jakobson, Fant, Halle 1972: 18 = Jakobson, Fant, Challe 1962: 176; Ungeheuer 1962: 86–87]). From an articulatory standpoint, tense sounds are also further removed from a neutral position than lax sounds. Thus, tense high vowels are a bit higher than lax vowels, and tense low vowels are lower. Tense sounds are also usually of greater duration; in addition, tense plosives can be aspirated.

§ 201. The seventh feature pair, "continuant"–"discontinuous,"[147] is the acoustic equivalent of the usual features "fricative"–"plosive" and "trilled"–"non-trilled." Continuant refers to a smooth transition to a sound from the absence of sound; discontinuous is an abrupt transition. As shown by computer experiments and experiments with a so-called automatic segmentator, sounds such as [s], [ts] and [t] differ only in the duration and abruptness of a transition from pause to sound. If we erase the beginning of an [s], the sound becomes a [ts]; if we remove a still larger initial portion, we hear a [t].

§ 202. The eighth feature pair, "strident"–"mellow," distinguishes, for example, such phonemes as Lithuanian affricates and the corresponding simple plosives or fricatives, such as English alveolar /s z/ and interdental /θ ð/ ("th"; cf. also [Chomsky, Halle 1968: 318–319, 329; Steponavičjus 1979: 154] and [Jakobson, Waugh 1979: 139–142], where the arguments seem less than convincing). Strident sounds are characterized by a greater intensity of noise, and mellow by a lesser intensity. Mellow consonants can sometimes even have something similar to formant structure, which is completely alien to strident consonants.

§ 203. The final pair of sonority features is "checked"–"unchecked." Lithuanian speakers recognize glottalization (the feature "checked") from the pronunciation *nè* 'no' as [neʔæ], and especially from the Žemaitic broken tone (cf. *dâˑkts* "*dáiktas*" 'thing'). But in such cases, glottalization is not a distinctive feature of phonemes, but an auxiliary prosodic device (see § 245, 250–251 and references, and

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[147] This order of the features became established in the later works of Jakobson himself (for reasoning, see § 166, and also [Jakobson, Waugh 1979: 140–141]).

also [Jakobson, Waugh 1979: 144–146]). In other languages (for example, Circassian, Georgian, Kabardian, many Native American languages), glottalization is as much a distinguishing feature of phonemes as Lithuanian "voiced"–"voiceless" or "soft"–"hard" (see § 150, but cf. [Fischer-Jørgensen 1981: 205]).

Acoustically, glottalization is a sudden drop in spectral energy, its high rate of dissipation. This acoustic effect is achieved by a sudden convergence of the vocal cords or even a complete closure of the glottis.

§ 204. Tonality features comprise only these three pairs: 10) "grave"–"acute," 11) "flat"–"plain," and 12) "sharp"–"plain." As we see from the terms themselves, they characterize in one way or another the high or low qualities of a sound's timbre.

The first pair of these tonality features, "grave"–"acute,"[148] has already been briefly mentioned (see § 192). It distinguishes, for example, back and front vowels, labials and dentals, velars and dentals, and also various types of velars and palatals.[149] Acute vowels (for example, [i e]) are characterized by a high second formant, considerably approaching the third formant. The second formant of grave vowels (for example, [u o]) is relatively low, generally lower than the central part of a spectrogram, approaching the first formant. Among other features, grave consonants are characterized by a general lowering of the second formant of neighboring vowels (at least the portion adjoining the consonant); acute consonants raise this formant (see § 195 and references). These features are perhaps easiest to perceive by ear: acute sounds, in comparison with corresponding grave sounds, always appear to be of a higher and brighter timbre.

§ 205. The features "flat"–"plain" correspond to various articulatory properties which lower the timbre of sounds. Flat includes labialized, velarized, pharyngealized, and retroflex sounds. The acoustic essence of this feature, as the name suggests (flat is a musical symbol which lowers a note's value by a semitone), is a lowering or weakening of high (or even all) formants or frequency zones. Plain sounds have normal formants or frequency zones.

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[148] Some linguists (for example, [Lekomceva 1962; Kazlauskas 1966]) use the non-traditional articulatory terms "peripheral"–"non-peripheral."

[149] On the need to strictly distinguish palatal and palatalized sounds, and also the phenomena of palatality and palatalization, see [Čekman 1979: 44ff.].

In standard Lithuanian these features have no independent value; they simply highlight grave or hard sounds. All Lithuanian non-compact grave vowels are flat (labialized [rounded]); almost all hard consonants (especially [ł]), should be considered flat, since they are accompanied by velarization (that is, a secondary raising of the back of the tongue toward the soft palate; see § 146). In addition, flatness (lip-rounding) reinforces the feature complex /"+vocalic" & "−consonantal" & "−acute" & "−compact"/ (see § 173). In the dialects, these features can have an independent distinctive function; they can differentiate phonemes of the type /i/ and /u/, /ẹ·/ and /o·/ (cf. § 181).

In some languages, acute flat vowels contrast with ordinary vowels, cf. Ger. *Kiel* : *kühl*, etc. (see § 189). The Arabic "emphatic" (that is, strongly velarized or pharyngealized) consonants are also flat: Egyptian *ṭïːṇ* 'clay' : *tiːn* 'figs', Tunesian *ðåᵣᵣ* 'he damaged' : *ðarr* 'he strewed' ([ṭ ṇ ð̣ ṛ] are "emphatic" consonants, [ɨː] and [å] are flat allophones of the phonemes /i· a/; see [Zavadovskij 1979: 41–42]). As we see, this emphatic property is quite reminiscent of prosodic features, since it flattens all sounds of a syllable or even a word; cf. also NŽem. *r̂ẹ́.t̂ẹn̂ò* "rìtiniu" 'roll, scroll-INS.SG' : *r̂ẹ́.t̥ẹṇ̀ò* "rìtinu" 'roll-1SG.PRS', where the vowel tonality of all syllables is determined by the sharpness or flatness of the final consonant ([n̂] or [n]).

§ 206. The final pair of distinctive features is "sharp"–"plain." These are the counterparts of the "impressionistic" terms "soft"–"hard" and the articulatory phonetic terms "palatalized"–"non-palatalized." The terms "sharp"–"plain" were chosen for these properties because palatalization raises all spectral frequencies of consonants and in particular the formants of neighboring vowels, at least that portion which is in direct contact with the consonant. This occurs because a secondary raising of the mid-part of the tongue toward the hard palate narrows the anterior resonating chamber of the oral cavity and makes it similar to that of a front vowel (especially [i]) or the consonant [j].

Lithuanian front vowels are also occasionally considered "sharp" and back vowels "plain," but the motivation for this usage is not very clear. Only the fronted allophones [ù], [ò·], etc., of back vowels should be considered "sharp."

It should be noted that the feature "sharp" (like the Arabic emphatics) is reminiscent of prosodic elements: it very much tends to

spread to neighboring sounds or even syllables. In the North Žemaitic dialects, for example, all consonants of the word *r̂ẹ̇.t̂ẹn̂ò* "*rìtiniu*" 'roll, scroll-INS.SG' are more or less soft, and all consonants of *rẹ̇.tẹnò* "*rìtinu*" 'I roll' hard. In the latter case, even the vowels are significantly backed; the pronunciation is approximately *rẹ̇.tẹn°ò* (see § 222 and 236).

δ) THREE EXAMPLES AND SOME GENERAL CONSIDERATIONS

§ 207. Let us try to apply universal acoustic features to concrete phonological systems. This should not be difficult, since we are already accustomed to a dichotomous analysis of phonemes and to the matrices and tree diagrams used in dichotomous phonology.

To begin, we can take Jakobson's classic example: the vowel system of standard Turkish /i æ ɨ a y œ u ɔ/ (see § 192 and [Jakobson 1962: 302–303; Jakobson, Waugh 1979: 146–148]; cf. also [Glison 1959: 236; Dmitriev 1960: 15; Mel'nikov 1966]).

The feature "compact" should be assigned to the open vowels /æ a œ ɔ/ of this system, and "diffuse" to the close vowels /i ɨ y u/ (cf. § 199). The vowels /æ/ and /a/ are undoubtedly more compact than /œ/ and /ɔ/, but as we know, phonological units are relative: we are only interested in the fact that /æ/ is more compact than the clearly diffuse /y/, and /ɔ/ is more compact than /u/. The front vowels /i æ y œ/ are "acute," and the back vowels /ɨ a u ɔ/ "grave" (cf. § 204). The rounded vowels /y œ u ɔ/ have the feature "flat," and the unrounded /i æ ɨ a/ "plain." Here these features are indeed distinctive, since both front vowels and back vowels can be rounded or unrounded.

We can now set up a phoneme matrix (see table 26; here and below the symbols in parentheses are abbreviations of the above-mentioned English terms, see [Širokov 1965: 89]).

Table 26. Acoustic distinctive features of standard Turkish vowel phonemes

No.	Distinctive features	Phonemes							
		/i/	/æ/	/ɨ/	/a/	/y/	/œ/	/u/	/ɔ/
1	compact (Cp)	−	+	−	+	−	+	−	+
2	grave (G)	−	−	+	+	−	−	+	+
3	flat (Fl)	−	−	−	−	+	+	+	+

The tree diagram of this system is fully symmetrical (see figure 25).[150]
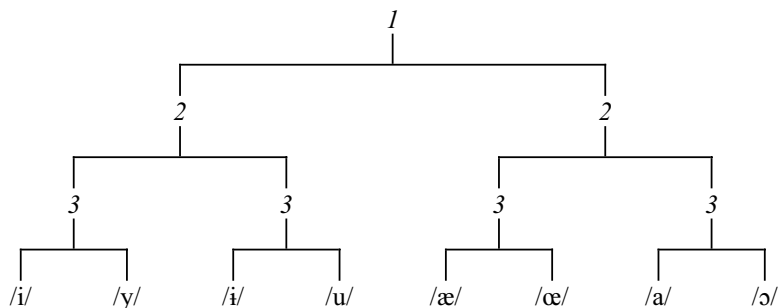
Figure 25. Tree diagram of Turkish vowel phonemes

§ 208. The vowel system of standard Lithuanian can be described with these features of the universal "alphabet": 1) "tense"–"lax," 2) "acute"–"grave," 3) "compact"–"non-compact," 4) "diffuse"–"non-diffuse." In addition, since Lithuanian has the phonemes /uo ie/ of gliding articulation and quality, we would need to add the feature pair "non-uniform (gliding)"–"uniform (non-gliding)," which is not characteristic of this "alphabet."[151]

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[150] This is a classic example of an ideal phonological system, since each distinctive feature is exploited to the fullest, and there is no single feature more than is strictly necessary to distinguish at least minimally all phonemes from one another.

The number (P) of distinctive features of an ideal system can be found using the formula $P = \log_2 F$ (F is the number of phonemes) [Lomtev 1976: 110ff.; Stepanov 1975a: 67–68]. If we perform the calculations using this formula, it becomes clear that for an ideal system of eight phonemes only three distinctive features are needed: $P = \log_2 8 = 3$. And, in fact, the Turkish vowel system consists of eight phonemes, differentiated by three binary features. Such a perfectly symmetrical system is a great rarity: the number of distinctive features is almost always greater than the ideal. For example, the five binary features of Lithuanian vowels (see § 178, table 19) could differentiate thirty-two phonemes, rather than twelve; the nine phonemes (see § 169, table 16) distinguishing Lithuanian consonants would suffice for 512 phonemes. All twelve features could "handle" a fantastical system of 4096 phonemes.

[151] Non-standard features are often needed by other researchers as well (cf. [Lekomceva 1962], which makes reference to the non-standard opposition "reduced"–"non-reduced").

The choice of other features can easily be based on a spectral analysis (see § 195 and table 25).

The index of tenseness for long vowels (*T*) is in all cases significantly greater than for corresponding short vowels.[152] Of course, instead of the pair presented in the table, we could also have chosen the prosodic pair "long"–"short" (cf. [Šaumjan 1962: 156]), but in those cases where two types of solution are possible, adherents of dichotomous phonology give priority to internal or inherent (that is, spectral) features of Jakobson's "alphabet." The tense vowels [iˑ ẹˑ æˑ] should be considered acute, since their second formant (F2) is in the high frequency zone; that is, it exceeds a frequency of 1500 Hz. The contrasting [uˑ oˑ aˑ] have a relatively low second formant, close to the first. The features "acute"–"grave" should be reversed, since Lithuanian acute vowels are the marked members of this opposition (see § 144 and 172) and should therefore have a positive feature.

Of the acute tense vowels, the most compact are [æˑ e] (for their index of compactness, see table 25) and the most diffuse is [iˑ]; of the grave vowels, the most compact is [aˑ] and the most diffuse is [uˑ]. In addition, the results of a spectral analysis show that the values of compactness and diffuseness are not absolute, but relative. The vowel [oˑ], as a sound, is more compact than [æˑ], but it is not a compact phoneme, since the system of grave vowels includes the more compact [aˑ]. The vowels [uˑ oˑ] also have the feature "flat," contrasting with the "plain" of all other vowels, but this logically follows from other features: /"+V" & "−Co" & "−Ac" & "−Cp"/ → ["+Fl"].[153] The feature "compact"–"diffuse" should be split in two, since Lithuanian tense vowels have three tongue heights, rather than two (cf. § 199 and [Šaumjan 1962: 156]).

The results of a spectral analysis of lax vowels are usually analogous, so we will not stop to examine these.

In principle, it would be possible to do without the fifth feature pair, "gliding"–"non-gliding." Since the beginning of [uo ie] is clearly "diffuse" and the end is nearly "compact," we could consider its

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[152] The situation is evidently different in the North Žemaitic dialect, where, for example, short [e] appears even more tense than [eˑ], while the index of tenseness for the other vowels is much lower than in the standard language.

[153] That is, "flat."

spectral variability a result of the interaction of the opposite features "compact" and "diffuse." But, firstly, this solution appears too paradoxical, and secondly, it does not accord well with the great articulatory closeness of [uo] and [o·], [ie] and [ẹ·] (cf. § 175).

After these considerations, we can create a matrix of vowel phonemes (see table 27; the features in parentheses are needed only if we include the marginal <e/ẹ> in the system; otherwise there would be zeroes in their place), differing from the previous one (see § 178, table 19) only in the names of the distinctive features.

Table 27. Acoustic distinctive features of the vowels of standard Lithuanian[154]

No.	Features	Phonemes											
		/e/	/e·/	/i/	/i·/	/ẹ·/	/ie/	/a/	/a·/	/u/	/u·/	/o·/	/uo/
1	tense (T)	−	+	−	+	+	+	−	+	−	+	+	+
2	acute (Ac)	+	+	+	+	+	+	−	−	−	−	−	−
3	compact (Cp)	+	+	−	−	−	−	+	+	−	−	−	−
4	diffuse (D)	0	0	(+)	+	−	−	0	0	(+)	+	−	−
5	gliding (Gl)	0	0	0	0	−	+	0	0	0	0	−	+

A tree diagram of this classification would coincide with the one created on the basis of the articulatory feature matrix (see § 178, figure 18), except that the numbers at the nodes would now refer to the corresponding acoustic features.

§ 209. The consonant system described with universal binary features differs somewhat from the one examined earlier (see § 169, table 16). First, certain acoustic features unite sounds of different articulations; second, due to a certain unwieldiness of the universal "alphabet," we need to divide the /k t p/ and /g d b/ triads somewhat differently, and even somewhat disturb their syntagmatic classification.

Following Gunnar Fant [Fant 1964: 208], we venture here to unite /v v̂ j/, /l l̂ r r̂/, and /m m̂ n n̂/ (on the sonorant nature of the latter, see [Plakunova 1967; 1968]) into a single class, since this is required by their syntagmatic relations with other phonemes (for an earlier interpretation, see [Girdenis 1981a: 158–159]): the phonemes /j v v̂/ contrast with other non-nasal sonorants as "diffuse" to "compact." Keeping in mind the relativity of distinctive features, we will reject "discontinuous" as a distinctive feature of /r r̂/; this would unacceptably split

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[154] Eng. *gliding* is an *ad hoc* translation of the corresponding Lithuanian term *kintamasis*; the abbreviation is *Gl*.

these phonemes off from the entire sonorant class. The discontinuous nature of these consonants can easily be accounted for by the general rule /"+V" & "+Co" & "−N" & "+Cp" & "−G"/ → ["−Cn"].

Of the numerous other features explainable by general rule, especially noteworthy is the flatness of "non-sharp" phonemes:[155] /"−V" & "−Sh"/ → ["+F1"] (see § 206).

The distinctive feature matrix would now look like this (see table 28; as in table 16, the symbols for hard consonants represent both sharp and plain phonemes).

Table 28. Acoustic distinctive features of consonants in standard Lithuanian

No.	Distinctive features	Phonemes																			
		k	g	t	d	p	b	c	ʒ	č	ǯ	s	z	š	ž	l	r	j	v	n	m
1	vocalic (V)	−	−	−	−	−	−	−	−	−	−	−	−	−	−	+	+	+	+	+	+
2	nasal (N)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	−	−	−	−	+	+
3	continuant (Cn)	−	−	−	−	−	−	−	−	−	−	+	+	+	+	0	0	0	0	0	0
4	strident (St)	−	−	−	−	−	−	+	+	+	+	0	0	0	0	0	0	0	0	0	0
5	compact (Cp)																				
6	grave (G)																				
7	voiced (Vc)	−	+	−	+	−	+	−	+	−	+	−	+	−	+	0	0	0	0	0	0
8	sharp (Sh)	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	0	±	±	±

§ 210. It is also possible to create a general distinctive feature matrix which combines both vowels and consonants; such systems are presented in many works on dichotomous phonology (see, for example, [Kazlauskas 1966; Perebyjnis 1970: 62; Muljačić 1972: 36]). But in constructing "universal" systems, we must inevitably neglect syntagmatic relations among phonemes, together with phoneme classes and correlations revealed by neutralization (cf. [Širokov 1965: 95]), since vowel subsystems generally show one type of feature hierarchy, while consonant subsystems show another. In combining all features into a single system, we must disregard the phoneme relations of one subsystem or the other. This would not be good, since it is in fact relations which are the main object of phonological study; distinctive features should only be the material and even somewhat arbitrary expression of these relations.

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[155] This has been demonstrated by Aldonas Pupkis and his students (for example, [Dogelytė 1973]).

Unfortunately, the founders of dichotomous phonology gave little attention to syntagmatic relations. Their primary, and, we might say, almost exclusive "hero" was distinctive features, and Jakobson and his supporters were inclined to sacrifice all other phonological phenomena and relations. Even the question of feature hierarchy was of little interest to them (cf. [Žuravlev 1979: 17]). As a result, they essentially created not a new, independent theory of phonology, but only a universal analytic phonetic alphabet which permits a description of the distinctive features of different languages based on the same principles. The future will show just how universal this alphabet actually is, but the idea itself will almost certainly never be rejected. This is also shown by the works of adherents of generative phonology, which operate with a finite (though much larger) list of universal binary features (see, for example, [Chomsky, Halle 1968: 298ff.]), although this approach has almost nothing in common with classical phonology. It is true that the generativists returned to the articulatory aspect of features, but this must simply be explained by the then-fashionable motor theory of speech perception, rather than by any principal difference in views.

The greatest achievement of the dichotomous theory is undoubtedly the clearly and strictly formulated principle of binary oppositions. While it is true that there are some very consistent opponents of binarism (for example, Martinet), most phonologists (and not just phonologists) accept it without reservation. What drives support for this principle is not so much the criterion of simplicity or the impetus of information theory, as, most importantly, the fact that syntagmatic relations among phonemes (and other linguistic elements) are without question binary. If we classify phonemes first of all on the basis of these relations, we will inevitably obtain binary classes and binary features for these classes.

In evaluating the dichotomous theory, it should also not be forgotten that it successfully brought together the ideas of phonology and the achievements of acoustic phonetics, and created a reliable scholarly apparatus for interpreting the results of acoustic experiments phonologically.

§ 211. In concluding our remarks on dichotomous phonology, it should be noted that this theory has been significantly compromised by numerous rather superficial studies of diverse phonological

systems which operate with an "alphabet" of distinctive features. In many such works we will not find much true phonology, except for the terms themselves, the matrices, and the tree diagrams (for a justified criticism, see [Širokov 1965: 95 et passim]). It seems that these authors were under the illusion that these external attributes form the essence of dichotomous phonology (or even phonology in general).

In fact, the universal "alphabet" of features is only a handy tool for summarizing the results of a thorough analysis of syntagmatic and paradigmatic relations; it cannot of itself turn a phonetic study into a phonemic one (cf. [Horálek 1965: 366]). On the other hand, a good phonological work may not refer to the binary features of dichotomous theory at all, but (like a very individualistic phonetic transcription) this would reduce its accessibility, and make it difficult to correlate the results with instrumental research on the acoustics of sounds.

f) DISTINCTIVE FEATURES AND SEMANTIC COMPONENTIAL ANALYSIS

§ 212. The analysis of phonemes into distinctive features is quite reminiscent of semantic componential analysis, which plays a large role in contemporary work on semantics. This research is based on the assumption that every more complex lexical meaning, or meaning of grammatical forms or categories, can be considered a combination of more elementary semantic components, so-called sememes. For example, the most typical meanings of the words *man*, *woman*, *boy*, *girl*, *sheep*, *ram*, *lamb* can be described as combinations of roughly these smallest binary components: 1) "human"–"non-human,"[156] 2) "child"–"non-child," 3) "female"–"non-female." Componential analysis can be shown in a table which does not differ from a phoneme matrix (see table 29).

Table 29. Example of semantic componential analysis

Components	Words						
	man	*woman*	*boy*	*girl*	*sheep*	*ram*	*lamb*
human	+	+	+	+	−	−	−
child	−	−	+	+	−	−	+
female	−	+	−	+	+	−	0

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[156] These two components have been singled out somewhat arbitrarily: in a broader context, we would need more components distinguishing various living creatures; a *sheep*, after all, is not just "non-human," but also "non-cow," etc.

We could also use this table to draw a typical tree diagram. But even without this, it is clear that there is an obvious isomorphism between phoneme structure and the semantic composition of words, and that the decomposition of phonemes into distinctive features and semantic componential analysis are essentially the same procedures. Only semantic research is of course far more complicated than phonological research.

It should be noted that even the general direction of semantic research in recent years has become increasingly similar to that of dichotomous phonology. Semanticists also intensively seek universal components of meaning, common to all languages. There have even been quite fruitful attempts to derive all meaning from just a few primary components—"semantic primitives" (see, for example, [Wierzbicka 1972])—although at present the number of "primitives" is several times greater.

g) SUMMARY REMARKS

§ 213. In investigating the paradigmatic relations of phonemes and in seeking their distinctive features, the following more important claims and principles should be kept in mind.

1. Paradigmatic relations are possible only among phonemes which are found in the same position; in other words, to form a single paradigm. Since vowels and consonants are used in different positions, they can only have syntagmatic relations.

2. The result of an analysis of paradigmatic relations is a set of distinctive features—the smallest simultaneous phonological units, realized as individual properties of sounds and distinguishing phonemes from one another.

3. Paradigmatic relations and distinctive features first and foremost represent syntagmatic phoneme classes. Phonetic properties which distinguish certain syntagmatic classes from others are highly important distinctive features in those cases where the members of different classes are found in the same position.

4. In establishing distinctive features, neutralization phenomena should also be taken into account. Correlation marks revealed by neutralization are important distinctive features, determined by the system itself.

5. When we cannot rely on syntagmatic relations or neutralization, we should first consider phoneme frequency and the auditory properties of sounds representing phonemes—their similarity or lack

thereof—as perceived by ear. We can depend least of all on the data of acoustic and articulatory phonetics; they are only used to describe already established distinctive features.

6. In establishing distinctive features, it is most useful to assume that all phonological oppositions are binary and whenever possible to formulate research results in terms of a universal "alphabet" of distinctive features.

7. The decomposition of phonemes into distinctive features is related to componential analysis of meaning.

§ 214. In conclusion, we should add that distinctive features can neither displace nor replace phonemes. A phoneme is not a mechanical sum of features; it often needs to be treated as a relatively homogeneous, rather than complex, unit (see, for example, [Dukel'skij 1962: 126; Šaumjan 1962: 114; Zinder 1979: 43]). This must be said first of all regarding syntagmatic relations, whose analysis would become indescribably complicated if we were to reject the phoneme as the true object of these relations. The phoneme is also most often the prime agent in many diachronic events, although in some cases, individual distinctive features may also change, as well as units larger than the phoneme.[157]

Quite the same can be said regarding the phonological syllable and word; they are likewise not a simple sum of lower-level units (cf. [Popela 1966: 75]). In general, it would be most logical to maintain the view that distinctive features directly distinguish only phonemes, rather than words or syllables. Phonemes are distinguishing elements of the syllable, and syllables are distinguishing elements of the word, etc. (cf. § 25–30). Each unit of a higher level has its own characteristic properties and functions, just as a house is not just a sum of bricks, mortar, metal, wood and glass, but a specific structure with its own spatial relations and its own functions.

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[157] In fact, it is almost always allophones which change first, rather than phonemes. This had already been demonstrated in the nineteenth century by Karl Verner with his celebrated law, which famously explained exceptions to Germanic consonant mutations (*Lautverschiebung*) (see [Verner 1877]).

IV. SUPRASEGMENTAL UNITS

1. INTRODUCTORY REMARKS

§ 215. The above analysis of syntagmatic and paradigmatic relations broke each phoneme down into distinctive features—the smallest simultaneous units with distinctive function. Every phoneme can now be considered a simultaneous combination of distinctive features, every syllable a linear sequence of phonemes, and every word a linear sequence of syllables. However, neither the smallest nor the largest of such units would be sufficient to identify even the shortest utterance or sentence. For example, the word *tù* 'you', singled out with all its physical properties from Salomėja Nėris's sentence *Tù nubùsi vidurỹ naktiẽs* 'You will wake up in the middle of the night', cannot be replaced by the similar sounding but nevertheless different utterances *Tu?* or *Tu.*,[1] although they are formed with the same syllable and consist of the same phonemes /t u/, whose distinctive features all coincide.

It is easy to verify this with a simple experiment. If we record the first, longer, utterance on magnetic tape and carefully erase all words except the first, and then present the remaining fragment *tù*… to listeners or listen to it carefully ourselves, we will easily agree that this fragment differs from the utterances *Tu?* and *Tu.* and can in no way replace them. Thus, in addition to words, syllables, and phonemes and their distinctive features, every utterance and every sentence contains additional simultaneous units which differentiate entire sentences or other units and sequences larger than the phoneme. These are the above-mentioned (see § 32–34) suprasegmental phonological units, as distinguished from linear, or segmental, units and distinctive features.

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[1] This phrase could be an answer to a certain question (for example, "Who will be speaking today?").

§ 216. As the term itself suggests, suprasegmental units should essentially be secondary phonological phenomena, which only supplement the basic—linear—elements. This impression might also arise from the description given above (§ 33). But in fact neither phonemes nor words can exist without suprasegmental units, since only they turn lifeless phonemes, syllables, and words into true sentences and utterances (cf. [Kacnel'son 1971: 138–139]). A sentence without intonation is just as impossible as a sentence without words (cf. [Solncev 1977: 188–191]).

The illusion of the greater significance of words and other linear units arises perhaps because many writing systems meticulously record these elements, but indicate suprasegmental phenomena only approximately. Stress, pitch accent, and tone are often fully ignored, and intonation is shown only by punctuation marks, very generalized and simplified. Additionally, linear units convey and differentiate more varied and complex referential information.

§ 217. Thus, every larger phonological unit, first and foremost the sentence, is a combination of linear and suprasegmental units (or, figuratively speaking, an "orchestra" of these units [Milewski 1965: 26]). Somewhat simplifying the actual situation, we could say that *Tu?* = /tù/ & /?/, *Tu.* = /tù/ & /./, *Tu!* = /tù/ & /!/, etc. (/?/, /./, /!/ denote the corresponding intonation here). The first suprasegmental unit (/?/) marks "question," the second "statement," the third "exclamation," and they thus convey a certain content. But we cannot utter these units separately, since they are only formed by certain modulations in the pitch, intensity, and articulatory duration of a word's syllables and phonemes. Here, one sign, expressed by words, their syllables, phonemes, and distinctive features, merges with another sign, expressed by these modulations. Every sentence fragment therefore conveys several signs simultaneously, some by means of linear units, others by means of suprasegmentals.

Even a single intonation is a highly complex phenomenon. It interweaves elements of content and expression, representational and expressive functions of sounds, even purely linguistic and so-called paralinguistic phenomena (cf. [Girdjanis 1976: 106 (= Girdenis 2000c: 369)]).[2] Therefore, intonational phenomena are usually not the pur-

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[2] Paralinguistic elements (from Gk. *παρά* 'alongside, nearby' and *linguistic*) are non-linguistic phenomena and signs which accompany acts of speech:

view of phonology, but of the above-mentioned (§ 17) comprehensive discipline of intonology (see [Svetozarova 1982: 14]), which studies speech melody, dynamics, and speech rate from the standpoint of various functions (for details, see [Ceplitis 1974 and references]). The area of this research which is closest to phonology is sometimes called sentence phonetics or sentence phonology. Word phonology, which is the object of the present study, is interested in intonation only in so far as it is connected with the suprasegmental elements of a word.

The present work also does not consider issues of so-called intrinsic (non-functional) prosody. First, they are only indirectly connected with phonology, in so far as they are components of distinctive features. Second, we have long had Pakerys's exhaustive study, a major part of which is in fact devoted to intrinsic prosodic phenomena [Pakerys 1982: 10–15, 17–25, 43–48].[3]

2. NON-PROSODIC SUPRASEGMENTAL UNITS

a) TYPES OF SUPRASEGMENTAL UNITS

§ 218. In separating out suprasegmental units which differentiate certain larger speech fragments, the overall number of phonological units is always reduced, and a description and interpretation of the entire linguistic system is often simplified. Indeed, if intonation were not distinguished, we would need to consider *Tu?*, *Tu.* and *Tu!* completely different words, and we would find yet another word of related meaning in the sentence *Tù nubùsi vidurỹ naktiẽs*, and still another in the sentence *Eĩk tù!* 'Go on!' and so forth, ad infinitum. Such a solution would not only complicate the lexicon and grammar; it would also be intuitively unacceptable: even the most naive informants understand perfectly well that we have the same word *tù* in all these utterances. If we separate out intonation as a suprasegmental unit, we can further examine this word grammatically and phonologically,

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gestures, mimicry, individual overall tone of voice (for example, its tenderness, roughness, pitch range, hoarseness, etc.; see [Nikolaeva, Uspenskij 1966; Renský 1966; Kol'šanskij 1974]).

[3] Pakerys is also the author of the term *intrinsic prosody* [*savaiminė prozodija*].

regardless of modulations in pitch, intensity, and duration, which are now included in a separate system belonging to the sentence rather than the word (see, for example, [Harris 1963: 45–58; Nikolaeva 1977: 4–9 et passim; Solncev 1977: 188ff.]).

§ 219. In addition to sentence intonation, which is certainly a bilateral unit [Solncev 1977: 187, 190 and references], certain features of the word and syllable are usually considered suprasegmental units: stress, tone, and pitch accent, often called syllable intonation or syllable accent [Zinder 1979: 257ff.]. These features are usually called prosodic units, and their phonologically significant nuclei—prosodemes [Hammarström 1966: 33–37]. Prosodic units for the most part differ from distinctive features in phonetic expression as well; they usually consist not of timbre (spectral or inherent) properties of sounds, but of modulations in pitch, loudness, and articulatory duration, similar to features of intonation, although they are often accompanied by certain changes in sound quality as well (cf. [Fry 1965; Hammarström 1966: 35; Bondarko, Verbickaja, Zinder 1966; Pakerys 1967a; 1967b; 1968; 1982: 183–185]; for a theoretical justification, see [Ginzburg 1966: 98ff.]). But various other sound features, in addition to prosodic features, can also be interpreted as suprasegmental units, as long as they characterize and differentiate stretches of sound larger than the phoneme (cf. [Allerton 1965: 203]).

b) FOUR INTERPRETATIONS OF LITHUANIAN CONSONANT SOFTNESS

§ 220. The softness and hardness of consonants in standard Lithuanian and especially the dialectal West Aukštaitic of the Kaunas area (Suvalkija) could be considered an example of features which can be interpreted as suprasegmental units, although when we examined paradigmatic relations among consonants, we assigned them without further discussion to distinctive features of phonemes. This interpretation was based on the prior assumption that fronted back vowels are allophones of the "pure" back vowels. But the actual situation is far more complicated.

As we know (see § 136, table 14 and [Girdenis 1967a (= Girdenis 2000b: 313ff.)]), hard (plain) consonants are used word-

finally ([—#], position 5) before "pure" back vowels ([—Vᵘ], position
1) and before hard consonants ([—C], position 3). Soft ("sharp")
consonants are found only before front vowels ([—Vⁱ], position 2),
soft consonants ([—Ĉ], position 4), and fronted back vowels ([—V̈ᵘ],
part of position 1). On the other hand, "pure" back vowels can only
follow a pause ([#—]) or hard consonants ([C—]); front vowels
follow a pause ([#—]) or soft consonants ([Ĉ—]), and fronted back
vowels only follow soft consonants ([Ĉ—]). Thus, only the following
types of sequences are possible: a) *iC*, *uC*; b) (*C*)*Cu*; c) (*Ĉ*)*Ĉü* (the
number of elements in parentheses can vary from zero to three), cf.:
[ṽer̊ž̂Î̊ùs] "*veržliùs*" 'impetuous, dashing-ACC.PL.M' : [ṽer̊ž̊ɫ̊ùs]
"*veržlùs*" 'impetuous, dashing-NOM.SG.M' : [ṽer̂ẑɫ̂ì] "*veržlì*" 'impetu-
ous, dashing-NOM.SG.F'.[4]

Before front vowels, soft consonants, and fronted back vowels,
there is automatic softness of consonants; in all other positions, they
are hard. But the vowels, especially the "pure" and fronted back
vowels, depend equally well on position, since the former can only
follow a pause or hard consonant, and the latter can only follow a soft
consonant,[5] that is, they are in complementary distribution.

This unique situation makes possible four interpretations of con-
sonantal softness, one of which is suprasegmental [Girdenis 1967a
(= Girdenis 2000b: 314f.)] (on a similar situation in Proto-Slavic, see
[Vinokur 1962]).

1. It may be assumed that front vowels, fronted back vowels, and
"pure" back vowels have a distinctive function and perform the role of
independent phonemes. In this case, the hard and soft consonants
would be allophones of the same phoneme (see table 30), since they

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[4] For details on these phenomena and processes, which are irrelevant for pho-
nological analysis, see [Vajtkjavičjute 1979].

[5] Here and elsewhere, it should be remembered that softness and hardness are
the "impressionistic" (auditory, psycholinguistic) counterparts of the articulatory
features of palatalization and velarization (or simply absence of palatalization),
corresponding to which on the acoustic plane are "sharp" and "plain" (or "flat").
Avoiding these terms and using only, say, the articulatory ones, would be un-
necessarily pedantic, devoid of phonological meaning. One should not forget
that what is important in phonology are oppositions themselves, rather than their
phonetic basis.

are in complementary distribution; soft or hard pronunciation is self-evident from the position.[6]

Table 30. Interpretation of consonant softness in standard Lithuanian (version I)

Sound types	Positions						Interpretation
	[—u]	[—ù]	[—i]	[—C]	[—Ĉ]	[—#]	
[C]	+			+		+	/C/
[Ĉ]		+	+		+		

In this interpretation, the system of long vowel phonemes would be:

$$\begin{array}{lll} /i\cdot/ & /\dot{u}\cdot/ & /u\cdot/ \\ /ie/ & /\dot{u}o/ & /uo/ \\ /\underset{.}{e}\cdot/ & /\dot{o}\cdot/ & /o\cdot/ \\ & /e\cdot/ \quad /a\cdot/ & \end{array}$$

Between vowels of the type /u/ and /ù/, we would have a correlation which is neutralized after a pause (i.e., in absolute word-initial position). The above-mentioned forms would be transcribed /veržlùs/ : /veržlùs/ : /veržlì/.

2. In the second case, we distinguish individual soft ("sharp") and hard ("plain") consonant phonemes, contrasting before back vowels. Fronted and "pure" back vowels are allophones of the same back vowel phonemes (see table 31): /v̂er̂Ẑl̂ùs/ : /v̂eržlùs/ : /v̂er̂Ẑl̂ì/ or /vεRẐl̂ùS/ : /vεRžlùS/ : /vεRẐLì/ (archiphonemes are marked with special characters).

Table 31. Interpretation of consonant softness in standard Lithuanian (version II)

Sound types	Positions			Interpretation
	[#—]	[Ĉ—]	[C—]	
[i]	+	+		/i/
[ù]		+		/u/
[u]	+		+	

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[6] In individual urban idiolects (individual speech varieties), this system may be contradicted by such internationalisms and professional jargon as [k°úĨtas] "*kùltas*" 'cult', [p°úĨsas] "*pùlsas*" 'pulse', [á.łgebra] "*álgebra*" 'algebra', [buhá.łtệr̂is] "*buhálteris*" 'book-keeper', but these cannot be considered facts of the normative standard language (cf. [Vajtkjavičjute 1979: 36] and [Girdenis, Pupkis 1979 (= Girdenis 2000c: 349ff.)]). The situation may be different in the dialects, but their phonological systems also differ.

3. Consonant softness can also be considered a manifestation of the articulatorily and acoustically similar phoneme /j/ (cf. § 71, likewise [Merlingen 1970: 343–344; Žulys 1975: 66]), since combinations of the type *Cju* and *Ĉu* are in complementary distribution: in simplex words [j] can only occur with initial [p], [b] (*bjaurùs* 'ugly', *spjáuti* 'spit-INF'); in all other cases, we only have *Ĉu*-type sequences: words of the type *atjóti* 'come (on horseback)-INF', *Gaĩdjurgis* [surname] do not contradict this, since their *C* + [j]-clusters are "undone" by open juncture (cf. § 36). Before consonants and front vowels, softness would only be a feature of allophones.

In this case, the transcription of the above forms would be /veržljùs/ : /veržlùs/ : /veržlì/.

4. A suprasegmental interpretation of consonantal softness is also possible. Just such an approach is assumed by the so-called phoneme cluster hypothesis (Ru. *группофонема*; see, for example, [Žuravlev 1966]; cf. [Kazlauskas 1968b]).[7]

Since consonant clusters are always either fully hard or soft, and since their softness cannot be separated from the front or fronted articulation of a following vowel, it is safe to assume that it is not the individual phonemes which have the property of hardness or softness, but entire (*C*)*Cu*-type sequences, that is, that entire sequences of the type (*Ĉ*)*Ĉu* and (*C*)*Cu* contrast. If these features distinguish sequences, rather than separate phonemes, we must consider them suprasegmental units. Thus (*Ĉ*)*Ĉu* = (*C*)$\widehat{Cu}$ = (*C*)*Cu* & /$\frown$/ (the arc here refers to the suprasegmental unit of softness). Thus, we now might transcribe the above words /ver$\widehat{žlù}$s/ : /veržlùs/ : /veržlì/. In the third example, the softness feature is neutralized and can therefore remain unindicated. The hardness feature can also be left without a special symbol, since it is the unmarked member of this opposition of suprasegmental units.

The actual properties of the sounds can now be explained as resulting from the suprasegmental elements in question (see table 32). As we see, sounds of the type [C] and [Ĉ], [u] and [ù] would be allophones of the phonemes /C/ and /u/ in this case, since they are used in different positions: some are used in those sequences which have the

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[7] The novel concept of universal accommodation is also based on the assumption of such a "phoneme" [Martynov 1966; 1968].

suprasegmental feature "hard," and others in those which have the suprasegmental feature "soft."

Table 32. Interpretation of consonant softness in standard Lithuanian (version IV)

Sound types	Positions		Interpretation
	hard sequences	soft sequences	
[C]	+		/C/
[Ĉ]		+	
[u]	+		/u/
[ù]		+	

　　　In Lithuanian dialects, these units may in some cases even span several syllables. For example, in the above-mentioned North Žemaitic words *r̂ę̂.t̂ęn̂ò* "*rìtiniu*" 'roll, scroll-INS.SG' and *ŕ̨.ţęņò* "*rìtinu*" 'roll-1SG.PRS' (see § 206), the features of softness and hardness are spread throughout the entire word; we could transcribe the first example /rèt̑ęnò/ and the second /rèţęnò/. Vowel harmony phenomena could be interpreted in a similar fashion (for example, [Lyons 1968: 128–131 = Lajonz 1978: 141–144; Lyons 1972: 278–279; Kuznecov 1966: 216; Reformatskij 1966; Garde 1968: 62–66; Vinogradov 1972: 345–351; Širokov 1973; Hyman 1975: 233–236]).

　　　§ 221. From a purely phonological standpoint, all the above interpretations of consonantal hardness and softness are possible. The third, "[j]" interpretation, seems the least suitable, since it very much complicates the syntagmatic relations of phonemes; it makes possible four-member initial clusters (cf. *striùkas* 'jacket' = /strjùkas/), and imposes the awkward automatic alternation /j/ : Ø (cf. *sakiaũ* 'say-1SG. PST' : *sakeĩ* 'say-2SG.PST') and corresponding syllable boundaries (cf. *aviũ̃* 'sheep-GEN.PL' = /a-vjũ·/ and *naujũ̃* 'new-GEN.PL' = /nav-jũ·/). We could say that this is no longer a classical interpretation, but a generative one (cf. [Heeschen 1968: 221–223; Kenstowicz 1972: 10]).

　　　Of the other interpretations, the most acceptable would seem to be the fourth, that is, the suprasegmental one. If Lithuanian did not have declension and conjugation, we would undoubtedly choose it without hesitation. But this is not the case, and therefore neither this solution, nor the first, is satisfactory from the standpoint of grammatical expediency (cf. § 59 and 61), since it destroys the identity of grammatical structure in forms such as *kalù* 'forge-1SG.PRS' : *galiù* 'be able-1SG.PRS', *tévo* 'father-GEN.SG' : *brólio* 'brother-GEN.SG' and

complicates their morphological and derivational interpretation. In assigning hardness or softness to a stem-final consonant, we easily avoid these complications.

Thus the second—traditional—interpretation appears to be the most acceptable (see also § 223 below). However, this by no means suggests that only the classical interpretation is correct. Even if one agrees with this solution, it must be remembered that in Lithuanian hardness and softness is not in fact a property of individual sounds, but of entire sequences of sounds. In this regard, standard Lithuanian differs fundamentally from Russian, for example, in which the consonants have a free correlation of consonantal softness, independent of neighboring vowels.[8] Certain Lithuanian dialects (especially eastern) also approach such a system (cf. [Girdenis 1983a (= Girdenis 2000c: 290f.)]).

A full typological picture of a linguistic system emerges from all possible phonological interpretations, rather than just a single one (however well motivated); phonological solutions which seemingly contradict one another clarify and enrich one another. What is noteworthy about the timbre correlation of Lithuanian consonants is that they can be treated in four ways; this is a very significant and archaic feature.

c) OTHER EXAMPLES AND SOME REMARKS ON "PROSODIC" PHONOLOGY

§ 222. In addition to consonantal hardness and softness in Lithuanian, other features, which in certain cases delimit and unite entire sequences of phonemes, can also be considered suprasegmental units.

For example, the voicing and voicelessness of the non-sonorant (obstruent) consonants could be interpreted in this way, since this feature is always shared by an entire sequence of such phonemes: *lãzdą* 'stick-ACC.SG' : *lãstą* 'kennel-ACC.SG', *šnibždù* 'whisper-1SG.PRS' : *šnipštù* 'flop-INS.SG', *Zdanỹs* [surname] : *Stanỹs* [surname].

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[8] Nevertheless, Jurij Stepanov has shown that even the hardness and softness of Russian consonants can be considered suprasegmental elements of phoneme sequences (see [Stepanov 1974 and references], also [Stepanov, Èdel'man 1976: 216ff.]; for a similar interpretation of Belarusian consonantism, see [Padlužny 1969: 216ff.]).

If we single out the suprasegmental units "hard" and "soft," we can treat the combinations /zd/, /bžd/ as simultaneous combinations of a corresponding voiceless (unmarked) sequence /st/, /pšt/ and a voicing element. Using the symbol "‾" to denote suprasegmental voicing, we get: /zd/ = /s̄t/ or /st/ & /‾/, /bžd/ = /p̄št/ or /pšt/ & /‾/, likewise [łã·zda·] = /lã·s̄ta·/, [šñib˚ž˚d˚ù] = /šñip̄štù/. If we adhere to the principle of generalization (on which see [El'mslev 1960b: 327]; cf. [Robins 1972: 273; Harris 1963: 131]), individual voiced obstruents must also be interpreted in this way: [b˚ùv˚o·] 'be-3PST' = /p̄ùvo·/ 'rot-3PST', [g˚u·b̂ri̊·s] 'ridge' = /k̄upr̃i·s/ 'humpback', etc.

We can similarly interpret the hissing and hushing (dental and palato-alveolar) articulations of *S*-type consonants and affricates, Arabic emphatic consonants and the backing of adjacent vowels (cf. § 205), and also such Lithuanian dialectal phenomena as various vowel assimilations and accommodations.

§ 223. Of all approaches to phonology, it is the London School, whose most prominent representative is John Firth (see [Kubrjakova 1964]), which has most fervently embraced suprasegmental interpretations. Phonologists of this school call all suprasegmental elements *prosodies* ([Firth 1973]), and this approach is therefore often called the prosodic school or prosodic phonology.

For proponents of prosodic phonology, the suprasegmental interpretations of soft and hard consonants examined above would be the only ones. They would often go even further, treating as independent "prosodies" vowel length, consonantal and vocalic labialization, etc. (cf. [Firth 1973; Robins 1972; Lyons 1968: 127–131 = Lajonz 1978: 141–144]; for a consistent prosodic conception of the origin of Indo-European consonantism, see [Klyčkov 1981: 135–139 and references]).[9]

Similar units—phonological long components—were also singled out by certain descriptivists (for example, [Harris 1963: 125–149; 1972]; cf. [Sljusareva 1960: 105; Lyons 1968: 105–108 = Lajonz 1978: 120–123 and figure 3; Voronkova 1981: 87]), but they based themselves not so much on the phonetic features of sounds, as on their distribution (cf. [Fischer-Jørgensen 1975: 99–101]).

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[9] Among Lithuanian phonologists, Kazimieras Garšva is especially close to this approach (at least in some of his works; cf. [Garšva 1977c: 70–74 et passim] and [Kačiuškienė 1983: 33]).

§ 224. There is no question that in singling out suprasegmental units or "long components," we always reduce the inventory of phonemes and phonological units overall. After such an operation, we can often formulate rules of syntagmatic relations (phonotactics) more simply as well. But more often still, this complicates rules of grammar and derivation. If, for example, voiceless consonants are regularly voiced before a morpheme represented by (or beginning with) /d/ (for example, Lith. *kãsa* 'dig-3PRS' : *kà*[z]*davo* 'dig-3PST.FREQ'), it is far easier and more natural to speak of neutralization or even traditional assimilation than of a suprasegmental unit encompassing an entire sequence. After all, this unit "radiates out" from a single source—the voiced [d]. Since it is only this sound which is the basis for the entire voicing chain, the distinctive feature of voicing should be assigned to it.

The same could be said regarding consonantal hardness and softness and vowel fronting in Lithuanian. In the form *vélnius* 'devil-ACC.PL' [v̂é.l̂n̂ùs], we unquestionably have the same ending as in the form *kélmus* [k̂ǽ.ɫmus] 'stump-ACC.PL', only it has undergone fronting, which proceeds from the source of palatalization, /n̂/. The preceding consonant also gets its softness from the same source, and the articulation of the [e.] is somewhat higher and more close. This can be represented schematically as follows:

véln̂us

We can explain in more or less the same way the pervasive palatalization of the sounds in NŽem. *r̂ę́.t̂ę̂n̂ǫ̀* 'roll, scroll-INS.SG' (see § 220):

r̨ęt̨ęn̨ǫ

Thus a suprasegmental (or prosodic) interpretation of certain features is the sole and necessary one only when it is not possible to find a phoneme which could be considered a source, "radiating" features shared by other members of a sequence (cf. [Hyman 1975: 235; Clements 1977]).

This implicit (not clearly formulated) assumption seems to underlie all classical interpretations of distinctive features and prosodic phenomena, although no one has ever stated this clearly. We must fully agree with Lyons, who considers that prosodic (suprasegmental), or, to use a more fashionable term, autosegmental (cf.

[Clements 1977]) interpretations are better suited for some languages, while purely phonemic interpretations are better suited for others [Lyons 1972: 279–280]. Languages can even be divided into prosodic and phonemic in this regard. This seems to be the right approach, but it should be kept in mind that intermediate (mixed) language types are also possible.

3. PROSODIC UNITS

a) STRESS

α) CONCEPT AND FEATURES

§ 225. It is not difficult to show that Lithuanian has suprasegmental units differentiating entire words. For this, it suffices to compare pairs or larger groupings of words or word forms such as *gìria* 'praise-3PRS' : *girià* 'woods', *kìlimas* 'rug' : *kilìmas* 'rise', *nèši* 'carry-2SG.FUT' : *nešì* 'carry-2SG.PRS', *rìši* 'tie-2SG.FUT' : *rišì* 'tie-2SG.PRS', *lìkime* 'remain-1PL.IMP' : *likìme* 'fate-VOC.SG' : *likimè* 'fate-LOC.SG'. These words differ in both meaning and sound, and therefore must have at least a single different phonological unit with distinctive function, determining the lack of identity in expression.

And in fact in all these words one vowel is pronounced somewhat differently from the others: in *kìlimas*, *nèši*, *lìkime*, *rìši* the vowel in the first syllable is pronounced more clearly, with a higher pitch and greater articulatory effort, while in *kilìmas*, *nešì*, *likìme*, *rišì* it is the second vowel. And so it would seem that vowels need to be assigned still another distinctive feature pair, say "strong"–"weak" (cf. [Jakobson 1962: 13; Challe 1962: 317, 321 et passim]; for critical remarks, see [Kuznecov 1970a: 176ff.]). If we introduce these features, the subsystem of short vowels would be:

strong:		weak:	
/ì/	/ù/	/ĭ/	/ŭ/
/è/	/à/	/ĕ/	/ă/

We might now treat the words in question as distinguished by vowel phonemes: /n̂èšì/ ≠ /n̂ĕšì/, /l̂ìk̂ĭm̂ĕ/ ≠ /l̂ik̂ìm̂ĕ/ ≠ /l̂ĭk̂ĭm̂è/, etc. (cf. the words *pir̃kęs* 'having bought' ≠ *kir̃pęs* 'having cut', *pū̃tus* 'having

blown' ≠ *tũpus* 'having perched', where the consonants seem to be similarly distinguished).

However, this interpretation would quickly run into great difficulty.

Let us draw a table of the distribution of "strong" and "weak" vowels (see table 33).

Table 33. Distribution of "strong" and "weak" vowels in standard Lithuanian

Vowel type	Positions				Interpretation
	[—CV́]	[—CV̆]	[V̀C—]	[V̆C—]	
[i]	+		+		/i/
[ì]		+		+	
[a]	+		+		/a/
[à]		+		+	

As we see, the vowels are in complementary distribution: if in a certain context we find a "strong" vowel, the other position (or more precisely, positions) can only be occupied by a "weak" vowel, and if there is a "weak" vowel in a certain context, the other position must be occupied by a "strong" vowel. Thus it would appear that the vowels [ĭ] and [ì], [ĕ] and [è], [ă] and [à], [ŭ] and [ù] are allophones of the same four phonemes /i e a u/. But this logical conclusion runs counter to the facts. We clearly hear and know, after all, that *rìši* ≠ *riši*, *kìlimas* ≠ *kilìmas*, *lìkime* ≠ *likìme*, but the phonological transcription shows complete identity for these words (/r̃iši/ = /r̃iši/, /ñeši/ = /ñeši/, etc.). One gets the impression that words differing in meaning and sound are expressed by the same phonological units, arranged in the same order. Obviously, this cannot be the case.

An attempt to assign to syllables the distinguishing features of the words and word forms in question would also lead to the same impossible conclusion. We would find a similar complementary distribution between "weak" and "strong" syllables, "demonstrating" a non-existent identity between these words and word forms. Thus, we would again come to the conclusion that clearly different words are fully identical.

In order to break this vicious circle, we must acknowledge that the words in question differ not in phonemes or syllables, but in suprasegmental units which distinguish entire words. The words *gìria*, *kìlimas*, *nèši*, *lìkime*, *rìši* and *girià*, *kilìmas*, *nešì*, *likìme*, *rišì* differ in

that the former have one kind of suprasegmental unit, and the latter, another. The former suprasegmental unit sets the first syllable off from the other syllables, while the latter sets off the second syllable. We could represent the lack of identity in the pronunciation of these syllables as follows: *nèši* = /n̂ešì/ & /⌐|_/, *nešì* = /n̂ešì/ & /_|⌐/, *lìkime* = /l̂ik̂im̂e/ & /⌐|__/, *likìme* = /l̂ik̂im̂e/ & /_|⌐|_/, *likimè* = /l̂ik̂im̂e/ & /__|⌐/ (cf. [Avanesov 1956: 21–22; Allerton 1965: 202; Kuznecov 1970b: 361–364; 1970c: 342]). As the very shape of these representations suggests, the essence of these units is the syntagmatic contrast between a single, more clearly pronounced syllable, and all other syllables of the word.

This contrast between clearer and less-clear pronunciations of syllables is accentuation, and the highlighting of one syllable against the background of others is stress or accent. The more clearly pronounced syllables (or those with a clearer nucleus) are called stressed, and other syllables are called unstressed (see also § 235). Since the nature and structure of accentuation is determined by the stressed syllable, in transcribing we usually use a special symbol only for this syllable; the stresslessness of other syllables is self-evident, since under normal conditions a word has only a single stress.

§ 226. A stressed syllable is the phonological core of a word, and unstressed syllables form its periphery; a stressed syllable can form an independent word, while an unstressed syllable is only a component part of a more complex word, cf.: *Kur̃ tóks jùs vès?* 'Where will that one take you?', *Kàs kàs, tàs lès* 'Who digs, will peck (food)', etc. *Dár tù mán čià kaũk!* 'Cry about this now!', or Ru. *Тут брат взял нож* 'Then brother took a knife' [Ščerba 1974: 176] (see also § 22). Thus, a stressed syllable occupies the same sort of position in a word as a vowel does in a syllable; unstressed syllables in this regard are reminiscent of consonants (see [Girdenis, Žulys 1967: 114 (= Girdenis 2000b: 162) and references]).

§ 227. Some linguists maintain that monosyllabic words in general do not and cannot have stress, since they lack a contrast of syllables pronounced in two ways (see, for example, [Reformatskij 1975: 40–42, 63–64; Pakerys 1967a: 130;[10] Laigonaitė 1978: 9–10]). But it is difficult to support this view. First, applying it consistently, we

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[10] Pakerys later rightly rejected this view (see [Pakerys 1982: 105–107]).

would have to admit that such words and syllables as Fr. *eau* [o] 'water', Gk. *οὖ* 'not', Lat. *i* 'go-2SG.IMP' have no vowels or even syllables: after all, they lack the contrast between vowels and consonants characteristic of syllables. Secondly, if monosyllabic words were to lack stress, they could not have oppositions which are neutralizable in unstressed syllables. But this is not in fact the case. Standard Russian distinguishes perfectly well such minimal pairs as *род* 'kin' : *рад* 'glad', *стол* 'table' : *стал* 'stood, became', and speakers of the Lithuanian Širvintos dialect, such forms as *tuõ* "tuõ" 'that-INS.SG.M' : *tõ·* "tõ" 'that-GEN.SG.M' : *tà* "tà" 'that-NOM.SG.F', although in both cases, these oppositions are neutralized in unstressed syllables in favor of [a]-type vowels (see § 137; cf. also Širvintos *padé.lıs* "puodẽlis" 'cup' , *staraî* "storaî" 'thickly', *stataî* "stataî" 'put, place; build-2SG.PRS' and *púodvs* "púodas" 'pot-NOM.SG', *stó·rvs* "stóras" 'thick, fat-NOM.SG.M', *stá.ta* "stãto" 'put, place; build-3PRS' [Morkūnas 1960: 14–15; Zinkevičius 1966: 69 and 87]). Thus, monosyllabic words, without question, function as stressed, rather than unstressed, syllables. Since stressed syllables in principle contrast syntagmatically with unstressed syllables, we could say that in monosyllabic words the contrast is between an actual stressed syllable and potential, unrealized unstressed syllables (see [Girdenis, Žulys 1967: 114 (= Girdenis 2000b: 162), fn. 5)]). Contrast, on the basis of which we define accentuation, is necessary from the standpoint of the entire system, rather than its individual members. Monosyllabic words would be truly stressless only in a language which lacked disyllabic, trisyllabic, or, in general, polysyllabic words. But this case is not at all interesting, since such a language would not have phonological stress anyway.[11]

Panov's attempt to treat the stress of monosyllabic words as resulting from a neutralization of stressed–unstressed (see [Panov 1972: 20; 1979: 166]; Pakerys seems inclined to agree with him [1982: 107]) is not successful; this is more or less equivalent to stating

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[11] What has been said here about monosyllabic words holds only for so-called orthotonic words (from Gk. *ὀρθός* 'right, correct', *τόνος* 'stress'). Enclitics and proclitics are only component parts of phonological words: a collocation such as *iš namũ* = /išnamũ·/ 'out of the house' or *kuř gi* = /kuř̃gi/ 'where (emphatic)' should be considered a single phonological word (for more detail on clitics, see [Zwicky 1977]).

that in the syllables *ý*-(*-la*) 'awl', *ó*-(*-ras*) 'air', *ū*-(*-žìmas*) 'noise' the opposition of vowels and consonants is neutralized. Moreover, if we were to agree with this explanation, the phonetically and statistically clearly marked stressed syllables (they are far less frequent than unstressed syllables, cf. [Karosienė, Girdenis 1990: 42 (= Girdenis 2001: 25) et passim]) would represent the archiprosodeme in the position of neutralization in question—monosyllabic words.

§ 228. The phonetic properties on which stress is based (that is, the contrast between stressed and unstressed syllables) belong not to the linguistic system, but to the language norm, and therefore from a phonological standpoint they are non-essential, or irrelevant (cf. [Girdenis, Žulys 1967: 113–114 (= Girdenis 2000b: 161f.); Malmberg 1971: 11]). For phonology, it is first and foremost the contrast itself which is important, rather than its phonetic basis. If in every word of some language one and only one syllable always had a voiceless consonant, we would have to consider this syllable stressed and the voicelessness of the consonant a realization of stress. We would treat nasalization in the same way if it were to occur in one and only one syllable in all words of a language. Thus, various phonetic realizations of stress and accentuation are theoretically possible.

However, most often a stressed or core syllable is set off from other (peripheral) syllables by so-called prosodic features, which signal greater overall articulatory energy (subglottal pressure and the like, cf. [Essen 1967: 218 and references; Ladefoged 1967: 1–49; 1975: 223]): vocal strength, pitch and its modulation, articulatory duration (generally together with intensity, cf. [Brovčenko 1966; 1970]), as well as combinations and modulations of these features, sometimes accompanied by certain qualitative phenomena (for example, an absence of reduction, cf. [Žinkin 1958: 239–257; Fry 1965; Kent, Netsell 1971: 43; Zinder 1979: 263–267 and references; Bondarko 1981: 59]). A stressed syllable, and especially its nucleus—a vowel or diphthong[12]—may be pronounced more clearly and forcefully (1) than unstressed syllables; it may be (2) higher (in exceptional cases, lower; see [Allen 1973: 75 and references]) or longer (3) than the "background." Based on these features, traditional, especially historical,

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[12] In general, stress can also be signalled by certain prosodic features of consonants, especially their length (cf. [Janota 1967: 62; Skupas 1967; Tankevičiūtė 1982]). But this is almost always just an auxiliary or secondary signal.

phonetics distinguished (and in part still distinguishes, cf. [Kazlauskas 1968a: 5ff.; Muchin 1976: 54]) dynamic or expiratory stress (1), musical or pitch stress (2), and quantitative stress (3) (for example, [Hirt 1929: 5–6 and references; Zinder 1979: 262–263; Wierzchowska 1980: 133–134]). Historical linguists attached great importance to these distinctions, since it was believed that stress of the first and third type has an almost mystical power to trigger all sorts of reductions in the vocalism of unstressed and especially word-final syllables (cf. [Brugmann, Delbrück 1897: 945–946; Burs'e 1952: 35–36 and 125–128; Doza 1956: 34–35]).[13]

For phonology, these distinctions are not all that important, especially since it has now become clear that there are no "pure" acoustic stress features in any known language (see, for example, [Lehiste 1970: 118; Pilch 1964: 49; Allen 1973: 74 and references; Ladefoged 1975: 223; Pakerys[14] 1982: 134–144 and references]); the comparativists have also begun to come around to this view (for example, [Semeren'i 1980: 86]). But in broader typological and diachronic studies, it can sometimes be appropriate and necessary to distinguish dynamic and non-dynamic phonological stress. For the phonologist, however, dynamic stress is only that stress which is connected with the neutralization of certain types of vowel oppositions, or, in general, a smaller number of vowels in unstressed syllables; the phonetic features of stress do not matter here [Kuryłowicz 1968a: 9; 1977: 225]. For example, experimental studies [Bolinger 1958; Katwijk 1972; Martine 1963: 439–440] have shown that for the perception of stress in English, pitch, rather than vocal intensity, is more important, but phonologists would still consider this stress dynamic, since in fully stressless syllables in this language many vowel oppositions undergo neutralization (on a similar situation in German, see [Lindner 1969: 71]). That there are dynamic aspects to

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[13] Perhaps the most recent echoes of this conception are Kazlauskas's speculative diachronic constructions [Kazlauskas 1968a] (for an analysis, see [Girdenis, Žulys 1972: 194–195 (= Girdenis 2000b: 357ff.)]).

[14] Pakerys [1982] has convincingly shown that Lithuanian stress is "mixed": it consists of a complex set of prosodic features. (It should be recalled that this was intuitively recognized by Polivanov as early as 1924 [Polivanov 1968: 150].)

On the mixed nature of Czech stress, see [Rigault 1972]; on the indistinct nature of "dynamic" stress features in Kazakh, see [Džunisbekov 1987].

the purely "musical" stress structure of Ancient Greek has long been noted (for example, [Hirt 1929: 34–36]).

Of course, dynamic stress understood in this way lacks a greater diachronic explanatory power; it simply describes the facts, without explaining them. Nor does phonetic dynamic, or expiratory stress explain much, since no one has succeeded in observing *in vivo* (naturally, in reality) what happens with a language or dialect which unmistakably has stress of this type. It is also not that easy to establish experimentally what sort of stress a language or dialect has; we almost always encounter complex stress features, possessing both dynamic and non-dynamic characteristics. Therefore, dynamic stress is usually reconstructed only from reductions which have taken place in the past, reflected in a present-day system in various neutralizations. Consequently, starting from reductions, conclusions are drawn about the nature of previously existing stress, and then those very reductions are explained on the basis of stress (cf. [Martine 1963: 219]). This is an obvious logical fallacy.

It should also be noted that in many languages and dialects, a stressed syllable is clearly set off from unstressed syllables only when a word is pronounced alone, or when it has phrasal or at least syntagmatic stress [Pike 1972a: 158–160; Rigault 1972; Bondarko 1981: 55].[15] This is also characteristic of Lithuanian, or at least certain dialects. For example, according to experimental data (obtained together with Regina Kliukienė), dialectal North Žemaitic minimal pairs such as *rìšîs* "*rìšies*" 'tie-2SG.FUT.REFL' : *rišî̃s* "*rišiesi*" 'tie-2SG.PRS.REFL', extracted by a segmentator from connected text, were well distinguished by listeners only in a position of phrasal stress (95.9% correct responses, a 95% confidence interval = 86.4 ÷ 99.9%); the same words, extracted from weak phrasal positions, were identified significantly less well (only 63.7% correct responses, a confidence interval equal to 46.6 ÷ 79.2%; the lower boundary is less than 50%).[16]

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[15] In the speech flow of Ancient Greek it is possible that acute stress on final syllables disappeared in some cases; this would be shown by its replacement by the grave accent, which would have marked the absence of stress (see, for example, [Hirt 1929: 40–41 and 63; Trubetzkoy 1977: 190 = Trubeckoj 1960: 236] (but cf. [Tronskij 1962: 74ff.]).

[16] This has also been confirmed by instrumental (oscillograph) experiments (on the basis of some 400 oscillograms). In strong positions, the stressed vowel

β) TYPES AND FUNCTIONS OF STRESS

§ 229. In standard Lithuanian,[17] accentuation, or more simply, stress, has a distinctive function; as we have seen, it can differentiate words and their forms. This type of stress is called free stress, or, in usual phonological terms, distinctive stress (cf. § 233). The distinctive nature of Lithuanian stress follows from the fact that there are no phonetic or phonological rules which would establish how many syllables can precede or follow a stressed syllable (that is, the core of the word). This makes possible oppositions of various stress patterns, the number of which is greater the more syllables there are in a word. For example, disyllabic words can differ in only two ways: /‾|_/ (*nèši*) and /_|‾/ (*nešì*); in trisyllabic words, a three-way pattern is possible: /‾|__/ (*lìkime*), /_|‾|_/ (*likìme*), /__|‾/ (*likimè*), etc. (cf. [Girdenis, Žulys 1967: 114 (= Girdenis 2000b: 162)]). Russian, Bulgarian, and Serbo-Croatian present the same sort of situation;[18] Vedic Sanskrit, among others, had a similar accentual system.

Stress can also have a distinctive function when its place is limited to the final two or three syllables. In Provençal, for example, only

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of the first syllable is 2.1 dB more intense and 6 semitones higher than the vowel of the second syllable; a final stressed vowel is 0.6 dB more intense and 2.1 semitones higher then the vowel of the first syllable. In weak positions, these differences are considerably reduced: in "pretonic" words, up to 0.21 dB and 0.7 semitones (*rìšî̀s*) and 0.4 dB, 0.0 semitones (*rišî̀s*); in "post-tonic" words, up to 1.2 dB, 1.0 semitones and 0.2 dB, 0.2 semitones respectively. Such insignificant physical differences (especially in "pretonic" words) cannot serve as a reliable support for clear perception. (In greater detail, see [Girdenis 1982a: 184, fn. 19 (= Girdenis 2000c: 279, fn. 19)].)

[17] Likewise in all the dialects (even those characterized by intensive stress retraction; here as well, at least such oppositions as *pamá.ta* "pamãto" 'see-3PRS' : *pá.mata* "pãmato" 'base, foundation-GEN.SG' are perfectly well maintained).

[18] We have in mind mainly the Čakavian dialects of this language; in Štokavian and the standard language, stress is "prohibited" on a final syllable [Garde 1968: 141 and 150ff.; Magner, Matejka 1971: 3–4]).

Here we might remark on the name of the language itself. It is now customary to say and write *serbų-kroatų kalba* 'Serbo-Croatian', on the "European" model, but it is difficult to believe that the form *kroãtai* 'Croats', which made its way into the languages of Western Europe (perhaps during the time of the Crusades) and was distorted along the way, is any more worthy than *chorvãtai*, which is much closer to the original *Hr̀vāt* 'Croat' (pronounced ['xrvaːt]; cf. the Serbian graphic version *Хрвȁт*).

the final or penultimate syllable can be stressed, but minimal pairs such as *arabì*[19] 'a kind of mosquito' : *aràbi* 'Arab' [Fourvières 1975: 40], *garrì* 'oak' : *gàrri* 'rat' [loc. cit., 415] are possible, and therefore stress is unquestionably distinctive. Here, as in Lithuanian disyllabic words, the stress patterns /_⌐/ and /⌐_/, associated with only the final two syllables of a word, contrast. In Modern Greek, one of three final syllables can have stress, and therefore we have only these stress patterns: /(_)|⌐_ _/ (for example: *κάμαρα* 'room', *παράγωγος* 'derivative'), /(_)|⌐_/ (*καμάρα* 'arch', *προγόνι* [proˈɣonɪ] 'step-son') and /(_)_⌐/ (*παραγωγός* 'producer', *προγονή* [proɣoˈnɪ] 'step-daughter')—proparoxytone, paroxytone, and oxytone stress, respectively; in disyllabic words, /⌐_/ (*βάλτος* 'swamp', *κάτης* 'cat') contrasts with /_⌐/ (*βαλτός* 'built', *κατής* 'judge'). Limited free stress differs from the free stress in Lithuanian not in its function, but only in the the number of possible oppositions; in Provençal this number is minimal and in Lithuanian it is maximal. In neither language, however, can the stress pattern of actual words or forms be explained by phonetic or phonemic rules. This is the essence of free, or distinctive, stress.

§ 230. In a certain sense we could say that free or distinctive stress is a typological anomaly: most languages have fixed stress, which plays a culminative and delimitative function (see § 22–23 and [Garde 1976: 379; Bolinger 1978: 480–482]),[20] indicating the number of meaningful units and boundaries.

Fixed stress differs from free stress in that its place can be defined by strict phonetic and phonological rules. Most often, these are quite simple statements indicating only the distance of the stress from the beginning or end of a word. On the basis of this distance, three basic models of fixed stress are distinguished: a) constant stress on the first syllable of a word (or other unit of meaning), b) constant stress on the last (final) syllable, c) constant stress on the next-to-last syllable, the so-called penult (Lat. *paene* 'nearly', *ultimus* 'last').

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[19] Words with final stress are in fact written without a stress mark (*arabi*, and also *garri* 'oak'), since final stress in this language is unmarked; it is far more common than non-final stress.

[20] From Bolinger's data [Bolinger 1978: 481–482] we see that only 13% of the languages which he examined have free stress. 50% of the remaining languages (all with fixed stress, of course) stress the penultimate syllable.

Characteristic of the first type of fixed stress is that no other syllable belonging to the same word can precede the stressed syllable; the number of post-tonic syllables is in principle unlimited. This is the system, for example, in Latvian, Czech, Slovak, Icelandic, Estonian, Finnish, and Hungarian; their accentuation may differ only in a few minor details. In Latvian, for example, a prefix remains unstressed, while in Czech (disregarding certain stylistically motivated exceptions; see [Vachek 1968: 103ff.]), a prefix is considered the first syllable of a phonological word and therefore attracts stress onto itself [Havránek, Jedlička 1963: 34–35],[21] cf.: Latv. '*Uzmeta uz‿'pleciem 'plikādas 'kažociņu un, 'sirmo 'plusku 'bārdeli 'kratīdams, 'gāja 'saņemt 'nelūgto 'ciemiņu* 'He threw a sheepskin coat on his shoulders and shaking his gray dishevelled beard went off to meet the uninvited visitor', Cz. '*Pojedeme 'na‿výlet 'na‿Šumavu 'nebo 'do‿Vysokých 'Tater* 'Let's take a trip to the Šumava or the High Tatras' [Palková 1997: 339] (cf. also Latv. *ap '*mums* 'around us', *pie '*tevis* 'to your place', *uz '*akmens* 'on a rock' and Cz. '*na‿hradě* 'in the castle', '*za‿jizdu* 'for a ride', '*za‿rohem* 'around the corner').[22]

Here the delimitative function of stress is especially obvious and direct. On hearing a stressed syllable, it is always clear that it begins a new word; a group of several unstressed syllables in a row can only belong to a single word.[23]

The other type of fixed stress, which always ends a word, functions analogously; here the number of pretonic syllables is essentially unlimited. This type of accentuation is characteristic, for example, of a

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[21] On the phonetic realization of Czech stress, see, for example, [Ondráčková 1961; Janota 1967]; on the present-day dynamics of this phenomenon, [Vachek 1968: 103–114].

[22] Cf. Serbo-Croatian stress "hopping" (*skakanje*)—the retraction of stress from an initial falling syllable to a preposition: *bräta* 'brother-GEN.SG' : *bèz‿brata* 'without brother', *rûku* 'hand-ACC.SG' : *pòd‿rūku* 'arm in arm', *grâd* 'town' : *ù‿grād* 'to town' [Trubetzkoy 1977: 191 = Trubeckoj 1960: 237; Kuznecov 1970c: 340; Magner, Matejka 1971: 9–12]. Recall the similar prefixal stress in the North Žemaitic dialect, for example: *bà.ga.lvũos* "be galvõs" 'without a head', *ì‿mažẽ.i.k̂ùs* "į Mažeikiùs" 'to Mažeikiai', *sò‿va˙k̃ã˙s* "su vaikaĩs" 'with children'.

[23] In weak positions of allegro-tempo speech, as noted above (see § 228 and fn. 15), the contrast between stressed and unstressed syllables can be neutralized in languages of this type as well.

large number of Turkic languages (for example, [Baskakov 1966: 27]) as well as Armenian, Farsi (and Tajik): Arm. *matenadarán* 'book depository', *t'unavór* 'poisonous', *usucíč* 'teacher' [Tumanjan 1966: 566–567], Farsi *goftán* 'speak-INF', *mādár* 'mother', *pesár* 'son' [Rubinchik 1971: 35]; a number of Romani dialects also have final stress [Ventcel', Čerenkov 1976: 297]. French has a similar stress, except that, as noted above (see § 22), it is not words, but certain semantic word groups, which receive stress [Ščerba 1955: 84–85].

The penultimate syllable is stressed, for example, in Polish. It alerts the listener in advance, as it were, that the following syllable ends the word, for example: '*Jednym z 'licznych ro'dzajów pomie'sza-nia jest mie'szanie atry'bucji z predi'kacją* (L. Zawadowski) 'Among the many types of confusion is the confusion of attribution and predication'. An analogous accentuation type is found in Modern Assyrian: *ärmíltä* 'widow', *parqínva* 'I wanted', *urusnḗta* 'Russian' [Tsereteli 1978: 37], *ктáва* 'book', *хоунáна* 'intelligent' [Arsanis 1968: 493], etc. This is the most widespread model of accentuation (see [Hyman 1975: 209–210; Kuryłowicz 1977: 218] and fn. 20). Its great frequency is explained by the fact that "feminine" word forms provide an excellent foundation for sentence intonation (cf. [Bolinger 1978: 481 and references]; on the statistical tendency of such stress in standard Lithuanian see [Girdzijauskas 1979: 161; Girdenis 1982a: 183–184 (= Girdenis 2000c: 277f.); 1983b: 118 (= Girdenis 2000c: 354f.); Karosienė, Girdenis 1990: 39–40 (= Girdenis 2001: 25f.)]).

In all three of these accentual systems, there can occur words or certain groups of words with stress which violates the general rule. In Latvian, these are expressive words of the type *lē'nītiņām* 'very slowly', *pama'zītiņām* 'little by little, gradually' [Laua 1980: 88];[24] in Farsi, a few particles or conjunctions can have non-final stress, for example: *báli* 'yes', *bálke* 'but', *čérā* 'why' [Rubinchik 1971: 35]; in Polish, we find such exceptions as *gra'matyka* 'grammar', *rzecz-po'spolita* 'republic' [Wierzchowska 1980: 134]. Very often, general stress rules are violated when enclitics are added to words (especially in the second and third systems); they lengthen a phonological word by one or several syllables, and the stress may remain in its original place.

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[24] The "graphic" words *ne'kas* 'nothing', *pa'visam* 'entirely' are in fact collo-cations of proclitic and orthotonic words: /ne kas/, /pa visam/.

§ 231. The fixed stress types reviewed above are so widespread because they best signal word boundaries: initial and final stress indicate these directly, while stress on a penultimate syllable functions as a kind of a warning sign.

From the standpoint of delimitative function, a constant stress fixed on the second syllable (from the beginning), for example, would not be suitable at all, although it is formally possible, since its "mirror image," penultimate stress, is quite normal and frequent. A speaker of a language with this sort of stress would only be able to perceive the boundaries of a phonological word by constantly keeping in mind at least two pretonic syllables—one belonging to the word being uttered, and the other to a preceding word. This, of course, is too great a load on human operational memory, and therefore such stress, in Kuryłowicz's well-grounded view, cannot in general exist [Kuryłowicz 1977: 217] (but cf. [Bolinger 1978: 481–482 (table 2)]). With this in mind, it is difficult to agree with certain studies on Lithuanian dialectal development, which envision, for example, a gradual retraction of Žemaitic stress from the end of a word to the beginning: first to the penultimate syllable, and then to the third syllable from the end, etc., until finally becoming established on the first syllable (for example, [Grinaveckis 1961: 122 et passim]). At one stage of such a development, quite a few words would have consistently stressed the second syllable. This is doubtless not a very realistic reconstruction (cf. also [Girdenis, Rosinas 1974: 192 (= Girdenis 2000b: 394)]).

§ 232. The place of fixed stress often depends not just on word boundaries, but on the quantity of vowels and syllables; there are quite a few languages in which a long vowel attracts stress.

Especially frequent is the accentual model known from Latin: in words of more than two syllables, a penultimate long syllable receives the stress; if this syllable is short, the third syllable, of any length (the antepenult), is stressed: Lat. *dē'lībo* 'I take', *litte'rātus* 'literate' (natural syllable length), *frū'mentum* 'grain', *oc'curro* 'I run, I hurry' (positional syllable length), but *a'cephalus* 'headless (usually regarding a hexametric foot beginning with a short syllable)', *'consono* 'I sound together', *cu'piditas* 'lust, passion', *'exitus* 'exit, end', *no'vācula* 'razor' [Tronskij 1960: 60–62], Akkad. *pa'rāsu*(*m*) 'cut off', *'i'ballut* 'he will recover', *šar'rūtu*(*m*) 'kingdom', but *''iplahū* 'they were frightened', *mu'ballitu*(*m*) 'vivifying', *'nandurum* 'angrily' [Lipin

1964: 42–43], Classical Arab. *ha'lῑfun* 'ally', *mā'sātῑ* 'I found', but *in'tašara* 'spread', *'lafaza* 'cut out', *ma'drasatun* 'school' [Grande 1972: 83, 384]. Words in classical Sanskrit were stressed in almost the same way, except that the fourth syllable from the end could also receive stress (if the second and third were short), for example: *bha'ranti* 'carry-3PL.PRS', *bha'rāmas* 'carry-1PL.PRS', *'bharati* 'carry-3SG.PRS' and *'duhitaram* 'daughter-ACC.SG' [Mayrhofer 1965: 25–26; Zaliznjak 1978: 791].

Stress connected with vowel and syllable quantity can also be governed by other sorts of rules. In Mongolian, for example, the first long syllable of a word receives stress, and if all syllables of a word are short, the initial syllable is stressed, for example: *санáагаар* (*аа* = [aː]) 'thought-INS', *хутагáар* 'fortune-INS', *залýус* 'young-NOM.PL.M', but *бóлиод* 'while stopping', *нúсэх* 'while flying', *хáдам* 'father-in-law' [Kas'janenko 1968: 7–8]. In Even, on the other hand, the first long syllable from the end usually receives stress, and if there are no long syllables the last syllable is stressed: *зȫрмэн* 'double', *мȫминат* 'material for a boat', *гȫмкэнэр* 'let him say', *гудъдмȳр* 'higher', *мȫнтэлсъ̣* 'autumn', *оръклá* 'to the deer' [Novikova 1968: 91ff.]. Punjabi stresses the last non-final long syllable, or, if all syllables are short, the first syllable: *ma'hῑna* 'I', *kalā'kārῑ* 'art', but *'pichalῑ* 'last', *'samasiā* 'question' [Garde 1968: 99–100]. In the Ancient Greek Aeolian dialect (Lesbos), stress depended regressively on the quantity of the final syllable: when the final syllable was long, the dialect stressed the penultimate syllable of a polysyllabic word, and in other cases, the third syllable from the end: *δυνάτω* 'strong-DAT.SG.M', *ποτάμω* 'river-DAT.SG', *πατροκτόνω* 'patricide-DAT.SG', but *δύνατος* 'strong-NOM.SG.M', *πόταμος* 'river-NOM.SG', *πατρόκτονος* 'patricide-NOM.SG' [Schwyzer 1934: 383; Tronskij 1962: 96–97]. Finally, even Lithuanian stress is statistically quite strongly connected with syllable quantity: in many cases stress falls on a long syllable, although there is no deterministic rule connecting stress with quantity [Girdenis 1983b (= Girdenis 2000c: 353ff.); Karosienė, Girdenis 1990: 42 (= Girdenis 2001: 25f.)].

§ 233. There are also languages which generally lack stable stress; the same word can be stressed one way in one context, and another way in a different context. For example, speakers of Komi-Zyrian can quite optionally say *мóртъяслы* 'people-DAT.PL.' =

мортъяслы́ 'id.' = *мортъя́слы* 'id.', and likewise *му́насны* '(they) will go' = *мунасны́* 'id.' = *муна́сны* 'id.' [Tepljašina, Lytkin 1976: 135]. We can give as an example the pair of Ishkashim (Pamir) sentences *awí šьm mɷ̆lɷ̆k vьd* 'He was a lazy person' : *uk mɷ̆lɷ̆k óɣad* 'Some person came'. Here *mɷ̆lɷ̆k* and *mɷ̆lɷ̆k* are fully the same word [Pachalina 1959: 36]. Some linguists assume that Proto-Finno-Ugric also had this sort of accentuation [Lytkin 1964: 234].

Stress in Georgian is also not stable. This is already evident from the fact that specialists in this language still hotly debate its nature and even its place in the word (cf. [Čikobava 1967: 28; Klimov 1979: 113–114; Schanidze 1982: 19; Tevdoraʒe 1978 and references, especially 23–25]).[25] This is confirmed by classical Georgian poetry, in which word stress is often determined by a poem's rhythm, for example Galaktion Tabidʒė writes: *úpasùxe, rom suntkvá xar, ar utxrá ki vísi* 'Answer that you are a breath, but do not say whose', although according to all known theories of Georgian stress, one can only pronounce the individual words, say, *súntkva, útxra*.

Sometimes this sort of undisciplined stress tends to appear in syllables which have more compact vowels. For example, in Komi-Yazvi dialects, *а*, *о*, *э* attract stress rather often (cf. *ва́төг* 'without water', *кэ́ркуйө* 'into the house', *го́жөм* 'summer'), although otherwise stress is quite unstable and has no clearer place [Lytkin 1961: 33].

This undisciplined stress can only have, of course, a culminative function; it can show how many words or other meaningful units there are in an act of speech.[26] As we know, delimitative and distinctive stress types also have this function. Thus, the culminative function of stress is the most important and universal function [Martine 1960: 202; 1963: 442; Martinet 1970: 368; Pilch 1964: 101–102].

§ 234. As noted above, stress which has a distinctive function is least common.

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[25] For example, Čikobava adduces the word *mascavlebeli* 'teacher' with two stresses (*máscavlèbeli*); Šanidze, with only one (*mascavlébeli*).

[26] Somewhat reminiscent of an "absolutely free" stress system are the Žemaitic dialects in the Kvėdarna, Šilalė, and Švėkšna regions, where optional prosodic word variants such as *ĝɛ̀rã· ‖ ĝɛrã· "geraĩ"* 'good, well', *vàkarã·s ‖ vakarã·s "vakaraĩs"* 'in the evenings', *ẑiᶦˌmũos ‖ ẑiᶦmũos "žiemõs"* 'winter-GEN.SG', etc., are used throughout (on this, see § 236, and also, in a broader context, [Pabreža 1984 and references]).

This is apparently explained by a noticeable tendency in the development of many languages to restrict stress freedom gradually, and in the end go over to a purely delimitative stress (cf., for example, [Martine 1960: 215–216; Schane 1972: 221]). This tendency is especially reinforced in conditions of language contact—a free stress system almost always yields to the influence of a fixed stress system; the reverse is even hard to imagine. Of course, in some cases fixed stress can become free, but this usually happens because of a change in vocalism, rather than the development of the stress system itself. For example, Italian and Spanish still have free stress (cf. It. *ancóra* 'still' : *áncora* 'anchor', *péro* 'pear' : *però* 'however' [Muljačić 1972: 108],[27] Sp. *sáno* 'healthy' : *sanó* 'heal-3SG.PST', *córtes* 'palace, parliament': *cortés* 'polite' [Alarcos Llorach 1975: 201–203]), but this is only because they have lost the opposition of long and short vowels, on which, as noted above (§ 232), Latin accentuation depended (cf. [Garde 1976: 501–502]).

γ) SECONDARY STRESS

§ 235. A longer string of unstressed syllables in a single word is not completely monotonic. Certain of these syllables are pronounced more strongly or with higher pitch, others more weakly or lower; in some, a rising shift in pitch and intensity is observed; in others, a falling shift.

The first in the history of linguistics to notice this were the Old Indic phoneticians. The celebrated Pāṇini, for example, divided all Sanskrit words into four classes (see [Barrou 1976: 108–109], cf. also [Kuznecov 1966: 210–211; Zaliznjak 1978: 884–885]). He called the stressed syllable *udātta* 'raised, high', the first post-tonic syllable *svarita* 'sonorous', and the first pretonic (counting from right to left) *sannatara* 'lowered'; the remaining syllables of a longer word are given the general term *anudātta* 'not raised, low'. Their relations are illustrated in table 34. The Vedic Sanskrit word *mandayátsakhas* 'pleasing friends' is used as an example; syllables are counted to the left (−1, −2) and to the right (+1, +2) of the stressed syllable (0).

The table somewhat simplifies the actual situation; for example, it does not show that *svarita*-type syllables had a variable pitch, falling from the *udātta* level to the *anudātta*. But the main thing is clear—the pretonic *anudātta*, separated from the stressed syllable (*udātta*) by the

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[27] Penultimate stress in these languages is very common, and therefore in an ordinary written text it is not marked (for example, in Italian one writes *però* 'however', but *pero* 'pear').

Table 34. Prosodic types of Old Indic syllables

Syllable types	Pretonic		Stressed	Post-tonic	
	−2	−1	0	+1	+2
udātta			***-yát-***		
svarita				*-sa-*	
anudātta	*man-*				*-khas*
sannatara		*-da-*			

very low pronunciation of the *sannatara*, must have been perceived as secondary stress. Together with the *sannatara*, it gave early warning, as it were, that the word's prosodic peak would soon appear; it thus played a role similar to an allophone of a phoneme (cf. § 67).

A similar secondary stress is also found in longer words of present-day languages and dialects; it is especially characteristic of fixed-stress systems. For example, in all known languages words of four syllables with fixed stress at the very beginning receive secondary stress on the penultimate syllable, cf. Latv. 'ada͵tiņa 'needle (dim.)' [Endzelīns 1951: 33], SCr. 'živo͵pīsan 'picturesque' [Trager 1940: 30], Cz. 'naři͵zeni 'decree' [Havránek, Jedlička 1963: 34], Icel. 'kennu͵runum '(to the) teachers' [Bëdvarsson 1962: 950], Est. 'liiku͵mine 'motion' [Kask 1966: 39]. Longer words in languages of this type are also often stressed according to a trochaic rhythm: all odd syllables get secondary stress (cf. [Trubetzkoy 1977: 192 = Trubeckoj 1960: 239; Martine 1960: 207; Garde 1968: 54]). This is also true of Georgian words pronounced in isolation [Tevdoraʒe 1978: 23–24].

A similar arrangement of secondary stresses is characteristic of many of the languages in which primary stress falls on the final syllable. Longer words in Yellow Uighur, for example, are stressed as follows: ͵quzu'ruq 'tail', ͵jaɣan'ɣa 'to the elephant', 'töqqan͵nyŋqy"tan 'from relatives' [Tenišev 1976: 32] (cf. [Baskakov 1966: 27]). Nor is this tendency alien to the so-called hyperdactylic words of Lithuanian (that is, words in which primary stress is on the fourth syllable from the end, cf. [Karosienė, Girdenis 1990: 38–39 (= Girdenis 2001: 22f.)]); in careful listening to words such as *Grìškabūdis* [place name], *pùskepalis* 'half loaf', *mókytojas* 'teacher', a fairly clear secondary stress can be heard on the syllables *-bū-*, *-pa-*, *-to-*; a narrower transcription of these words would be ['gr̃iška͵b°ũ·d̂is], ['p°ùŝK̂æ͵pàl̂is], ['m°ó·k̂i·͵t°ó·ɹæs] (cf. [Kurschat 1876: 64–65; Grinaveckienė 1957: 132]). Experiments show that there is a similar (if somewhat weaker)

secondary stress in pretonic syllables as well (cf.: *lupinė́jo* = [ˌlu̯p̂i'n̂ę̇·ɪ̯oˑ] 'strip off-3PST', *pasisukinė́jo* [ˌpa͡ʃiˌsu̯k̂i'n̂ę̇·ɪ̯oˑ] 'make a few turns-3PST'; see [Girdenis, Pupkis 1994 (= Girdenis 2001: 387f.); Bacevičiūtė 2001: 28ff.]. In the North Žemaitic dialect, trochaic secondary stress is so clear that it even lengthens the vowels *a, e, ę, ǫ* and creates conditions for a tonal opposition, cf. 'pòsk̂æˌpȧ.l̂ʲs "*pùskepalis*" 'half loaf', 'vèʃtvaˌnȧ.ĝʲʲs "*vìštvanagis*" 'chicken hawk', 'pòzbeˌprũot̂ʲs "*pùsbeprotis*" 'half-wit', cf. also: 'mú̯ok̂i.ˌt̂u̯oɪ̯ᵉ "*mókytojo*"[28] 'teacher-GEN.SG' : 'mú̯ok̂i.ˌt̂u̯oɪ̯ᵉ "*mókytojo*" 'taught-GEN.SG.M.PNL' (for details, see [Girdenis 1966b: 57–59 and references (= Girdenis 2000b: 59f., 63)]). Such stresses are fairly frequently marked in Daukša's *Postil* [*Postilla Catholicka*, Vilnius, 1599—TRANS.], for example: *kríkßtitóias* "*krìkštytojas*" 'baptist' 17₃₇, *Prânaßâwo* "*pranašãvo*" 'prophesy-3PST' 19₄₋₅, *tóbuɫúmo* "*tobulùmo*" 'perfection-GEN.SG' 74₁₉ [Girdenis 1984 (= Girdenis 2000c: 356f.)]. They can also be observed in North Russian dialects [Paufošima 1983: 65–66].

Perhaps the most subtle and ingenious account of the hierarchy of primary and secondary stress is that of metrical phonology, which operates with concepts of the relative prosodic weight of all sorts of noteworthy metrical feet and their components (most often syllables) (cf. [Roca 1994: 204ff.]). But a more detailed analysis of their interpretations would take too much space; moreover, we do not yet have preliminary studies of this type in Lithuanian linguistics.

A sort of framing stress, with weak "dynamic" stress on the first syllable and secondary "musical" stress on the final syllable, has been observed in Udege (Russian Far East), for example: *jə́ʓдигə̀* 'boy', *úсэвэсинку̀* 'pointer', *ку́сигэвэнѝ* '(his) knife-ACC.SG' [Sunik 1968: 213]; it is also characteristic of Korean (cf. [Polivanov 1968: 158–159]). This is quite similar to the combining of primary and secondary stress among many Žemaitic speakers (see § 23).

The above secondary stresses are all slavishly dependent on the primary stress, and therefore do not play an independent role; like the Sanskrit pretonic *anudātta*, they only highlight primary stress and its function, especially the delimitative one.[29] French phonologists and

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[28] In many places, *mú̯oki.tu̯ȯjâ.us* is more common.

[29] In addition, secondary penultimate stress helps realize the final contour of sentence intonation (like primary stress in this position; cf. § 231 and references).

accentologists therefore aptly call this regular emphasis on certain pre- and post-tonic syllables echo stress (Fr. *l'écho de l'accent* [Martine 1960: 207; Garde 1968: 53–57, 152 et passim]; cf. also Hirt's *Gegenton* [Hirt 1929: 16–17]).

§ 236. Non-phonological secondary stress, or echo stress, is almost always weaker or lower than primary stress. However, this is only a statistical, rather than "dynamic" pattern. In some (relatively rare) cases, this echo can also be more salient than phonological stress. This is the situation, for example, in North Žemaitic and in part South Žemaitic words like *ĝæ̀rã·* "*geraĩ*" 'good, well', *pàrašã·* "*parašaĩ*" 'signature-NOM.PL', *kàłakọ̀ts* "*kalakùtas*" 'turkey', etc. [Girdenis 1967b: 119–120 (= Girdenis 2000b: 110f.); 1967c: 31 (= Girdenis 2000b: 76); 1971b: 23–24 (= Girdenis 2000b: 214)]. The stress of the first syllable is unstable, since it shifts to a proclitic (cf. *nè̤ĝæ̀rã·* "*negeraĩ*" 'not well', *ìš‿łaukũ·* "*iš laukų̃*" 'from the fields', *nè‿kałakọ̀ts* "*ne kalakùtas*" 'not a turkey'), and can disappear in emphasis (for example, *ĝæ̀rã· bû·s!*[30] "*geraĩ bùs*" 'it will be good!'). Moreover, it is quite easily predictable from the stress, quantity, and pitch accent of the final syllable. Therefore, phonological stress is on the final syllable in these words: *ĝæ̀rã·* = /ĝerã·/, *pàrašã·* = /parašã·/, *kàłakọ̀ts* = /kalakọ̀ts/. In the first syllable, we have only an echo of this stress, with delimitative function and signalling that the word ends in a short or circumflex syllable with phonological stress.[31] The role of

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[30] See § 233, fn. 26. The likelihood of an absence of initial stress depends on many factors (investigated in detail in Juozas Pabrėža's above-mentioned dissertation [Pabrėža 1984] and in articles published on this topic, for example, [Pabrėža 1980; 1981; 1982; 1984]). What is important here is that all forms of this type can be uttered with just a single (final-syllable) stress (see also [Jablonskij 1897: xxxvi; Rokaitė, Vitkauskas 1967; Grinaveckis 1973: 36; Girdenis, Rosinas 1974: 189–190 (= Girdenis 2000b: 389ff.); 1976: 189 (= Girdenis 2000c: 14f.); Girdenis, Piročkinas 1977–1978: 34–35 (= Girdenis 2000c: 32f.)]).

[31] Kazlauskas attempted to explain these phenomena differently, though hardly successfully [1968a: 21ff.] (for comments, see [Girdenis, Žulys 1972 (= Girdenis 2000b: 355ff.); Girdenis, Rosinas 1980: 195 (= Girdenis 2000c: 198ff.)]). An especially weighty argument demonstrating the non-phonological nature of retracted stress is that in Telšiai dialects this stress does not block the neutralization of vowel quantity oppositions, cf. *vã·kọ̀.u* "*vaĩkui*" 'child-DAT.SG' : *tàkọ̀.u* "*tãkui*" 'path-DAT.SG', *vàkã·* "*vaikaĩ*" 'child-NOM.PL' : *tàkã·* "*takaĩ*"

echo stress here is essentially the same as the hard or soft pronunciation of an initial consonant in cases like *r̂ę́.t̨ęn̂ǫ̀* "*rìtiniu*" 'roll, scroll-INS.SG' : *r̨ę́.t̨ęnǫ̀* "*rìtinu*" 'roll-1SG.PRS' (cf. § 220).

Garde even considers Serbo-Croatian rising tones, or pitch accents, echoes of a following syllable stress (cf. § 250). In his view, for example, SCr. *grâdu* 'town-DAT.SG' = /'grādu/, *grádu* 'town-LOC.SG' = /grā'du/, etc. [Garde 1968: 152 et passim] (for critical remarks, see [Magner, Matejka 1971: 34]).

§ 237. Distinctive secondary stresses, independently performing a representative function, should be strictly distinguished from echoes of primary stress.

Culminative secondary stress is very characteristic of the Germanic languages. Perhaps the simplest secondary stress system is that of standard German (see § 22), in which every word, on becoming a component of a compound word, retains its stress [Trubetzkoy 1977: 192–193 = Trubeckoj 1960: 239; Lehiste 1970: 104; Martine 1963: 443; Martinet 1970: 367; Garde 1968: 75–79]. The stress of the first component usually becomes the primary, strongest stress, and a certain hierarchy emerges among the secondary stresses, reflecting the word's "derivational history" (or, in simpler terms, the derivational hierarchy of the components). For this reason, in words of more complex derivation, several layers of secondary stress are possible (secondary, tertiary, etc.).[32] For example, the word '*Feder‚halter* 'penholder'[33] has two stresses—a primary (') and a secondary (‚)—since it is formed from two words, '*Feder* 'feather, pen' and '*Halter* 'holder'. "*Vater‚-lands'liebe* 'love for the fatherland' has three stresses: a primary ("), a secondary (') and a tertiary (‚) [Martinet 1970: 367]. This word consists of the components '*Vater‚land* 'fatherland' and '*Liebe* 'love'. The first component is in turn formed from the words '*Vater* 'father' and '*Land* 'land'. Still more complex is the word "*Bahn‚hofs'vor‚steher*

'path-NOM.PL' and *vakâ.ms* "*vaikáms*" 'child-DAT.PL' : *takâ.ms* "*takáms*" 'path-DAT.PL' (see, for example, [Girdenis 1962: 141, fn. 2 (= Girdenis 2000b: 16f., fn. 2); Rokaitė 1962; Zinkevičius 1966: 41; Grinaveckis 1973: 95–96]).

[32] The hierarchy of secondary stresses is strictly maintained only in clear speech (cf. [Ščerba 1957: 21ff.; 1974: 141ff.]). In allegro style, it is significantly levelled, since it is affected by various rhythmic factors.

[33] Here and below, the German examples (except for a few rarer cases) are presented after [Siebs 1969].

'stationmaster'. Its structure and stress hierarchy is most clearly shown in a tree diagram (see figure 26).
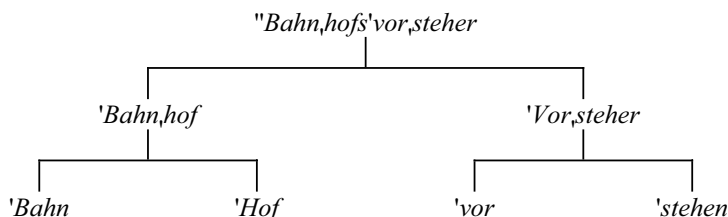

Figure 26. Prosodic structure of the German word *Bahnhofsvorsteher*

As we see, in a compound word, only the first component retains its normal salience; the other components are "lowered" approximately one degree. Compound words are similarly stressed in English, Danish, and Swedish, and even in some non-Indo-European languages (for example, Finnish, Hungarian), only in the latter, phonetic and rhythmic factors have a stronger effect on the prosodic structure of words, making it less obvious.

This sort of stress is quite alien to Lithuanian (and also many Slavic languages, such as Bulgarian and Russian [Maslov 1956: 24–25; Švedova 1980: 91]). Exceptions include only numerals such as '*kẽturias˳dẽšimt* 'forty', '*peñkias˳dẽšimt* 'fifty', and a few longer internationalisms, for example ˳*aũtosu*'*gèstija* 'autosuggestion', ˳*nìtroglice-*'*rìnas* 'nitroglycerin', ˳*ràdio*'*tèchnika* 'radio engineering', or such hybrids as ˳*sùperlai*'*dùmas* 'superconductivity'. For speakers of Lithuanian, stress is a clear signal of an independent word, and therefore structures with phonological secondary stresses of this sort are perceived as a kind of foreign body.[34] This is explainable at least in part by a periodically recurring conversion of more frequent words of this type into word collocations: ˳*kìnote*'*ãtras* 'movie theater' → *kìno teãtras*, ˳*kìnome*'*chãnikas* 'projectionist' → *kìno mechãnikas*, ˳*ràdio*'*tèchnika* 'radio engineering' → *rãdijo tèchnika*.

§ 238. Phonological secondary stress is found not only in the components of compound words; certain affixes may have it as well:

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[34] Exceptions are only words like ˳*tèle*'*pãtija* 'telepathy', ˳*tèle*'*grãfas* 'telegraph', where the secondary stress coincides with the trochaic echo of primary stress. Lithuanian speakers usually do not even notice this stress here.

cf. Ger. '*Frei͵heit* 'freedom', '*Büch͵lein* 'book (dim.)', etc., where the suffixes *-heit* and *-lein* receive secondary stress [Siebs 1969: 115]. This is so-called morpheme stress, which stands in opposition to the absence of stress and to normal word or phrasal stress [Martinet 1970: 367;[35] Ginzburg 1971; Girdenis, Rosinas 1974: 198 (= Girdenis 2000b: 401)] (cf. [Boduèn de Kurtenè 1963: vol. 2, 142]).[36]

This secondary morpheme stress is not quite alien to Lithuanian and its dialects. Speakers of North Žemaitic, for example, distinguish quite well such forms as nominative singular *dôunà* "*dúona*" 'bread', *šâ.rkà* "*šárka*" 'magpie' and accusative singular *dô.un^a* "*dúoną*," *šâ.rk^a* "*šárką*" [Girdenis 1966c (= Girdenis 2000b: 310f.); 1967b: 121f. (= Girdenis 2000b: 111f.); 1971b: 22–23 (= Girdenis 2000b: 213); Grinaveckis 1973: 71]; and speakers from the West Aukštaitic Kaunas region, nominative plural *klė́tys* 'granary', *diȓvos* 'soil' and locative plural '*klė́͵týs*, '*diȓ͵vós*. Listening experiments performed following the methodology described in § 45–48 have shown that even East Aukštaitic Utena speakers distinguish quite well such forms as third person (*á.nas*) *klíedi, kó·s̃ti, sé·d̃i* "(*jis*) *klíedi, kósti, sédi*" '(he) is delirious, coughs, sits' and second person (*tu*) '*klíe͵d̃ì, 'kó·͵s̃tì, 'sé·͵d̃ì* "(*tu*) *klíedi, kósti, sédi*" '(you) are delirious', cough, sit', or nominative plural *bó·ba.s* "*bóbos*" 'women', *ká.ȓvæ.s* "*kárvės*" 'cows' and genitive singular '*bó·͵bå.s*, '*ká.ȓ͵ṽæ.s* [Kosienė, Girdenis 1979 (= Girdenis 2000c: 141ff.)]. Spellings in Old Lithuanian texts such as Donelaitis's genitive singular *Ganyklôs* "*ganỹklos*" 'pasture' 282$_4$,[*] *Piewôs* "*píevos*" 'meadow' 281$_{26}$ (cf. nom. pl. *Ganyklos* "*ganỹklos*" 282$_{10}$, *Piewos* "*píevos*" 289$_{22}$) apparently also reflect a marking of secondary stress, rather than a purely morphological diacritic (as is generally assumed, cf. [Palionis 1979: 22]). Secondary morpheme stress is also undoubtedly shown by such spellings in Daukša's *Postil* as genitive singular *Dwâſiós* "*dvãsios*" 'spirit' 53$_{29}$, instrumental singular *kûnú̜* "*kū́nu*" 'body' 47$_{43}$, genitive plural *ámʒiú̜* "*ámžių*" 'ages' 127$_{18}$ (see [Girdenis 1984 (= Girdenis 2000c: 356f.)]).

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[35] Martinet uses the term *moneme stress*, but a *moneme* in his system ≈ *morpheme* (see, for example, [Martine 1963: 453ff.]).

[36] Cf. also [Grinaveckis 1975: 194–195, fn. 18] and [Girdenis, Rosinas 1976: 192 and fn. 16 (= Girdenis 2000c: 18 and fn. 16)].

[*] Examples cited according to *K. Donelaitis. Raštai*. Vilnius: Vaga, 1977— TRANS.

In all these cases, secondary stress contrasts with absence of stress, and therefore differentiates word forms.

Characteristic of North Žemaitic dialects is a highly complex system of phonological and non-phonological stresses. It is as if Baltic (and Slavic) and Germanic prosodic tendencies intersect here. The most characteristic feature of a derived word in this dialect is the preservation of suffixal stress even when the basic stem (most often the root) receives primary stress: cf. genitive singular *gȯ.dęn^a* /gȯdęna/ "*Gùdino*" [surname] : third person *gòdę̇.n^a* /gȯdęna/ "*gùdino*" 'trained', genitive singular *põˑrvęn^a* /põrvęna/ "*puřvino*" 'muddy' : third person *põˑrvę̇.n^a* /põrvęna/ "*puřvino*" 'soiled' and *gadę̇.n^a* "*gadino*" 'ruined', *šoŋ̂k̂ę̇.n^a* "*šankìno*" 'caused to jump' (in detail, see [Girdenis 1966b (= Girdenis 2000b: 56ff.); Girdenis, Rosinas 1974: 193 (= Girdenis 2000b: 394); Bukantis 1983]). A similar situation apparently once existed in the Aukštaitic dialect as well: cf. examples from Daukša's *Postil*: *átſiúſiu* "*atsiũšiu*" 'send-1SG.FUT' 215₂₁, *grînúmą* "*grynùmą*" 'penury-ACC.SG' 79₃₂, *paſwéikíno* "*pasveĩkino*" 'make healthy-3PST' 368₁₁ [Girdenis 1984 (= Girdenis 2000c: 356f.)].

δ) SUMMARY REMARKS

§ 239. In concluding this survey of accentual phenomena it must be said that there is no categorical boundary between the various functions performed by stress. Both purely culminative and delimitative stress and the relatively rare distinctive stress help differentiate, shape, and perceive referential meaning. This becomes quite clear as soon as we begin to compare not only similar sounding words, but also word phrases and sentences. For example, the following Lithuanian phrases and words are distinguished only by stress: *dù rìs* 'two will swallow' : *durìs* 'door-ACC.PL', *ką̃ ràs* 'who/what will he/she/they find?' : *kãras* 'war', *kuř̃ pėlės* 'where are the mice?' : *kurpėlės* 'sabots (dim.)', *kuř̃ šìs* 'where is this one?' : *kuř̃šis* 'Couronian', *tą̃ leñtą* 'that board-ACC.SG' : *tãlentą* 'talent-ACC.SG' or such sentences as *Tù mùlas?* 'Are you a mule?' : *Tùmulas?* 'A lump?', *Íeško tà kẽlio* 'That one (fem.) is looking for the road' : *Íeško takẽlio* 'He/she/they is/are looking for a path', *Paim̃k sáu ją̃* 'Take it for yourself' : *Paim̃k sáują* 'Take a handful', *Pradék tù skìnti* 'Begin to pick' : *Pradék tùskinti* 'Begin to shake'. The presence of two stresses immediately shows that we are hearing a phrase, and at the same time strictly separates it from

independent words, which can have only one clear stress[37] (cf. [Ondráčková 1961; Garde 1968: 8–9; Muljačić 1973: 220–221]). Thus on the phrase or sentence level, the culminative stress function merges with the distinctive function, or directly develops into it.

In this respect, there is no difference between free and fixed stress: Latv. *'tu 'pele* 'you are a mouse' : *'tupele* 'slipper' and Cz. *'je 'den* 'it is day' : *'jeden* 'one' (cf. also Swed. *làma djúr* 'lame animals' : *làmur* 'llamas' [Bruce 1977: 12–13]) differ in stress in precisely the same way as Lithuanian *tù mùlas* and *tùmulas*. Thus, all types of stress share a basic function: to distinguish phrases from individual words.[38] Apparently the reason that free stress is so rare is that it is functionally too complex, since it must simultaneously perform a twofold duty: one which is characteristic of stress alone and one which is usually performed by phonemes and their distinctive features.

Keeping in mind these obvious facts, we must negatively assess incautious attempts to consider as phonological only stress which distinguishes words and their forms (distinctive function) (for example, [Kazlauskas 1968a: 13ff.], and among theoretical works on phonology [Hyman 1975: 204]). Such a view turns a secondary function, not particularly characteristic of stress, into a primary one (cf. [Ginzburg 1966: 102]). Only the secondary stress which, following Garde, we have called echo stress, can be truly non-phonological (see § 235).

b) PITCH ACCENT AND TONE

α) THE CONCEPT OF PITCH ACCENT AND TONE.
THE PITCH ACCENT SYSTEM OF LITHUANIAN.

§ 240. Knowing only the place of stress, we can easily stress and pronounce only those Lithuanian words in which the syllable nucleus

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[37] In such cases we ignore secondary stress; what is important is just primary stress; cf. Eng. *'black‚bird* : *'black 'bird*, *'black‚board* : *'black 'board* [Trager 1941: 137–138; Trager, Bloch 1972: 75–76].

[38] It is interesting that in the North Žemaitic dialect, the phrase : word opposition remains even when the first syllable receives a strong echo of phonological stress, cf. *và͜kũˑ!* "*Và ką!*" 'I say!' ≠ *vàkũˑ* "*vaikų̃*" 'child-GEN.PL' (Tirkšliai, etc.). This demonstrates especially clearly that the first syllable of forms of the *vàkũˑ* type do not have phonological stress (see § 236).

is a short (lax) vowel with no sonorant (i.e., *R*-type) consonant in the coda. These are words such as *Danùte* 'Danutė-VOC' : *Danutè* 'Danutė-INS', *lùpa* 'peel-3PRS' : *lupà* 'magnifying glass', *pàlikta* 'left-N' : *paliktà* 'left-NOM.SG.F', *sunèšti* 'bring together-INF' : *suneštì* 'brought together-NOM.PL.M', *vìsa* 'all.N' : *visà* 'all-NOM.SG.F'. The stressed syllable can be pronounced in various ways—more abruptly or smoothly, higher or lower, a bit longer or shorter, with rising or falling pitch, but the referential meaning of the word will not thereby change; only the emotional or expressive coloration of the words or forms may change. Thus, words of this type do not differ from Russian, English, or standard German words, which may differ only in place of stress, but not in its actual phonetic realization. For example, in pronouncing Russian *со́рок* '40', what is important is what distinguishes this word from the word *соро́к* 'magpie-GEN/ACC.PL'; other specific features of the stressed syllable are phonologically irrelevant. The same can be said regarding the stress of such word pairs as Bulg. *въ́лна* 'wool' : *вълна́* 'wave' [Maslov 1956: 23–24], It. *capíto* 'turn up-1SG.PRS' : *cápito* 'understood' [Muljačić 1972: 103] (for more examples, see § 234 and [Lichem 1970: 126–130]), Rom. *copíi* 'children' : *cópii* 'copies' [Reychman 1970: xviii], Eng. 'transport : trans'port [Trager, Bloch 1972: 75], Ger. 'gebet 'give!' : Ge'bet 'prayer' [Garde 1968: 6]; in these as well, it is only the place of stress that has distinctive function, and not how a stressed syllable is pronounced. Even variations in unstressed syllables—greater or lesser reductions, various neutralizations—has no independent function; they only highlight the stressed syllable, increasing the contrast which forms the essence of stress[39] (on this in Russian, see [Bondarko, Verbickaja, Zinder 1966], in Catalonian [Mascaró 1978: 25–30]).

In all these cases, various stress models are the only prosodic units which can differentiate words which are otherwise identical in expression.

§ 241. The situation in Lithuanian becomes far more complex as soon as we proceed to words in which the syllable nucleus (normal or extended) is a long (tense) vowel or a combination of short vowel and coda sonorant, rather than a short vowel. Even the most precise tran-

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[39] Garde has aptly termed such phenomena negative accentual processes (*les procédés accentuels négatifs*) [Garde 1968: 57ff.].

scription will not help us read and understand, without context, such representations as ['ˈđi·kt̂i], ['kˈɫ̊o·ŝt̂ę·], ['rˈu·ksta], ['vˈo·kt̂i] (or ['wo·kt̂i]), ['kˈ̊ur̂p̂ę·], [iŝˈv̂ir̂si], since it is not clear how the stressed syllables or their nuclei should be pronounced. If we pronounce them more abruptly and energetically, we will have the words *dýgti* 'sprout-INF', *klóstė* 'spread, cover (with)-3PST', *rū́gsta* 'turn sour-3PRS', *vókti* 'gather in-INF', *kùrpė* 'sabot', *išvìrsi* 'boil-2SG.PRS'; if we pronounce them more smoothly, in a more continuous and drawled manner, we will have words of completely different meaning: *dỹkti* 'become spoiled (of a child)-INF', *klõstė* 'pleat', *rū̃ksta* 'smoke-3PRS', *võgti* 'steal-INF', *kur̃pė* 'botch, bungle-3PST', *išvir̃si* 'overturn, tumble-2SG.FUT'. Thus the twofold (abrupt or smooth) pronunciation of the nucleus of a stressed syllable has a distinctive function in Lithuanian—it distinguishes referential (lexical or grammatical) meaning.

If the above properties were to differentiate only those words in which the nucleus of a stressed syllable consists of long vowels, we could say that Lithuanian has two types of long vowel phonemes, which are distinguished, for example, by the binary distinctive feature "smooth" (/ĩ· ę̃·…/)–"non-smooth" (/í· ę́·…/) or "abrupt" (/í· ę́·…/)–"non-abrupt" (/ĩ· ę̃·…/). The choice of one or the other feature pair would depend on further phonological analysis, which would have to show which phonemes should be considered marked members of these oppositions and which should be considered unmarked. The fact that these oppositions are realized only in stressed syllables[40] is not particularly important, since unstressed syllables often form a position of neutralization for various vowel phonemes (see § 137 and 227), cf. EAukšt. Širvintos *pȧ·dvs* "*pãdas*" 'sole (of foot)' ≠ *púɔdvs* "*púodas*" 'pot', but *padȧ̇·l̂ıs* "*padėlis*" 'sole (dim.)' = *padȧ̇·l̂ıs* "*puodėlis*" 'cup', EAukšt. Kupiškis *kɔ́ɹæ* "*kója*" 'foot, leg' ≠ *kúɔɹæ* "*kúoja*" 'roach (fish)' but *kɔ·ɹȩ̇·ła·* "*kojėlė*" 'foot, leg (dim.)' = *kɔ·ɹȩ̇·ła·* "*kuojėlė*" 'roach (fish)(dim.)' (see § 143). Since in unstressed syllables, vowels close to the smooth ([ĩ·]-type) vowels of stressed syllables usually occur, the marked members should be considered the more abrupt ([í·]-type) vowels, and the unmarked members the smooth vowels. This conclusion is also confirmed by stressed endings, where almost only [ĩ·]-type vowels are found.

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[40] This is the generally accepted view, but cf. § 244, fn. 48.

Such an interpretation seems quite reasonable and logical; it is not for nothing that it has been proposed in Lithuanian scholarly works (for example, [Dambrauskaitė 1957]). But the illusion of acceptability immediately dissipates when we recall that similar features distinguish not only those syllables formed by long vowels, but also those in which a short vowel is followed by a coda sonorant, that is, when a *VR*-type sequence is formed, for example: *grùmdė* [gˑrˑúm̂dẹ·] 'rumple-3PST' : *grum̃dė* 'washboard', *kùrpė* [kˑúr̂p̂ẹ·] 'sabot' : *kur̃pė* 'botch-3PST', *nuskùrsi* [nˑusˑkˑúr̂ŝi̜] 'become poor-2SG.FUT' : *nuskur̃si*, *skìrtas* [ŝk̂ĭrtas] 'separated; devoted' : *skir̃tas* 'difference', *šiùrpis* [ŝˑúr̂p̂i̜s] 'dishevelled person' : *šiur̃pis* 'shudder', *vìrsi* [v̂îr̂ŝi̜] 'boil-2SG.FUT' : *vir̃si* 'overturn, fall-2SG.FUT', etc. It would be hopeless here to try to assign a distinctive feature of intensity or duration to some phoneme, since greater or lesser vowel intensity and greater or lesser length and salience of a sonorant are in complementary distribution (see table 35), which clearly shows that, for example, [ì] and [i], and [r̃.] and [r], are allophones of the same phonemes. There is only one correct way out: to assign to all syllables the distinctive properties of all the above minimal pairs and consider them prosodic units differentiating entire syllables, rather than individual phonemes.

Table 35. Distribution of vowels and coda sonorants in Lithuanian stressed syllables

Sound types	Positions				Interpretation
	[—R̃.]	[—R̆]	[V̀—]	[V̆—]	
[i]	+				/i/
[i]		+			
[r]			+		/r/
[r̃.]				+	

Phonetic similarity and especially functional identity[41] suggest that the same prosodic units should also be assigned to the syllables examined above which are formed by long vowels, as well as to such minimal pairs as *káltas* [ká.łtas] 'chisel' : *kal̃tas* 'guilty', *láuk* [łá.ukˑ]

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[41] Cf. the identical accentuation of such forms as *blỹną* 'pancake-ACC.SG' : *blynùs* 'pancake-ACC.PL' = *pir̃štą* 'finger-ACC.SG' : *pirštùs* 'finger-ACC.PL' and *výrų* 'man-GEN.PL' : *výrus* 'man-ACC.PL' = *tìltų* 'bridge-GEN.PL' : *tìltus* 'bridge-ACC.PL'.

'wait-2SG.IMP' : *laũk* 'get away!', *mérkti* 'shut one's eyes-INF' [m̂ɛ́.r̂kt̂i̯] : *mer̃kti* 'soak-INF', *pláutas* [pɫá.utas] 'rinsed' : *plaũtas* '(sauna) shelf', where the left-hand members have a more salient and somewhat lengthened vowel [Pakeris, Plakunova, Urbelene 1972: 23; Pakerys, Plakunova, Urbelienė 1974: 8–10 and 14; Pakerys 1982: 158–163], which always shortens in unstressed position, cf.: [ká.ɫtas] 'chisel' : [kaɫ̂t̂ɛ̃·l̂i̯s] "*kaltẽlis*" 'chisel (dim.)', [m̂ɛ́.rkˑ] "*mérk*" 'shut one's eyes-2SG.IMP' : [m̂er̂k̂i̯mas] "*merkìmas*" 'shutting (one's eyes)'.[42]

These prosodic syllable units, differentiating otherwise identical syllables and words, are called pitch accents or tones [Martine 1963: 434–437; Girdenis, Žulys 1967: 114–115 (= Girdenis 2000b: 163); Muljačić 1973: 217–218]. The actual phonetic properties by which these prosodic units are distinguished are not crucial; what is important is that they distinguish units larger than the phoneme—syllables. Pitch accents are usually best distinguished by so-called prosodic features: modulations of pitch, loudness (intensity), and quantity (cf. [Girdenis, Pupkis 1974 (= Girdenis 2000b: 272ff.)], and especially [Pakerys 1982: 182–184 et passim]), but under certain conditions, qualitative features of a syllable nucleus and their modulations can have great, even decisive weight: see [Pakerys 1967b; 1968; 1974b; 1982: 184 et passim]; cf. also [Robinson 1968].[43]

The traditional view of acute (or abrupt) accent as falling or strong-initial [*tvirtapradė*] and circumflex (or smooth) as rising or strong-final [*tvirtagalė*] is objectively hardly demonstrable (cf. [Purcell 1971; 1973; Girdenis, Pupkis 1974: 118 (= Girdenis 2000b: 281)]). But if we view the realization of these pitch accents as a kind of modulation of a phrasal intonation contour—the fragment corresponding to the basis of the pitch accent—this approach may seem quite acceptable. Acute (´) is perhaps a falling accent not in an absolute sense, but only from the standpoint of a "neutral" intonation

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[42] Here also, this interpretation is nicely supported by functional identity, cf. *tvìrtą* 'firm-ACC.SG' : *tvìrtus* 'firm-ACC.PL' = *stórą* 'thick-ACC.SG' : *stórus* 'thick-ACC.PL' = *kárštą* 'hot-ACC.SG' : *kárštus* 'hot-ACC.PL', but *tir̃štą* 'dense-ACC.SG' : *tir̃štùs* 'dense-ACC.PL' = *dõrą* 'honest-ACC.SG' : *dorùs* 'honest-ACC.PL' = *kal̃tą* 'guilty-ACC.SG' : *kaltùs* 'guilty-ACC.PL'.

[43] Pakerys's work [1982] frees us from the need to stop in greater depth on these issues. The main conclusion of this study should be strongly emphasized: stress and pitch accent in the standard language are phenomena of a mixed phonetic nature.

contour, while circumflex (˜) is rising from the standpoint of a falling or neutral contour. In rising sentence fragments both pitch accents, as purely phonetic phenomena, can be rising, and in falling fragments, falling, although the rising or falling of one will differ from the rising or falling of the other (cf. [Martinet 1970: 364; Ivić 1987: 474]).

Kazlauskas [1968a: 7, 29–30] (seemingly uncritically following Jakobson [Jakobson 1963a: 159 et passim]) tried to derive Lithuanian pitch accents from an opposition of higher (acute) and lower (circumflex) tone, preserved, in his view, in the Žemaitic dialect. Experiments have not confirmed this hypothesis; Žemaitic (at least northern) pitch accents differ in the relative abruptness of a change in all acoustic features (especially overall acoustic energy) and a different concentration of energy: the energy of the acute is concentrated at a single point in a syllable nucleus and changes very abruptly; circumflex is a non-abrupt accent of non-concentrated energy. The differences in relative pitch height are quite insignificant and without question secondary (see [Girdenis 1974: especially 186 (= Girdenis 2000b: 300ff.) and references]). A certain rise in pitch in acuted syllables is easily explained as a side effect of its glottalization ("breaking") (cf. [Pike 1947: 106]).

Sometimes the terms *syllable intonation*, *syllable accent*, or even *syllable stress* are used as synonyms of *pitch accent* or *tone*. The term *syllable stress*, because of its novelty and vagueness, became very fashionable a dozen or so years ago and even misled a number of specialists in Baltic linguistics (cf. [Kazlauskas 1968a: 20 et passim; Grinaveckis 1973: 125ff.; Girdenis, Žulys 1972: 197 (= Girdenis 2000b: 361f.); Girdenis, Rosinas 1974: 197–198 (= Girdenis 2000b: 401); 1976: 190 and fn. 10 (= Girdenis 2000c: 16 and fn. 10)]). Where pitch accents are distinguished only on stressed syllables, there is sometimes direct reference to types of stress [Martine 1963: 440], as distinguished from tone or pitch accent (which is unconnected, or very little connected, with stress), or to melodic or polytonic stresses [Kuznecov 1970b: 366]. This interpretation is hardly correct; it clearly ignores a hierarchy of prosodemes (in fairness, Martinet noted this himself, cf. [Martine 1963: 440; Martinet 1970: 374]).

§ 242. Like every other phonological phenomenon, pitch accents, or tones, may have positional variants, sometimes called allotones [Fintoft 1970: 39 et passim].[44] Their invariant properties (that is, the phonetic features shared by all allotones of a pitch accent and distinguishing it from another pitch accent or other pitch accents) form a toneme [Koefoed 1967: 157; Lehiste 1970: 92]. In positions of toneme

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[44] Hammarström suggests the more general term *alloprosode* [Hammarström 1966: 35], but so far it seems that no one else has used it (probably because of too broad a derivational meaning).

neutralization, the syllable features heard represent architonemes, or archiprosodemes [Ivanov 1959: 136], of the corresponding pitch accents. One member of a toneme opposition is unmarked; this is the toneme which is acoustically and articulatorily close to the representative of the architoneme; the toneme which clearly differs from this representative is the marked member of the prosodic opposition.[45]

This survey of terminology and concepts already shows that pitch accents obey general principles of phonological analysis and identification of phonological units; their paradigmatic (and in part syntagmatic) relations are also analogous.

§ 243. Our analysis and examples have shown that, under identical phonetic and phonological conditions, only two types of pitch accent can contrast in Lithuanian: 1) [V́] : [Ṽ] (*klóstė* : *klõstė*), 2) [V́R] : [VR̃.] (*kùrpė* : *kur̃pė*), 3) [V́.R] : [VR̃.] (*káltas* : *kaĩtas*). Each of these three groups differs quite a bit phonetically, but they cannot contrast with one another and therefore must be considered allotones of the same two pitch accents (two tonemes: /˜/ ≠ /´/).

It is most convenient to use for these pitch accents or tonemes the above-mentioned neutral terms acute (the pitch accent of words of the type *klóstė*, *kùrpė*, *káltas*) and circumflex (the pitch accent of words of the type *klõstė*, *kur̃pė*, *kaĩtas*), which do not suggest any categorical phonetic characteristics. The traditional terms *tvirtapradė priegaidė* '"strong-initial" accent' and *tvirtagalė priegaidė* '"strong-final" accent' seemingly preempt research and impose the notion that pitch accents differ in the "strength" of the beginning or end of a syllable, although, as just mentioned, this has not been demonstrated thus far; *krintančioji priegaidė* 'falling accent' and *kylančioji priegaidė* 'rising accent' similarly suggest in advance musical characteristics.[46]

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[45] Cf. [Kacnel'son 1966: 38 et passim], although we do not at all agree with the actual interpretation of prosodeme markedness presented here; it is a purely phonetic, rather than phonemic, approach.

[46] But cf. § 241. This was also apparently the view of Simonas Stanevičius, who used the Greek acute or grave (symbols of a rising toneme) to mark smooth pitch accent and a curved or broken circumflex (symbols of a falling toneme) to mark abrupt pitch accent [Girdenis 1968b (= Girdenis 2000b: 171ff.); 1992b (= Girdenis 2001: 54ff.)]. But even this great authority cannot outweigh concrete observations. Listening results of reverse recordings (on the method, see [Dukel'skij 1962: 16–17]) clearly show that speakers of both Žemaitic and West

The terms *staiginė priegaidė* 'abrupt accent' and *tęstinė priegaidė* 'smooth accent' would be substantially better (cf. Fr. *intonation rude* 'rough accent' and *intonation douce* 'smooth accent' [Saussure 1922: 491]), characterizing these tonemes according to their auditory impression. The most recent speech synthesis experiments (unfortunately, not yet published, but cf. [Girdenis 1998b (= Girdenis 2001: 403f.)]) also support the acoustic validity of these terms; at least the Žemaitic acute differs first and foremost from the circumflex in an abrupt change in pitch (in the adduced sentence, falling). But, as noted, it is most convenient for the phonologist to use terms which do not suggest actual phonetic properties.

§ 244. In general, the relations among the various prosodic types of Lithuanian syllables can best be illustrated in the following tree diagram (see figure 27; syllable nucleus type is given in parentheses; see [Girdenis, Žulys 1967: 116 (= Girdenis 2000b: 164); Ambrazas 1985: 48; 1997: 40 (= Girdenis 2001: 227)]).[47]
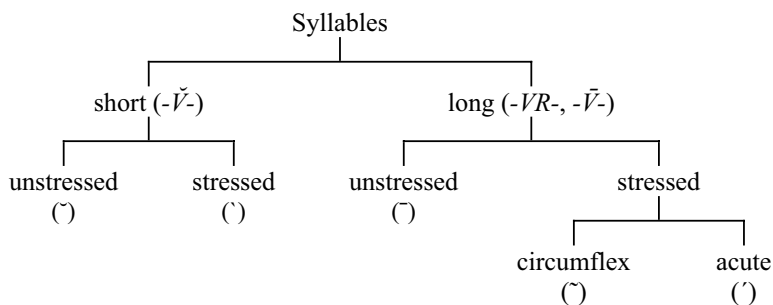

Figure 27. Prosodic syllable types of standard Lithuanian

Aukštaitic distinguish "reversed" pitch accents (reproduced in the opposite direction) just as well as regular ones (cf. [Girdenis 1974: 192–193, fn. 30 (= Girdenis 2000b: 304, fn. 30)]). More or less the same can be said of pitch accents in whispered words: they are well distinguished in all languages and dialects investigated (see, for example, [Meyer-Eppler 1957; Jensen 1958; Miller 1962; Fintoft 1970: 40–43; 125–131 and references; Girdenis, Pupkis 1974: 118 (= Girdenis 2000b: 281); Girdenis 1974: 192–193 (= Girdenis 2000b: 304), especially fn. 30]).

[47] It is interesting that just the same sort of diagram was used a few years later to represent the prosodic syllable types of Slovene [Neweklowsky 1973: 81] (cf. also [Haugen 1967: 189]). See also [Karosienė, Girdenis 1990: 42 (= Girdenis 2001: 25)], where the relative frequency of each syllable is also indicated.

We see that pitch accents characterize and differentiate only stressed long syllables, that is, those formed with tautosyllabic *VR*-type sequences or long vowels (such syllables are now most often called heavy; cf. [Hyman 1985]). Short syllables (that is, those formed with short vowels; so-called light syllables) can only be stressed or unstressed (see also [Garde 1976: 3–4]). If pitch accents are ever shown to contrast on unstressed long syllables as well, the right branch of the diagram would need to be transformed as follows (see figure 28).
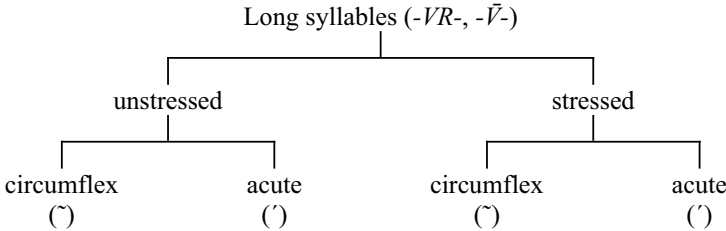

Figure 28. Syllable accents of long syllables (alternative version)

Many specialists believe that this must have been the distribution of the Baltic proto-language (among more recent works, see, for example, [Garde 1976: 4; Zinkevičius 1980: 48; Dybo 1981: 12]). This view has been categorically opposed by Kuryłowicz, who has denied even the theoretical possibility of pitch accent on unstressed syllables (see [Kuryłowicz 1958: 210; 1977: 159; Kuryłowicz 1960: 234–236 = Kurilovič 1962: 326–328]; cf. [Martinet 1970: 381]).[48]

In addition to acute and circumflex, a short pitch accent had also long been noted in the Lithuanian linguistic literature, hence it was believed that Lithuanian had three, rather than two, pitch accents (see, for example, [Ekblom 1922: 9; Gerullis 1930: xxvi; Vaitkevičiūtė, Grinaveckis 1959; Ulvydas 1965:

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[48] There has accumulated quite a bit of credible evidence suggesting that pitch accents (at least in some Lithuanian dialects) can contrast in unstressed syllables as well. For example, the dialect of the West Aukštaitic Kaunas-region (Suvalkija) distinguishes such minimal pairs as genitive singular ['p̡íe̞ˌv̥o̞�·s] "*píevos*" 'meadow' : locative plural ['p̡íe̞ˌv̥ó̞·s] "*píevos*(*e*)," accusative singular ['ŝm̡ę̃ˌl̡ì�·] "*smẽl̦į*" 'sand' : locative singular ['ŝm̡ę̃ˌl̡ì�·] "*smẽlyj*(*e*)," genitive singular (noun) ['m̥óˌk̂i·ˌt̥õˑjo̞·] "*mókytojo*" 'teacher' : genitive singular (adjective) ['m̥óˌk̂i·ˌt̥ó̞ˑjo̞·] "*mókytojo*" 'taught' (see [Girdenis 1972b: 72 (= Girdenis 2000b: 265); 1973: 73 (= Girdenis 2000b: 320); Girdenis, Žulys 1972: 198 (= Girdenis 2000b: 363)]).

135–136; Mikalauskaitė 1975: 78–79]). The "theory" of three pitch accents appeared when instrumental studies showed that short stressed syllables, like the long, are pronounced with a certain melody—various fundamental frequency and intensity curves. The treatment of these curves or modulations as an essential feature of pitch accent left no choice but to accept a short pitch accent.

Phonology, of course, does not support such a characterization of pitch accent, nor the "short pitch accents" based on it. The essence of pitch accents is the distinctive function they perform, rather than vocal modulations themselves. Russian and French stressed and unstressed syllables are after all undoubtedly pronounced with certain modulations of pitch, intensity, and duration, but it would not be possible to speak of pitch accents here, since the melody of their stressed syllables cannot differentiate referential meaning.[49] Precisely the same situation exists in Lithuanian words in which a stressed syllable is formed by a short vowel without a coda sonorant. The voice modulations seen in oscillograms and kymograms of these words do not and cannot perform a distinctive function, not least because they cannot be perceived by ear, as even advocates of "short pitch accent" acknowledge (cf. [Vaitkevičiūtė, Grinaveckis 1959: 30; Grinaveckis 1973: 98]). Phonetic features which cannot be heard, which are imperceptible and cannot be distinguished, cannot be phonological units of a language; they are simply not in the linguistic system (cf. [Trubetzkoy 1977: 180 = Trubeckoj 224; Girdenis, Žulys 1967 (= Girdenis 2000b: 161ff.); Garšva 1977c: 114–115; 1977a: 78; 1982: 73]).

It is sometimes pointed out that "short pitch accent" can contrast with acute and circumflex in minimal pairs such as *kàsti* 'dig-INF' : *ką́sti* 'bite-INF', *plùkti* 'burst (into tears, sweat)-INF' : *plū̃kti* 'scutch-INF', *trèšti* 'rot-INF' : *trẽšti* 'fertilize-INF', etc. But this is false reasoning: these pairs are not distinguished by pitch accent, but by vowel quantity. The members on the right have long (tense) vowels in stressed syllables, while the members on the left have short (lax) vowels, which, as we know, are independent phonemes.

§ 245. Kazlauskas [1968a: 6–7] had already shown that all Lithuanian dialects have a system of two phonological pitch accents,[50]

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[49] Here and elsewhere, the clever linguistic rule 2 − 1 = 0 applies: we can speak of a certain linguistic category or subsystem only when it consists of at least two members [Panov 1967: 16–18]. There are no languages, and there can be no languages, which would have only a single gender, a single verb tense, a single case, etc. This also holds for pitch accent (cf. [Zinkevičius 1966: 32–33]).

[50] The view was once widespread that in eastern dialects the pitch accents of monophthongs were lost (for example, [Kazlauskas 1968a: 14], but this has not been confirmed (see, for example, [Girdenis 1971a: 206–207 (= Girdenis 2000b: 351f.); Zinkevičius 1974; Eidukaitienė 1977; Stundžia 1979; 1980; Kosienė 1982], cf. [Pakerys 1982: 154]). Nevertheless, even now we must admit that the pitch accents on monophthong syllables in eastern and southeastern dialects are

although dialectologists and specialists in pure phonetics find a far greater number. For example, stressed short syllables in many dialects lengthen in certain cases and thereby receive so-called middle accent (1). As a final circumflex syllable shortens, a middle accent with a somewhat different pronunciation may appear, or an apocopated accent (2). Yet another type of middle accent arises when stress is retracted from an ending onto a long syllable (3). Finally, quite a few Žemaitic speakers produce in certain cases an abrupt or "pushed" [*stumtinė*, 'Stosston'] accent instead of acute, while others pronounce a broken accent [*laužtinė*] (4); rising [*tvirtagalis*] and smooth [*tęstinis*] circumflex also often differ (5) (cf. [Salys 1992: 45]).

Without going into a detailed analysis, we can say that in all the above cases, we have two types of allotones, in complementary distribution, of the same prosodemes. In the first case (1) (cf. EAukšt. *kì.šæ.* "*kìšė* (standard *kìšo*)" 'thrust-3PST' : *kìš* "*kìš*" 'thrust-3FUT', NŽem. *kę̇.š^a* : *kèš*) middle accent is the realization of the stress of a short non-final syllable; in the second case (2) (cf. EAukšt. *płåũ.kæ* "*plaũkia*" 'swim-3PRS' : *płåu̇ks* "*plaũks*" 'swim-3FUT'), middle accent (as well as apocopated accent) represents a word-final circumflex; in the third case (3) (cf. EAukšt. Kupiškis *tĩ.l̨ì* "*tỹli*" 'be silent-3PRS' : *ti.l̨ì* "*tylì*" 'be silent-2SG.PRS'), it represents the circumflex which accompanies secondary phonological stress.[51] The Žemaitic abrupt

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quite unclear; we could say that their oppositions are optional (see also [Hasiuk 1978: 17–18 and references]).

[51] This "middle" variant of circumflex functions in many dialects as the manifestation of a special phonological stress. In some dialects, a kind of opposition of "strong" and "weak" stress has arisen due to stress retraction, cf. EAukšt. northern Panevėžys *łåũ.k^{b}s* "*laũkas*" 'field-NOM.SG' ≠ *łåu̇k^{b}s* "*laukùs*" 'field-ACC.PL', EAukšt. Utena *næd͒.ra* "*nedõra*" 'immoral-N' ≠ *næd͒.rà* "*nedorà*" 'immoral-NOM.SG.F; immorality-NOM.SG' [Girdenis, Žulys 1972: 199 (= Girdenis 2000b: 365); Garšva 1977c: 65; Kosienė 1978: 35–36] (cf. [Baranovskij 1898: 21; Ekblom 1922: 8; 1925: 55, 95–97; Girdenis 1978a (= Girdenis 2000c: 95f.)] and § 251). The first to mark "weak" (two-peaked) stress was Daukša: *Sûdžiá* "*sudžià*" 'judge-NOM.SG' = [ˌsuˈdžæ̀] *Postil* 15₃₆, *lę́gwá* [ˌɫɛŋˈgvà] "*lengvà*" 'easy-NOM.SG.F' *Postil* 434₂, *gêriús* [ˌɡ̑ɛ̇ˈȓùs] "*geriùs*" 'life of luxury-ACC.PL' *Postil* 50₁₅ (cf. [Girdenis 1984 (= Girdenis 2000c: 356f.)]).

It should be noted here that the opposition of two stress (or pitch accent) types is also observed in forms where there never was regular stress retraction; cf. NŽem. (1) *kâ.lts* "*kált as*" 'chisel' ("strong" stress) : *kâlts* "*kált as*" 'forged-

[*staiginis*] acute (4) and rising [*tvirtagalis*] circumflex (5) occur only before a certain secondary stress, while the broken [*laužtinis*] acute and smooth [*tęstinis*] circumflex occur when no secondary stress follows (cf.: *dá·ktâ·* "*daiktaĩ*" 'thing-NOM.PL' : *dâ·kt^a* "*dáiktą, -o*" 'thing-ACC/GEN.SG', *bã.ł.dâ·* "*baĩdai*" 'furniture-NOM.PL' : *bã·łd^u* "*baĩdų*" 'furniture-GEN.PL'; see, for example, [Girdenis 1967b: 31 (= Girdenis 2000b: 106–109); 1974: 160 (= Girdenis 2000b: 285)]). Thus, here as well, we have only two pitch accents, realized by two types of allotone.

β) FUNCTIONS AND PARADIGMATIC RELATIONS OF PITCH ACCENTS

§ 246. Pitch accents are close to phonemes and distinctive features; they perform the same distinctive function: they distinguish otherwise identical syllables and words and their forms (see [Martine 1963: 441; Martinet 1970: 364; Koefoed 1967: 161]).[52]

In a morphological or morphonological system, pitch accents function as an important auxiliary characteristic of morphemes [Garde 1968: 160–165; Garde'as 1971] (see also the article [Hjelmslev 1936–1937], from which Garde's basic idea derives).

NOM.SG.M' ("weak" stress), *svê.ists* "*svíestas*" 'butter' : *svêists* "*svíestas*" 'thrown-NOM.SG.M', *sã·us^i* "*saũsį*" 'January-ACC.SG' (cf. nom. sg. *saũsis*) : *sã.u.s^i* "*saũsį*" 'aphid-ACC.SG' (cf. nom. sg. *sausỹs*), (2) *trâ.uk^e* "*tráukė*" (inf. *tráukti*) 'pull-3PST' : *trâuk^e* "*tráukė*" (inf. *tráukyti*) 'pull (iterative)-3PST', *brã·uk^e* "*braũkė*" (inf. *braũkti*) 'cross out, brush off-3PST' : *brã.u.k^e* "*braũkė*" (inf. *braukýti*) 'cross out (iterative)-3PST', (3) *kâ.iš* "*káišia*" 'scrape, shave-3PRS' : *kâiš* "*kaĩš*" 'scrape, shave-3FUT', *mẽ·iš* "*miẽšia*" 'dilute-3PRS' : *mẽ.i.š* "*miẽš*" 'dilute-3FUT'. Similar oppositions have also been observed in Aukštaitic dialects (see [Girdenis 1982a: 180 (= Girdenis 2000c: 274f.); Girdenis, Kačjuškene 1987 (= Girdenis 2000c: 327ff.)]).

[52] Pakerys has expressed and in a preliminary way tried to support the original idea that pitch accents also have a culminative function: they signal a syllable peak [Pakerys 1982: 144–154]. This view does not seem convincing (see [Girdenis, Stundžia 1983: 178–179 (= Girdenis 2000c: 403); Vitkauskas 1983a]). First, the syllable is neither a sign nor a meaningful unit, and it hardly needs a special distinguishing element; second, a function similar to culminative is already performed in the syllable by a vowel (see, for example, [Padlužny 1969: 31 and references]).

Every morpheme whose expression (or partial expression) consists of a stressed long vowel or tautosyllabic *VR*-type sequence is either acute or circumflex. For example, the root of the word *brólis* 'brother' preserves acute accent in all forms and in all derivatives and compounds, cf.: *brólis* 'brother-NOM.SG', *bróliui* 'brother-DAT.SG', *brólį* 'brother-ACC.SG', *brólienė* 'sister-in-law', *bróliškas* 'fraternal', *brólvaikis* 'nephew'; the root of the word *rankà* 'hand' in stressed positions is always circumflex, cf.: *rañkos* 'hand-GEN.SG/NOM.PL', *rañkų* 'hand-GEN.PL', *rañkena* 'handle', *rañkininkas* 'handball player', *rañkdarbis* 'needlework', etc. Possible metatony (change of pitch accent; from Gk. *μετά-* 'a prefix meaning change', *τόνος* 'stress, syllable accent') in certain cases (see [Būga 1959: 386–483; Ulvydas 1965: 142–150; Mikalauskaitė 1975: 81; Laigonaitė 1978: 19–27; Ambrazas 1985: 67; 1997: 53 (= Girdenis 2001: 241f.); Mikulenene 1987]) does not contradict the general principle, since it is essentially no different than similarly functioning vowel apophony, cf.: *gražùs* 'beautiful' : *grõžis* 'beauty', *krìto* 'fall-3PST' : *kráičiojo* 'gradually fall-3PST' and *stóras* 'thick, fat' : *stõris* 'thickness', *ū̃žė* 'make a noise-3PST' : *ū́žavo* 'id.', *plaũkė* 'swim-3PST' : *pláukiojo* 'swim about-3PST'.

It is true that morphemes generally "lose" their pitch accents in unstressed positions (cf., however, fn. 49), for example *mérkti* 'shut one's eyes-INF' ≠ *meȓkti* 'soak-INF', but *merkìmas* 'shutting one's eyes' = *merkìmas* 'soaking', *várpą* 'ear (of grain)-ACC.SG' ≠ *vaȓpą* 'bell-ACC.SG', but (*varpẽliai →*) *varpẽlių* 'bells-GEN.PL' = (*varpẽlės →*) *varpẽlių* 'ear (dim)-GEN.PL'. Pitch accents are essentially neutralized in grammatical endings as well, since here (with a few exceptions) only circumflex is possible,[53] representing the architoneme (or

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[53] This traditional statement (incidentally, greatly exaggerated by Kuryłowicz [1958: 167–168; 1968a: 114], not least because there are words like *pusiáu* 'in two, in half', *visái* 'quite, completely') would still need to be checked by more rigorous experiments. There are data which suggest that the second person *maišaĩ* 'mix', *sakaĩ* 'say', *vilkaĩ* 'dragged', for example, and the nominative plural *maišaĩ* 'bags', *sakaĩ* 'resin', *vilkaĩ* 'wolves' and other similar forms are not homonyms; the pitch accents of the former appear to set off the first component of the diphthong more (one hears as it were *maišài*, *sakài*, *vilkài*), and the latter, the second component. Listeners hear this distinction quite well (see, for example, [Valentas, Girdenis 1976; Kosienė 1978: 32, fn. 18; 1979]).

archiprosodeme) of both pitch accents, and showing that circumflex is the unmarked member of the opposition (see [Trubetzkoy 1977: 213 = Trubeckoj 1960: 265]). This is also suggested by the proximity of unstressed (especially pretonic) syllables to circumflex [Pakeris 1966], and likewise by the greater frequency of long circumflex syllables in connected texts: they are approximately 1.4 times more frequent than acute [Girdenis 1983b (= Girdenis 2000c: 354); Karosienė, Girdenis 1990: 42–43 (= Girdenis 2001: 24–26)]. We have in this case a phenomenon similar to the neutralization of oppositions of the type /a/ : /ɔ/ in unstressed syllables in standard Russian and some Lithuanian dialects (see § 137, 227, 241). In this regard as well, pitch accents function as phonemes.

The pitch accents stand in a different relationship in the North Žemaitic dialect. Here the acute is not only freely used in stressed endings (cf. the second person singular *maišâ·* /majšá·/ "*maišaĩ*" 'mix', *sakâ·* /saká·/ "*sakaĩ*" 'say', *vęłkâ·* /vęlká·/ "*vilkaĩ*" 'drag' and the nouns *mȧišã·* /majšã·/ "*maišaĩ*" 'bags', *sàkã·* /sakã·/ "*sakaĩ*" 'resin', *vę́łkã·* /vęlkã·/ "*vilkaĩ*" 'wolves'), but is also the representative of the archiprosodeme in the main position of neutralization: an unstressed final syllable (for example: *bàtâ·* /bàta·/ "*bãtai*" 'boots', *múokê·* /múoke·/ "*mókei*" 'you taught', *vàkâ·r* /vàkar/ "*vãkar*" 'yesterday'). Acute is unquestionably the unmarked member of the pitch accent opposition and circumflex the marked member. This is also shown by the relative frequency of these pitch accents; the ratio of acute to circumflex long syllables here is approximately 1.32 : 1.

§ 247. The main functional property distinguishing pitch accents from phonemes and distinctive features is their connection with stress and stress paradigms. As we know, certain morphemes (especially endings; we could call them "attracting" endings) attract the stress from a neighboring short or circumflex morpheme according to Saussure's and Fortunatov's law [Garde 1968: 163; Garde'as 1971:

Nor should it be forgotten that perhaps all Aukštaitic speakers pronounce the pronominal forms *anúo* 'that-INS.SG.M', *anúos* 'that-ACC.PL.M', *túo* 'that-INS.SG.M', *túos* 'that-ACC.PL.M', etc., with acute endings. These were already found in Kurschat's grammar [Kurschat 1876: 236] (cf. [Laigonaitė 1959: 66], where such forms were justifiably proposed for the standard language; it is inexplicable why they were later abandoned and clearly fictive forms were codified).

95; Garde 1976: 15–16].[54] These endings include, for example, the first and second persons singular of the verb, the accusative plurals of nouns, etc. (they are characterized by long acute allomorphs in reflexive and pronominal forms), for example: *plaũkia* 'swim-3PRS' → *plaukiù* 'swim-1SG.PRS', *plaukì* 'swim-2SG.PRS' (but *láukia* 'wait-3PRS' → *láukiu* 'wait-1SG.PRS', *láuki* 'wait-2SG.PRS'; cf. *keičiúo-si* 'change-1SG.PRS.REFL', *keitíe-si* 'change-2SG.PRS.REFL'), *pir̃štą* 'finger-ACC.SG' → *pirštùs* 'finger-ACC.PL', *rañką* 'hand-ACC.SG' → *rankàs* 'hand-ACC.PL' (but *tìltą* 'bridge-ACC.SG' → *tìltus* 'bridge-ACC.PL', *sáują* 'handful-ACC.SG' → *sáujas* 'handful-ACC.PL'; cf. *gerúos-ius* 'good-ACC.PL.PNL.M', *gerąs-ias* 'good-ACC.PL.PNL.F'). Synchronically interpreted, Saussure's and Fortunatov's law essentially determines the interaction between pitch accent and stress, and the particular character of Lithuanian word prosody. Thus pitch accent and stress, taken together, would form quite independent subsystems of word and syllable prosodemes.

Pitch accents can also optionally be connected with sentence intonation. One of the main instances of this interaction is the neutralization of pitch accent oppositions in conditions of strong emphatic sentence stress; this occurs even in the North Žemaitic dialect, which has particularly clear pitch accents, for example: *ànà kap‿supî̃kᵃ, nubî̃ega* (← *nubî̃egᵃ*) *ę‿papàsakûoị̯ᵉ pũonộ.u vę̀skǫ̃n* "*Anà kaip supỹko, nubẽgo, ir papãsakojo põnui vìską*" 'She got angry and ran off and told the master everything' (Alsėdžiai), *aš‿tòrò lazdė̇.k̂ᵉ – kap‿aš‿tâ.u dîesọ* (← *dîesọ*)*! "Aš turiù lazdìkę – kaip aš táu désiu!*" 'I have a stick and I'm going to let you have it!' (Klaipėda), *vî̃rùs ęš.ą̃u.da* (*ęš.âuda*)*, ę‿pàlę̃.ikt mûotręšk̂ᵃs "Vỹrus iššáudo, ir paliẽkt mótriškos*" 'They shoot the men and the women are left' (Kaltinėnai), *nag̃æ̀rk* (← *nag̃æ̀rk*)*, – sá.kᵃ, – pavę̃.r̂sⁱ á.rkl̂el̂ù "Negérk, – sãko, – paviȓsi arkleliù*" 'Don't drink, he says; you'll turn into a horse' (Plungė), *matâ.u, ka‿dęž̂ą̃u.ŝis* (← *dęž̂â.uŝⁱs*) *vî̂rs pas‿pušî̃.nᵃ stûoụ "Mataũ, kad didžiáusias vỹras pas pušýną stóvi*" 'I see that a huge man is standing over by the pine woods' (Telšiai), *karvė̇.lᵉ gràž̂ì,*

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[54] The fact that Fortunatov had discovered this law independently (and somewhat earlier than Saussure, that is, before 1891–1892) has long been demonstrated, but the evidence has somehow been overlooked; see [Torbiörnsson 1924: 11, fn. 1; 1932: 363–364, fn. 1].

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pę̃.inˀ dõ̆.u.d (← *dǫ̂.ud*) "*Karvẽlė gražì, píeno dúoda*" 'The cow is beautiful; she gives milk' (Tirkšliai).[55]

§ 248. Pitch accent is unquestionably only an auxiliary morphological device, since it can never appear on morphemes which lack stress (for example, dative or accusative singular noun endings), or on morphemes which lack the necessary basis for pitch accent (a long vowel or tautosyllabic *VR*-type sequence). The fact that their opposition is neutralized in some cases is not particularly significant, since such neutralization is also often characteristic of vowel (especially vowel quantity)[56] oppositions.

γ) TYPOLOGICAL REMARKS

§ 249. Pitch accent, or tone, is not a very exotic prosodic phenomenon. Quite a few languages and dialects have one system or another, even in Europe.

Most popular are systems of two pitch accents or tones. Many Latvian dialects have these, for example, as do some South Slavic languages and a large group of Germanic languages and dialects: the

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[55] On this phenomenon in greater detail, see [Zinkevičius 1966: 37 and references; Girdenis, Lakienė 1976: 73 (= Girdenis 2000c: 339)] (for other languages: [Hansen 1943: 28; Jensen 1960: 28; Toporišič 1972]).

[56] Apparently this (and, of course, also the "prosodic" nature of quantitative features) has led more than one specialist to regard quantity as a suprasegmental prosodic phenomenon (see, for example, [Toporova 1972: 141; Garšva 1977c: 101–102]).

Without going into greater detail on this issue, let us just say that such an interpretation is possible and acceptable only when, first, the number of long vowels does not exceed that of short vowels (cf. [Lehiste 1970: 43]), and secondly, when such an interpretation indisputably facilitates the description of various phonological and grammatical processes. A factor favoring this interpretation is the neutralization of quantity oppositions in unstressed syllables. A prosodic interpretation of vowel quantity for standard Lithuanian and many dialects would conflict with the first condition: Lithuanian has more long vowels than short vowels (see [Girdjanis 1977: 305–306, fn. 17 (= Girdenis 2000c: 384, fn. 17); Kačjuškene 1980; Kačiuškienė 1982: 41ff.]). Moreover, Lithuanian vowel quantity cannot be shifted to prosody for general phonological reasons, since it distinguishes only speech fragments equal to a single phoneme (cf. § 34 and 215).

Therefore, Lithuanian vowel length (tenseness) and shortness (laxness) can only be considered distinctive features of phonemes.

German Rhine dialects, Danish, Swedish, and Norwegian. We all know quite well the Ancient Greek opposition of acute and circumflex. The three degrees of vowel and consonant quantity in Estonian is reminiscent of pitch accent (see [Liiv 1962a; 1962b]).[57]

§ 250. Among the South Slavic languages, closest to Lithuanian is the pitch accent system of Slovene (cf. [Garde 1968: 154–160]), in which stressed long syllables are pronounced with either a rising ([´]) or falling ([ˆ] or [`]) accent, cf.: *dán* 'given' : *dân* 'day', *pót* 'road' : *pôt* 'sweat' [Toporišič 1970: 913], dialectal *míːza* 'table' : *mìːza* 'tables', *čŕːna* 'black-NOM.SG.F' : *čř̀ːna* 'black-NOM.SG.F.PNL' [Neweklowsky 1973: 82]. In unstressed syllables these oppositions are neutralized.

In stressed and post-tonic syllables of standard Serbo-Croatian and Štokavian dialects, it is first and foremost long and short vowels which contrast, cf.: *grȁd* [`grad] 'hail' : *grâd* [`graːd] 'town', *vȅsela* 'happy-NOM.SG.F' : *vȅselā* 'happy-NOM.SG.F.PNL'. A stressed initial syllable of any quantity may in turn have rising accent (on long syllables [´], on short syllables [`]) or falling accent ([ˆ] and [`], respectively) (on their phonetic properties, see [Trager 1940; Lehiste, Ivić 1963; Pollok 1965], on pronunciation in connected speech [Purcell 1971; 1973]), cf.: *mládīh* 'young-GEN.PL' : *mlâdīh* 'young-GEN.PL.PNL', *pústīm* 'become empty-1SG.PRS' : *pûstīm* 'empty-1SG.PRS' (long syllables), *pàra* 'money' : *pȁra* 'steam', *sȑčan* 'pertaining to the heart' : *sȑčan* 'brave' (short syllables) [Magner, Matejka 1971: 5–6] (cf. also *rávan* 'equal' : *rârvan* 'plain (n.)', *klòbūk* 'hat' : *klȍbūk* 'vial' [Peco 1965: 454]). In medial syllables the opposition of pitch accents is neutralized in favor of rising accent ([´] or [`]); in monosyllabic

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[57] Cf.: *vina* 'glow' : *viina* 'whiskey-GEN.SG' : *v`iina* 'whiskey-ACC.SG' (the symbol " ` " indicates an overlong sound), *sada* '100' : *saada* 'send-INF' : *s`aada* 'get-INF', *kolis* 'moved' : *koolis* 'school' : *k`oolis* 'died', *kalas* 'fish-LOC.SG' : *kallas* 'shore' : *ka`llas* 'poured'. Some years ago, so-called lexical tones were also observed in Estonian (see [Helimski 1977; Lippus, Remmel 1976]; cf. [Lehiste 1980: 199–200]). There has recently been serious mention of tones in Russian (see [Kodzasov 1989]; it is not difficult in some cases to observe the presence of a tone-like phenomenon in this language: compare, for instance, the nominative singular *гранáт* 'pomegranate', *солдáт* 'soldier', in which the stressed syllable seems to be falling [*tvirtapradiškas*] and the corresponding genitive plural form, where this syllable is almost rising [*tvirtagalis*], that is, pronounced approximately [grʌnãːt], [sʌɫdãːt]).

words, only falling accent is possible, for example: *grâd* 'town', *lûk* 'bow', *grȁd* 'hail', *lȕk* 'onion' [Peco 1965: 455].[58]

§ 251. The German Rhine dialects are characterized by an opposition of so-called correption (abrupt accent) and extension (smooth accent) [Žirmunskij 1956: 163–165; Kacnel'son 1966: 217ff.], reminiscent of the Lithuanian opposition of acute and circumflex,[59] cf.: [e·ʔ] (correption) = standard *Au* 'meadow' : [e·] (extension) = standard *Ei* 'egg', [hu·ʔs] 'of the house' : [hu·s] 'house', [štru·ʔs] 'of an ostrich' : [štru·s] 'ostrich' [Kacnel'son 1979: 208, 217].

This system is quite reminiscent of the Danish prosodic opposition "*stød*"–"non-*stød*" (*stød–ikke-stød*), which in many positions is almost indistinguishable from the Žemaitic contrast of broken and smooth accent; long vowels with *stød* (a glottal occlusion, or more precisely, laryngealization [Lehiste 1970: 89–90]) sound almost the same as corresponding Žemaitic and Latvian vowels with broken accent (cf. [Ekblom 1933: 50] and [Lehiste 1972]).[60] The following minimal pairs are distinguished, for example, by "*stød*"–"non-*stød*": *læser* ['lɛ·ʼsəʁ] (" ʼ " is the symbol for *stød*) '(I) read' : *læser* ['lɛ·səʁ] 'reader', *pilen* ['pi·ʼlən] '(the) arrow' : *pilen* ['pi·lən] 'haste', *taget* ['tɑ·ʼɣəð] '(the) roof' : *taget* ['tɑ·ɣəð] 'taken'. A specific feature of Danish which has no direct counterpart in Baltic dialects is *stød* concentrated on sonorants, cf.: *maj* [mʌɪʼ] 'May' : *mig* [mʌɪ] 'me', *hund* [hʊnʼ] 'dog' : *hun* [hʊn] 'she'. The place of *stød* on diphthongs

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[58] In works on Lithuanian historical grammar, Lithuanian pitch accents are still associated with those of Serbo-Croatian (for example, [Zinkevičius 1980: 44]), although in fact they are connected only with the vowel quantity of that language: Lith. [´] = SCr. [`], Lith. [˜] = SCr. [¯] (cf. Lith. *dū̃mas* 'smoke', *várna* 'crow' = SCr. *dìm*, *vrȁna*, Lith. *žiẽmą* 'winter-ACC.SG', *var̃nas* 'raven' = SCr. *zímu*, *vrân* (in Czech, these relations are the diametric opposites: *dým*, *vrána* and *zimu*, *vran*; the acute here denotes vowel length). In general, the pitch accents of the modern Baltic and Slavic languages are not directly related; their origin is presumably also different.

[59] The renowned German dialectologist Theodor Frings has written specially about the similarities and differences between pitch accents of the Rhine dialect and Lithuanian; see [Frings 1934: 120–130].

[60] For more detail on prosodic systems with *stød* and pharyngealization, see [Ivanov 1959; 1975]; on developmental tendencies of such systems, see [Ivanov 1979]); on the phonetic realization of Danish *stød*, see [Smith 1938; 1944; Jakobson, Waugh 1979: 149; Fischer-Jørgensen 1989].

can even have distinctive function: *fugl* [fuːˀl] 'bird' : *fuld* [fʊlˀ] 'full', *hvil* [viːˀl] 'rest' : *vild* [vɪlˀ] 'wild' (cf. [Fischer-Jørgensen 1962: 101–102; 1989: 8ff.; Koefoed 1967: 164–165]).[61] This, presumably, is one of the reasons for treating *stød* as a unit of the segmental plane (a "kinakeme," a kind of distinctive feature; see, for example, [Plotkin 1979; 1982: 105 et passim]). Nevertheless, the traditional approach appears more convincing: treating *stød* as a prosodic phenomenon and accounting for its position in *VR*-type sequences by length or shortness of the first component of these sequences (*V:R* & /ˀ/ → *V:ˀR*, *VR* & /ˀ/ → *VRˀ* [Basbøll 1977: 148, fn. 3]).

In Swedish and Norwegian non-monosyllabic words (except for some dialects), so-called accent 1 ("acute," [ˊ]) and accent 2 ("grave," [ˋ]) contrast; these are also called pitch accents or tonal word accents (but cf. [Kacnel'son 1966: 36]), for example: Swed. *búren* '(the) cage' : *bùren* 'carried', *tánken* 'tank' : *tànken* 'idea' [Malmberg 1971: 192], *stégen* (-[eː]-) '(the) step' : *stègen* '(the) ladder' [Bruce 1977: 15], Norw. *bónder* [ˊbønːər] 'peasants' : *bònner* [ˋbønːər] 'beans', *fárene* 'tracks' : *fàrene* 'dangers' [Fintoft 1970: 15, 21], *lånet* [ˊlɔːnə] 'loan' : *låne* [ˋlɔːnə] 'lend-INF', *hénder* 'hands' : *hènder* 'happens' [Jensen 1961: 20–21]. Accent 1 of disyllabic words is always concentrated on the first syllable and is usually marked by a falling tone and intensity; accent 2 is fairly evenly distributed across two syllables, and the first syllable of words containing it has a rising or at least even tone and intensity. It is generally believed (especially after Malmberg's subtle experiments [Mal'mberg 1962: 362–377]) that musical features form the essence of these accents, but there are other views (for example, [Gårding, Lindblad 1973: 44–48; Makaev 1964: 131ff.]). From a phonological standpoint this is, of course, irrelevant; what is important is just a contrast of two types of accentuation.

To the Lithuanian ear, these oppositions are rather reminiscent of oppositions in eastern, non-stress-retracting dialects, such as *gíˑva* "gýva" 'alive, living-N' : *giˑvà* "gyvà" 'living-NOM.SG.F', *stɔ́ˑra* "stóra" 'thick, fat-N' : *stɔˑrà* "storà" 'thick, fat-NOM.SG.F' (cf. [Kosienė 1978: 35–36]). The Norwegian pronunciation *lånet* [ˊlɔː nə] sounds to the

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[61] This is a bit reminiscent of the realization of circumflex in eastern dialects in cases such as *taiˑ* 'that', *kurˑ* 'where', and the "weak" stress of North Žemaitic forms such as future *kâiš* 'will scrape' or iterative *trâukᵉ* 'pulled' (pronounced almost as *kaîš*, *traûkᵉ*; see § 245, fn. 51).

Lithuanian ear almost like [lɔ̂·n̂æ], and *lằne* [`lɔːnə] like [lɔ̂·'n̂æ̀] (with eastern secondary stress on the syllable [lɔ̂·]-).[62]

The system of three pitch accents of standard Latvian and the central dialect (*vidus dialekta*) is well known, cf. *krîtu* 'net-ACC.SG' : *krĩtu* 'chalk-ACC.SG' : *krìtu* 'fall-1SG.PRS',[63] *luôgs* (in ordinary spelling *logs*) 'window' : *luõks* 'leek' : *lùoks* 'bow', *raûšu* 'pull, tear-1SG.FUT' : *raũšu* 'oil cake-GEN.PL' : *ràušu* 'rake-1SG.PRS', *vâts* 'ulcer, wound' : *vãts* 'vat' : *vàc* 'collect-2SG/3.PRS' (cf. [Grīsle 1970; 1972]; on the phonetic features of these pitch accents, see [Ekblom 1933; Stelle 1968 and references]). In medial and final syllables only two pitch accents, smooth and broken, contrast in Latvian: *mazuõs* 'small-ACC.PL.M.PNL' : *mazuôs* 'small-LOC.PL.M', *mazãs* 'small-ACC.PL.F.PNL' : *mazâs* 'small-LOC.PL.F' (but cf. *šitâs* 'this-LOC.PL.F' : *šitàs* 'this-GEN.SG.F' : *šitãs* 'this-ACC.PL.F'. It is true that Kuryłowicz tried to treat broken tone as the absence of pitch accent (see, for example, [Kuryłowicz 1958: 382]),[64] but this is an entirely artificial interpretation, justifiably criticized by Ivanov [Ivanov 1954: 134–136], who later wrote special studies devoted to tonemes of this type [Ivanov 1959; 1975].

Nevertheless, in many Latvian dialects we find the usual system of two pitch accents, either broken and non-broken (falling or smooth) contrast, or falling and rising [Endzelīns 1951: 39–41; Laua 1980: 85].[65] The two-pitch-accent system is now also tolerated in the standard language (see, for example, [Laua 1980: 87; Liepa 1979: 47]).

§ 252. Ancient Greek also had an opposition of rising (acute, [́]) and falling (circumflex ([̃] or [̂]) accent (cf. [Tronskij 1962: 37ff.; Lur'e 1964; Garde 1968: 144–148]). These pitch accents contrasted

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[62] Apparently in a functional regard as well, Swedish and Norwegian accents are closer to the Lithuanian opposition of "strong" and "weak" stress, rather than to pitch accents (see § 245, fn. 51).

[63] Recall that the symbol " ̂ " denotes broken accent, " ̃ " smooth, " ` " abrupt or falling.

[64] He considered smooth and falling accent (most likely following Trager [Trager 1941: 141]) a sequence of moras of differing quantity.

[65] On the realization of pitch accents in such a system and their paradigmatic relations, see [Markus 1979: 120; 1982: 93–95; Sarkanis 1993]. Among other things, these works show that the essential feature of broken tone in these dialects is the abrupt change of the acoustic pattern, contrasting with the smooth, continuous change of falling (level) pitch accent. On systems with rising accent instead of broken, see [Ancītis 1977: 35–43].

only in word-final position: genitive singular *ἀγορᾶς* 'square', *θεᾶς* 'goddess' : accusative plural *ἀγοράς* 'squares', *θεάς* 'goddesses'. In other syllables (if we disregard extremely rare cases like *οἴκοι* 'at home' : *οἶκοι* 'houses' [Schwyzer 1934: 376]), the opposition of circumflex and acute was neutralized: before a long ending and in the third syllable from the end only acute could appear; in a penultimate long syllable before a short ending, only circumflex, cf. *θῆρα* 'wild animal-ACC.SG', *Μοῦσα* 'Muse' (see for example, [Kuryłowicz 1958: 168–169; 1968a: 141]). The acute of a short syllable, like Lithuanian grave, undoubtedly marked simple stress, rather than pitch accent [Tronskij 1962: 41]. A word-final grave most likely denoted a certain allotone of acute, or the disappearance or at least significant weakening of stress (cf. § 228, fn. 15).

Superficially, this system seems quite similar to the Lithuanian one, but in fact it is quite different, since the Greek pitch accents contrast only word-finally, precisely where Lithuanian pitch accents tend toward neutralization (see further [Kuryłowicz 1960: 236ff. = Kurilovič 1962: 329ff.]).[66]

§ 253. As we see, many of the European languages and dialects with pitch accent or tone are located around the Baltic Sea. In Jakobson's view [Jakobson 1962a: 156–159ff.], they form the so-called Baltic basin linguistic area, or polytonic Sprachbund, opposing the Eurasian Sprachbund, which is characterized by a timbre correlation and the absence of pitch accents (in other words, monotonic stress). Lithuanian occupies an intermediate position in this regard, since it has characteristics of both linguistic areas. This is a rather peculiar combination of nearly incompatible features, since pitch accents are usually found only in languages which lack a timbre correlation, and those languages which have a timbre correlation lack pitch accents.

§ 254. The Prague School phonologists termed languages having pitch accent associated with stress (in other words, several types of stress) polytonic languages, and strictly distinguished them from so-called monotonic languages, lacking pitch accents [Jakobson 1962: 122]. Polytonic languages include, for example, Lithuanian, Latvian,

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[66] This great typological difference, of course, does not prove (as Kuryłowicz believed) that Greek and Lithuanian pitch accents must be of a totally different origin (cf. [Ivanov 1954: 132]). Typological features of languages are not all that constant; genetically related languages can belong to completely different typological groups.

Serbo-Croatian, and Swedish, and monotonic, Russian, Polish, Czech, English, and French.

So-called tone languages are often rather strictly distinguished from polytonic languages, in which tones are associated with accentuation (only the pitch accents, or tonemes, of stressed syllables essentially contrast). In tone languages, the various prosodic features are independent of stress (or weakly dependent on stress); they function more or less like distinctive features of phonemes [Pike 1947: 105ff.; Fischer-Jørgensen 1962: 102; Allen 1973: 84 and references] (on the drawbacks of this distinction, see [Hockett 1955: 129], on the spread and typology of tone languages, see [Maddieson 1978]). Tones are distinguished from phonemes and distinctive features more for the sake of convenience; there may be no functional reason for this distinction.

The number of tones varies greatly. Yoruba, mentioned at the beginning of the present work (§ 13), distinguishes three distinctive tones in both stressed and unstressed syllables: high, low, and mid. The Dungan, who speak a distinctive dialect of Chinese,[67] also have three tones, although they are used and pronounced differently, cf. *мá* 'mother' : *мà* 'horse' : *мā* 'scold' [Kalimov 1968: 478]. Standard ("Mandarin") Chinese has a similarly moderate system of four tones, for example: *bāo* [b̥āu] 'wrap' : *báo* [b̥áu] 'thin' : *bǎo* [b̥ǎu] 'defend' : *bào* [b̥àu] 'newspaper' [Zadoenko, Chuan Šu-in 1973: 633ff.] (cf. also § 28). Vietnamese distinguishes six tones; Burmese and some Chinese dialects eight, etc. (cf. [Andreev, Gordina 1957]). Various tonal systems are quite widespread in African and Native American languages.

There is no impassable gulf between tone languages and polytonic languages; their differences are more quantitative than qualitative.[68] Even the criterion of association with stress is not absolute, since in polysyllabic Chinese words, for example, only the tones of a single syllable usually contrast; in other syllables they converge, for example: *mèi-mei* 'younger sister', *wǒ-men* 'we', *nǎi-nai* 'grandmother'. This is quite similar to the neutralization of stress in

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[67] For the meanings of the diacritics, see §28, fn. 33.

[68] For this reason, tone languages and polytonic languages are sometimes combined into a single typological class, and are all called either polytonic [Zinder 1979: 257] or tone [Martinet 1970: 364, 378f.] languages.

unstressed syllables (cf. [Polivanov 1968: 140; Dragunov 1962: 37–38 and fn. 1; Martinet 1970: 381–385; Hyman 1975: 208]).

Also as purely acoustic phenomena, tones do not differ as sharply from pitch accents as is sometimes imagined: most often they too are elements of a mixed nature, realized by both musical and dynamic and quantitative, and even qualitative (timbre), features. If we were to assume that the nature of tones is only musical, it would be incomprehensible why and how they are distinguished in whispered speech (see, for example, [Abramson 1959; Segerbäck 1966] and § 243, fn. 46 and references).

δ) MORAS

§ 255. If we were to accept the view that pitch accents are essentially rising and falling pitch or increasing and decreasing (*crescendo* and *decrescendo* = *diminuendo*-type) vocal strength, we could interpret pitch accent oppositions as contrasts in the place of stress.

In Lithuanian, the preconditions for such an interpretation would be these: a) the phonemic basis for pitch accents includes not just long vowels, but also diphthongal *VR*-type sequences; b) in certain cases, metatony (pitch accent alternation) performs the same morphological role as a change in stress placement, cf.: *púodas* 'pot' : *puõdžius* 'potter' = *kùbilas* 'barrel' : *kubìlius* 'cooper'; c) according to Saussure's and Fortunatov's law, stress advances onto endings and other morphemes from both short and circumflex morphemes (see § 247 and references). Sometimes broken tone (as in Latvian, Danish, and Žemaitic) is indicated as a phonetic precondition for this interpretation, since it clearly breaks a syllable and its nucleus into two unequal parts (see [Trubetzkoy 1977: 180, 186 = Trubeckoj 1960: 223, 233ff.; Šaumjan 1962: 60]).

If a syllable has a coda sonorant forming a diphthong, pitch accents can be converted to stress contrasts quite easily. We just need to agree that acute accent is stress on the first component of a diphthong and circumflex accent is stress on the second component, that is, to assume that $\acute{V}R = \grave{V}\breve{R}$ and $V\tilde{R} = \breve{V}\grave{R}$, and correspondingly change the phonological interpretation of words with sounds of this type. We could then interpret and transcribe minimal pairs such as *káltas* 'chisel' : *kal̃tas* 'guilty', *skìrtas* 'separated; devoted' : *skir̃tas* 'difference', *šáukite* 'shoot-2PL.IMP' : *šaũkite* 'shout-2PL.IMP' as

follows: /kàltas/ : /kaⱢtas/, /ŝk̂ìrtas/ : /ŝk̂ir̃tas/, /šàv̂k̂ite/ : /šav̂k̂ite/ (or /šàuk̂ite/ : /šaũk̂ite/), etc. As can be seen, this is quite consistent with the pitch accent properties of many Aukštaitic dialects, since they in fact clearly emphasize either the first or second component of a diphthong.

If we wish to generalize this interpretation so that it also applies to syllables with a long-vowel nucleus, we would have to break down these vowels, or at least their quantitative features, and treat them as sequences of smaller units: moras (from Lat. *mora* 'delay, interval'), that is, as though they were diphthongs formed from two identical vowels, or simply conventional units, equivalent in structural duration to a single short syllable or half of a long one. We would then obtain these interpretations: *dýgti* 'sprout-INF' : *dỹkti* 'become spoiled (of children)-INF' = /dìikti/ : /diìkti/, *rū́gsta* 'turn sour-3PRS' : *rū̃ksta* 'smoke-3PRS' = /rùuksta/ : /ruùksta/, *vókti* 'gather in-INF' : *võgti* 'steal-INF' /vòokti/ : /voòkti/, etc. (see [Trager 1941: 139; Trubetzkoy 1977: 180 = Trubeckoj 1960: 223;[69] Martine 1963: 437–438; Garde 1968: 14–15 et passim], for a generative interpretation [Heeschen 1968: 195ff.; Kenstowicz 1969: 84ff.; 1972: 53ff.]). The above-mentioned metatony *púodas* : *puõdžius* would appear as /pùodas/ : /puòǯus/ and would no longer differ from the stress alternation in examples of the type *kùbilas* 'barrel' : *kubìlius* 'cooper', *kãtilas* 'cauldron' : *katìlius* 'boiler-maker'. Saussure's and Fortunatov's law could now be formulated as stress advancement from the mora preceding certain endings and other morphemes, cf. /v̂ìštā/ "*vištą*" 'chicken-ACC.SG' : /v̂ištàs/ "*vištàs*" 'chicken-ACC.PL' = /rañkā/ "*rañką*" 'hand-ACC.SG' : /rankàs/ "*rankàs*" 'hands-ACC.SG'.

Moras can also greatly simplify the description of certain variations in vocalism in Lithuanian dialects. For example, Baranauskas [Baranovskij 1898: 20–25] proposed a very logical mora-counting interpretation for East Aukštaitic Anykščiai and Utena vowel systems. He treated long vowels as sequences of three moras ("moments"),

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[69] Trubetzkoy placed Lithuanian among the so-called mora-counting languages (*morazählende Sprachen* [Trubetzkoy 1977: 174]; languages for which a mora-counting interpretation is not suitable are syllable-counting: *silbenzählende Sprachen* [ibid.]). In Stepanov's view, Lithuanian is simultaneously mora-counting and syllable-counting [Stepanov 1972: 175].

half-long vowels two moras, and short vowels single-mora elements.[70]
The alternation of stressed [iˑ], [uˑ], [ie], [uɔ] → unstressed [i.], [u.],
[a.] ([æ.]), characteristic of these dialects, can then be considered a
simple dropping of one mora (the first): /iii/ → /ii/, /uuu/ → /uu/,
/iaa/ → /aa/, /uaa/ → /aa/, cf. *gi̇́vas* /ĝìiivas/ "*gývas*" 'alive-NOM.SG.M' :
gi.vu̇́. /ĝiivuù/ "*gyvų̃*" 'alive-GEN.PL', *púɔdas* /pùaadas/ "*púodas*" 'pot' :
pa.du̇́.kas /paaduùkas/ "*puodùkas*" 'pot (dim.), cup' (for a present-day
treatment, see [Kosienė 1978: 30–31]; cf. [Jasiūnaitė, Girdenis 1996
(= Girdenis 2001: 257ff.)]).

§ 256. While it may look elegant, a mora-counting interpretation
of pitch accent is not very suitable for Lithuanian. Lithuanian pitch
accents are not entirely "obedient" to accentuation: as we have seen
(§ 246), they function as a supplementary characteristic of certain
morphemes (rather than entire words or word forms) and are not much
associated with stress. Secondly, as experimental studies show, the
Lithuanian acute is not purely falling, and the circumflex is not purely
rising; nor can they be unambiguously characterized by features of
increasing (*crescendo*) or decreasing (*decrescendo*) vocal strength.
For example, as Pakerys has shown [1967b; 1968; 1974b; 1982: 180–
185], the pitch accents of diphthongs differ more in the quality of the
first component of the diphthong than in a prosodic contrast between
the first and second components. And if both pitch accents differ at
the very beginning of a syllable, it is rather difficult to speak of a first
and second mora.[71] Third, this interpretation conflicts with the fact
that the vowels /oˑ ęˑ/ lack short counterparts of which they could be
considered sequences; this would make moras a purely theoretical
construct, lacking a firm empirical basis (but cf. Alfonsas Tekorius's
valid remarks [1984: 181], which are especially weighty in the context
of so-called autosegmental phonology).

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[70] Baranauskas ascribed the three-mora structure to Lithuanian in general (this
view was adopted by some Indo-Europeanists, for example, [Brugmann,
Delbrück 1897: 986–988]). Overall, this view is not quite correct, but it is far
more valid than is generally assumed, since non-final stressed [a e] lengthen
only to half-longs (in other words, they remain shorter than long vowels) in
perhaps all dialects (cf. § 174, fn. 117).

[71] The results of reverse listening tests should not be forgotten here (see
§ 243, fn. 46); they also go against a mora-counting interpretation of Lithuanian
pitch accents.

In general, there is a tendency at present to assume that a mora-counting interpretation is more or less appropriate only for Serbo-Croatian Čakavian dialects and for Classical Greek [Garde 1968: 166 et passim] (cf. [Martine 1963: 437–438]).[72] The stubborn desire to interpret the pitch accents of all languages as a contrast solely of moras has perhaps done the greatest harm to Kuryłowicz's theory of Baltic accentual development (see, for example, [Ivanov 1954: 135] on the artificiality of this theory).

4. SUMMARY REMARKS

§ 257. Having completed this survey of suprasegmental and in particular prosodic phonological units, we can state these more important conclusions.

1. General.

a) Those simultaneous phonological phenomena which differentiate linear units or sequences larger than a single phoneme should be considered suprasegmental units.

b) Prosodic units—intonations, accentuation, and pitch accent or tone—form the main subclass of suprasegmental units. The essence of their phonetic realization is most often modulations of pitch, vocal strength, and articulatory duration and rate of speech.

c) We can interpret as suprasegmental units not just "true" prosodic features, but also various other phenomena performing a distinctive function (for example consonantal softness, voicing, etc.), if they differentiate speech fragments larger than a single phoneme.

d) In singling out non-prosodic suprasegmental units, the criterion of grammatical expediency is particularly relevant. If such elements prevent a simple and consistent description and explanation of grammatical phenomena, the phonetic features in question are better assigned to individual phonemes and considered distinctive features.

2. Stress.

a) Stress, or more precisely, accentuation, is the syntagmatic contrast between more and less salient pronunciations of the syllables of a single word (or other unit of content).

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[72] Elsewhere, Martinet [1970: 343–344] was correct in saying that the mora is only a convenient tool for describing language, rather than an ontological unit of language.

b) The most important and universal function of stress is culminative: stress shows, first and foremost, how many units of content there are in a text (or act of speech) and distinguishes words (or other units of content) from word collocations (or sequences of other units of content).

c) Fixed stressed, determined by simple phonological rules, also performs a delimitative function: it indicates the boundaries of words or other units of content.

d) Free stress occurs less often; alongside a culminative function, it also performs a distinctive function: like phonemes and distinctive features, it distinguishes words and word forms.

e) Any primary or secondary stress should be considered phonological as long as it has an independent representative function (it does not need to be distinctive). Secondary stress is non-phonological only if its position automatically depends on primary stress or other purely phonological or phonetic factors.

3. Pitch accents, or tones.

a) Pitch accents, or tones, are formed by prosodic syllable features, which have an independent distinctive function: they differentiate words and word forms which otherwise have identical expression.

b) Lithuanian (and quite a few other languages) has two pitch accents, acute and circumflex; the pitch accents contrast in stressed long syllables (that is, in syllables in which the nucleus is formed by long vowels or *VR*-type sequences). In Europe, only standard Serbo-Croatian and its Štokavian dialect have short-syllable pitch accents. In Lithuanian, short syllables have no pitch accent.

c) Languages which have pitch accents or tones realized only in stressed syllables are called polytonic languages. Languages characterized by only one type of stress (that is, those which lack pitch accents) are called monotonic languages. Distinct from these are tone languages, which have complex tone systems not associated with culminative stress.

d) The pitch accents or tones of some languages can be interpreted as a contrast of moras—different parts of the syllable. Stress on the first mora of a syllable would correspond to pitch accents of the falling type, and stress on the second mora to pitch accents of the rising type. But there are not many languages for which the concept of

mora is fully necessary and appropriate; Lithuanian hardly belongs to these.

§ 258. A final remark. In studying and investigating the prosodic aspect of a language, the most important thing to keep in mind is that we establish and interpret stress, pitch accent, intonation, and other prosodic phenomena on the basis of their function and interrelations, and not their phonetic properties. Instrumentally established prosodic properties can be declared facts of a given language only if the speakers of that language perceive and actively employ them for communication, and if they indisputably perform a representative function. That which language informants do not perceive or distinguish can in general only be a physical phenomenon, and not a fact of a linguistic system.

It is also worth noting that prosodic phonological units can be expressed not only by prosodic, but also qualitative (spectral or inherent) features. Whenever phonetic properties and the functions of these phenomena are at odds with one another, the researcher should be especially consistent in following functional criteria. This is a general axiom of phonology, but here it should be especially emphasized and kept in mind, since prosodic phenomena are far more fluid, subtle, and abstract than syllables, phonemes, or their distinctive features; moreover, the Lithuanian writing system does not promote an intuitive understanding of these phenomena (cf. [Jensen 1961: 165]).

APPENDICES

Appendix 1. **Random numbers** (see § 46)

7336	8398	8979	7332	2780	7532	7152	168	9968	5623
7653	8046	2594	5750	8950	7151	6696	7965	2431	5265
4615	3428	2311	5005	7978	3661	4498	8243	3487	7574
1764	9149	3626	5679	1917	4482	2536	7376	2117	6315
966	6168	8992	9432	3735	1883	5499	1790	2531	3379
4442	4455	3592	442	6738	3436	3190	9541	3194	478
569	4343	5031	5058	9343	6471	896	7925	7743	5134
3137	7510	4152	8138	9852	2478	9946	561	7482	1944
8744	3525	9139	9454	951	2377	5636	2384	156	5014
2039	2895	124	8655	8593	8621	4689	5992	4672	2539
3465	2563	6448	2191	4963	5036	9467	7766	6469	9443
9226	4774	3814	653	221	363	1109	7221	3225	9024
8137	5264	3465	9956	2688	6425	8768	8020	5570	9534
5062	1704	611	4811	2191	6860	7168	4077	2524	6653
5619	8324	4286	7918	6233	7362	9634	9196	6309	7761
1846	7686	5811	3318	3680	3358	8806	3697	6266	8978
3500	5503	8060	7346	5660	6066	2215	6429	6521	891
4709	9473	2715	5615	8356	2873	4905	5651	7118	3903
619	8057	7695	9475	7377	2958	6301	7184	3300	9163
3766	124	1954	387	8405	4120	3497	3299	2610	5986
4837	1421	9820	5628	3792	1719	8158	751	4523	1722
7510	8801	2085	3806	9804	5695	9228	1418	2282	4999
2067	8132	6001	3575	4205	6590	8615	3981	1623	8291
7464	6839	1417	4023	8843	6502	2066	62	6089	729
6543	7016	5192	156	6963	5931	2395	3285	3612	7109
4078	37	1107	1910	9898	2432	7264	4681	4046	4032
2342	8611	7455	147	2855	2024	8707	2873	2355	9104
3876	7218	9488	8051	4458	9295	6572	2491	7123	4142
6160	6852	8918	1378	9760	7128	3082	9244	9092	8326
7857	5034	7658	5987	1393	2001	695	5089	9400	2222

8805	4693	5952	4933	6136	3828	4640	2180	9727	1303
3139	2443	7316	6442	6513	2894	2152	9638	5005	9600
6129	5006	2192	2616	97	2288	4135	1372	2206	4444
1346	5030	7571	2672	3669	3382	6337	5561	5514	2112
4618	9711	2826	641	3701	6057	6236	3398	5465	3644
3099	2354	8754	6971	5313	565	1215	3322	5	434
5591	133	8065	5838	4077	894	2218	8779	4936	1631
3841	8980	4464	6627	5327	5569	5090	2971	3447	4307
9466	1536	2546	3010	682	6835	6778	8998	9412	2301
6223	9104	5674	8053	6463	4163	8581	8861	4149	4702
2290	3556	4039	8803	3692	2994	3635	9743	1319	9897
2255	99	70	8782	4362	4691	834	1015	9659	6120
3507	6879	3413	1825	3660	8614	2354	401	8239	4443
6699	2323	2631	5710	2835	2254	6983	2742	3916	5149
4987	6175	5844	9005	2406	381	6438	9796	5691	3417
1723	5172	7470	9583	377	9131	6859	4508	5643	5265
1294	9271	3278	8221	5171	5970	2665	8188	1140	9684
2795	9389	918	5748	7947	1472	4956	4048	7997	7895
1214	2585	8139	7157	4013	3856	1667	5508	9285	5679
5834	5614	5859	1135	7991	2214	1633	2738	9471	9710
525	2805	8293	8429	2458	9362	9775	5853	8575	3829
5611	9189	7317	7508	4713	269	5585	8209	6037	6191
6022	4820	3258	945	1393	6972	2099	8230	8980	3240
5389	1218	9293	953	5597	5952	7547	3216	4550	1426
791	5894	1662	7527	6221	8876	6865	3547	1024	2622
7830	5863	2849	7618	4187	2661	5258	753	7389	4167
731	6105	9958	8777	5255	9785	1002	7853	6047	9472
7140	3906	5444	5713	4104	4804	9670	5424	8365	137
2329	5016	2387	3194	9369	7977	6976	1833	7737	5501
2468	2552	1522	3741	4323	1982	2411	1057	9862	581
1682	4608	2178	3538	2893	2608	879	6549	4902	8315
2552	1481	4344	5001	5693	9416	4495	4570	1238	7072
4770	8463	4023	9452	5765	7260	1762	5433	5486	9344
1621	5154	9081	8322	8715	4631	6282	6093	8473	2569
8983	7189	7777	6329	6929	9754	2222	2528	1855	8023
6542	1371	7142	5063	2562	380	8691	5332	5069	8715
5890	100	3425	425	8981	8197	241	6980	7308	2221
5218	6069	1764	2345	5354	3825	5660	4184	4196	9397
5265	3147	7291	229	4070	3293	2265	3783	3861	4918
6236	4385	4848	2555	5681	1973	7856	5610	2093	552

359	3100	9499	4081	1046	6891	7546	768	1263	7142
9769	7953	5043	9077	5375	3347	7635	8748	2712	6212
4425	7974	2685	4037	3855	6797	3725	1845	7272	7139
9719	8463	7085	8293	3538	5920	5258	280	3624	823
8491	3709	1954	5987	1194	7822	3671	6498	9178	5810
7119	7464	2380	7820	1808	1296	6347	2052	3159	7787
382	7103	6095	6025	7403	9092	3561	5526	6580	8389
4780	2420	841	1005	891	5134	597	4937	8810	4274
4996	4987	44	3061	4619	7600	2224	3035	5402	2371
3191	9014	3974	7663	8326	3836	1737	8958	6881	2274
5824	9658	8586	7689	6168	8010	1719	4678	3175	1691
7666	9702	9215	1076	7517	7469	8742	9651	3382	5903
7727	559	1328	7312	1220	8714	9176	2151	5552	7158
6743	8520	5514	1228	7998	8950	8296	682	6181	4955
957	2206	8898	7497	683	4135	9882	3934	4090	3131
1833	2135	172	4303	6964	9472	8496	2714	8400	4711
6432	8369	417	9602	4354	3282	1614	2281	5265	449
8114	7153	6926	8423	2038	187	3818	8529	3067	1991
2259	2503	2198	4639	9315	4555	225	6464	753	5612
6690	3671	5287	5644	5299	132	1330	4390	9009	7456
1505	4425	7718	3390	9584	6800	6482	2267	8947	6211
7976	5085	1125	193	8552	411	8146	7659	8006	4171
1225	3248	8824	2778	7012	6612	4155	7723	7737	2606
6356	4143	8502	2966	9856	4625	145	667	3185	2399
2732	6554	8194	8479	3431	1893	9344	5114	8525	5856
6080	5247	2764	2265	1294	5552	1925	827	8670	663
3122	5832	3048	3798	4055	1653	1075	9203	1508	1899
8408	3012	4870	796	7993	8074	8017	7004	484	3051
8046	8148	107	4775	2124	2066	3125	1736	2194	1982
13	7069	6984	8903	8408	8359	5348	2134	8690	2766
5735	4085	1809	1560	4806	8776	7120	2178	9178	9342
2627	3119	9307	4070	5834	9290	6947	2085	797	1933
2272	1915	3766	6027	345	5452	6861	4707	3168	2134
3940	239	8164	6655	1188	2145	6912	780	6403	7654
8118	8031	3477	5643	6459	8587	3916	1457	7254	2608
9752	4433	5343	1887	7024	4527	6614	1563	3096	4314
5882	3629	287	3584	9988	8563	4453	2011	8433	2544
7363	8444	8674	8106	2817	4541	2164	4814	3603	2134
9347	7634	6598	5102	7792	6944	7328	9138	385	4929
231	7802	3872	1256	1478	1229	3121	1818	4185	1973

4495	7647	1379	2728	9732	4502	1028	9415	3964	5358
8532	4518	2311	9836	5072	9365	1187	2512	483	8770
8184	9497	4758	2783	8080	6681	4561	3381	4011	2453
6339	1412	7890	2697	2559	4107	9126	894	2665	8467
5700	1130	5302	849	6675	6829	3370	8047	188	3017
8473	197	5997	4939	6326	802	6636	834	9678	4211
6253	1679	329	5842	1183	5727	6771	5470	1317	631
9054	8906	6342	987	7417	8352	5901	4100	6243	6775
7747	1776	9921	6580	2941	973	2154	7933	2169	1103
5293	7006	2231	814	1254	9487	6770	2052	570	9653
303	4222	1166	324	9612	6259	3385	4004	1563	9425
2864	530	1414	8636	7789	1537	671	5139	2119	7052
8560	8350	1320	4523	6174	9664	2191	5613	7358	6050
3325	1053	5393	6240	7781	8876	9546	7339	4527	6340
549	4643	217	858	9053	2506	7850	245	6151	9043
3907	7592	1	2501	486	1078	7627	2100	4033	4045
5967	1160	7215	5629	1208	5321	5493	7280	493	3682
4977	5461	5058	5655	3099	5867	8840	1357	8692	9445
1659	8350	3021	5553	994	2541	8331	2556	1445	6054
5483	1174	5930	9885	7233	904	7682	4162	8710	4814
7114	3807	1679	3030	2602	2423	4120	228	9264	2222
1713	7440	4786	2790	2771	3497	6359	6521	3206	6398
7797	3519	3057	9950	891	3790	1183	5961	62	9523
9651	7322	4380	5293	4393	2272	6006	8974	3704	5172
9127	1198	1123	4096	8434	6154	4285	546	1223	1551
6276	1612	2163	554	1083	9887	4808	3502	9685	1448
8907	2228	8347	7208	7578	4785	5689	7974	3408	3397
83	8497	7541	3444	3949	841	819	6296	6500	2386
1030	3806	1519	8765	5338	7277	1703	7063	1952	8711
6168	9573	89	7161	2643	3440	2306	7988	951	6488
8257	7842	9307	4560	3935	3180	24	666	5469	5132
6166	1266	1532	8523	5723	9991	3426	7871	4871	4117
6904	8170	6874	4111	4791	3271	8196	1547	4475	9669
8373	5724	9315	8522	5235	4280	8045	3691	2000	8123
1223	8642	7847	5998	8798	2	8491	8982	7848	581
8352	250	4560	9694	860	393	9511	3567	8474	3621
308	3660	8966	5159	657	5713	9538	5141	9924	7322
5337	9330	2235	6868	3918	1954	9206	1603	2238	995
5333	7713	7724	1226	128	160	9991	5318	6057	5122
4759	8318	6340	2854	6548	5829	1670	3754	1703	1189

Appendix 2. **Values of the function $\varphi = 2$ arcsin $\sqrt{p}$** (see § 47)[1]

p (%)	Decimals									
	0	1	2	3	4	5	6	7	8	9
50	**1.571**	1.573	1.575	1.577	1.579	1.581	1.583	1.585	1.587	1.589
51	1.591	1.593	1.595	1.597	1.599	1.601	1.603	1.605	1.607	1.609
52	1.611	1.613	1.615	1.617	1.619	1.621	1.623	1.625	1.627	1.629
53	1.631	1.633	1.635	1.637	1.639	1.641	1.643	1.645	1.647	1.649
54	1.651	1.653	1.655	1.657	1.659	1.661	1.663	1.665	1.667	1.669
55	1.671	1.673	1.675	1.677	1.679	1.681	1.683	1.685	1.687	1.689
56	1.691	1.693	1.695	1.697	1.699	1.701	1.703	1.705	1.707	1.709
57	1.711	1.713	1.715	1.717	1.719	1.721	1.723	1.725	1.727	1.729
58	1.731	1.734	1.736	1.738	1.740	1.742	1.744	1.746	1.748	1.750
59	1.752	1.754	1.756	1.758	1.760	1.762	1.764	1.766	1.768	1.770
60	1.772	1.772	1.772	1.772	1.780	1.780	1.780	1.780	1.780	1.791
61	1.793	1.795	1.797	1.799	1.801	1.803	1.805	1.807	1.809	1.811
62	1.813	1.815	1.817	1.819	1.821	1.823	1.826	1.828	1.830	1.832
63	1.834	1.836	1.838	1.840	1.842	1.844	1.846	1.848	1.850	1.853
64	1.855	1.857	1.859	1.861	1.863	1.865	1.867	1.869	1.871	1.873
65	1.875	1.878	1.880	1.882	1.884	1.886	1.888	1.890	1.892	1.894
66	1.897	1.899	1.901	1.903	1.905	1.907	1.909	1.911	1.913	1.916
67	**1.918**	1.920	1.922	1.924	1.926	1.928	1.930	1.933	1.935	1.937
68	1.939	1.941	1.943	1.946	1.948	1.950	1.952	1.954	1.956	1.958
69	1.961	1.963	1.965	1.967	1.969	1.971	1.974	1.976	1.976	1.980
70	1.982	1.984	1.987	1.989	1.991	1.993	1.995	1.998	1.991	2.002
71	2.004	2.006	2.009	2.011	2.013	2.015	2.018	2.020	2.022	2.024
72	2.026	2.029	2.031	2.033	2.035	2.038	2.040	2.042	2.044	2.047
73	2.049	2.051	2.053	2.056	2.058	2.060	2.062	2.065	2.067	2.069
74	2.071	2.074	2.076	2.078	2.081	2.083	2.085	2.087	2.090	2.092
75	2.094	2.097	2.099	2.101	2.104	2.106	2.108	2.111	2.113	2.115
76	2.118	2.120	2.122	2.125	2.127	2.129	2.132	2.134	2.136	2.139
77	2.141	2.144	2.146	2.148	2.151	2.153	2.156	2.158	2.160	2.163
78	2.165	2.168	2.170	2.172	2.175	2.177	2.180	2.182	2.185	2.187
79	2.190	2.192	2.194	2.197	2.199	2.202	2.204	2.207	2.209	2.212
80	2.214	2.217	2.219	2.222	2.224	2.227	2.229	2.231	2.234	2.237
81	2.240	2.242	2.245	2.247	2.250	2.252	2.255	2.258	2.260	2.263

[1] Abridged from [Urbach 1975: 285–287].

82	2.265	2.268	2.271	2.273	2.276	2.278	2.281	2.284	2.286	2.289
83	2.292	2.294	2.297	2.300	2.302	2.305	2.308	2.310	2.313	2.316
84	2.319	2.321	2.324	2.327	2.330	2.332	2.335	2.338	2.341	2.343
85	2.346	2.349	2.352	2.355	2.357	2.360	2.363	2.366	2.369	2.272
86	2.375	2.377	2.380	2.383	2.386	2.389	2.392	2.395	2.398	2.401
87	2.404	2.407	2.410	2.413	2.416	2.419	2.422	2.425	2.428	2.431
88	2.434	2.437	2.440	2.443	2.447	2.450	2.453	2.456	2.459	2.462
89	2.465	2.469	2.472	2.475	2.478	2.482	2.485	2.488	2.491	2.495
90	2.498	2.501	2.505	2.508	2.512	2.515	2.518	2.522	2.525	2.529
91	2.532	2.536	2.539	2.543	2.546	2.550	2.554	2.557	2.561	2.564
92	2.568	2.572	2.575	2.579	2.583	2.587	2.591	2.594	2.598	2.602
93	2.606	2.610	2.614	2.618	2.622	2.626	2.630	2.634	2.638	2.642
94	2.647	2.651	2.655	2.659	2.664	2.668	2.673	2.677	2.681	2.686
95	2.691	2.695	2.700	2.705	2.705	2.714	2.719	2.724	2.729	2.734
96	2.739	2.744	2.749	2.754	2.760	2.765	2.771	2.776	2.782	2.788
97	2.793	2.799	2.805	2.811	2.818	2.824	2.830	2.837	2.844	2.851
98	2.858	2.865	2.872	2.880	2.888	2.896	2.904	2.913	2.922	2.931
99	2.941	2.952	2.963	2.974	2.987	3.000	3.015	3.032	3.052	3.078
100	3.142									

Appendix 3. **Estimating the u-criterion for listening experiments** (see § 48)

P	n / p_0	15	20	25	30	35	40	45	50	60	70	80	90	100	110	120	130	140	150	160	170	180
0.95 ($Z_{0.05}$)	50%	12	15	18	21	24	27	29	32	38	44	49	55	60	66	71	77	82	87	93	98	104
	67%	14	18	21	25	29	33	36	40	47	55	62	69	76	84	91	98	105	112	119	126	133
0.99 ($Z_{0.01}$)	50%	13	16	19	22	25	28	31	34	40	46	52	58	63	69	75	80	86	91	97	102	108
	67%	14	18	22	26	30	34	38	42	49	57	64	72	79	86	94	101	108	115	122	130	137
0.999 ($Z_{0.001}$)	50%	14	17	21	24	27	30	34	37	43	49	55	61	67	72	78	84	90	95	101	107	112
	67%	–	20	24	28	32	36	40	44	51	59	67	74	82	89	97	104	111	119	126	133	141

P	n / p_0	190	200	210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	360	370	380	390
0.95 ($Z_{0.05}$)	50%	109	114	120	125	130	136	141	146	152	157	162	167	173	178	183	189	194	199	204	210	215
	67%	140	147	154	161	168	175	182	189	196	203	210	217	224	231	238	245	252	259	266	273	280
0.99 ($Z_{0.01}$)	50%	113	119	124	130	135	140	146	151	157	162	167	173	178	184	189	194	200	205	210	216	221
	67%	144	151	158	165	172	179	187	194	201	208	215	222	229	236	243	250	257	264	271	278	285
0.999 ($Z_{0.001}$)	50%	118	124	129	135	140	146	151	157	162	168	173	179	184	190	195	201	206	212	217	222	228
	67%	148	155	163	170	177	184	191	199	206	213	220	227	234	242	249	256	350	270	277	284	291

P	p_0 \ n	400	410	420	430	440	450	460	470	480	490	500	510	520	530	540	550	560	570	580	590	600
0.95	50%	220	225	231	236	241	246	252	257	262	267	272	278	283	288	293	298	304	309	314	319	325
$(Z_{0.05})$	67%	287	294	300	307	314	321	328	335	342	349	356	363	370	376	383	390	397	404	411	418	425
0.99	50%	226	232	237	242	248	253	258	263	269	274	279	285	290	295	300	306	311	316	322	327	332
$(Z_{0.01})$	67%	292	299	306	313	320	327	334	341	348	355	362	369	376	383	390	387	404	411	418	425	432
0.999	50%	233	239	244	250	255	260	266	271	276	282	287	293	298	303	309	314	319	325	330	335	341
$(Z_{0.001})$	67%	298	306	313	320	327	334	341	348	355	362	369	376	383	390	397	404	411	418	425	432	439

P	p_0 \ n	610	620	630	640	650	660	670	680	690	700	710	720	730	740	750	760	770	780	790	800	810
0.95	50%	330	335	340	345	351	356	361	366	371	376	382	387	392	397	402	408	413	418	423	428	433
$(Z_{0.05})$	67%	432	439	445	452	459	466	473	480	487	494	500	507	514	521	528	535	542	549	555	562	569
0.99	50%	337	343	348	353	358	364	369	374	379	385	390	395	400	406	411	416	421	427	432	437	442
$(Z_{0.01})$	67%	439	446	452	459	466	473	480	487	494	501	508	515	522	529	536	543	550	556	563	570	577
0.999	50%	346	351	357	362	367	373	378	383	389	394	399	405	410	415	421	426	431	436	442	447	452
$(Z_{0.001})$	67%	446	453	460	467	474	481	488	495	502	509	516	523	530	537	544	551	558	565	572	579	586

The symbol n denotes the total number of responses, n_1 – the number of correct responses, Z_α – the critical number of correct responses. The null hypothesis (H_0) is accepted if $n_1 < Z_{0.05}$, and rejected (that is, a statistically significant difference is stated) if $n_1 \geq Z_{0.01}$. The data in the table have been newly calculated using a personal computer (TURBO PASCAL 7.0 programming language).

Appendix 4. **Phoneme frequencies for standard Lithuanian**

No.	Phoneme	Absolute frequency	%	No.	Phoneme	Absolute frequency	%
1	/a/	10,455	10.46	29	/eˑ/	1,244	1.24
2	/i/	7,175	7.18	30	/ie/	1,212	1.21
3	/s/	5,883	5.88	31	/m̂/	1,208	1.21
4	/oˑ/	5,010	5.01	32	/p̂/	1,175	1.18
5	/j/	4,811	4.81	33	<d̂>	1,059	1.06
6	/e/	4,542	4.54	34	/ŝ/	989	0.99
7	/k/	4,066	4.07	35	/š/	911	0.91
8	/u/	3,713	3.71	36	/b/	837	0.84
9	/t/	2,850	2.85	37	/ẑ/	742	0.74
10	/v/	2,777	2.78	38	/ĝ/	734	0.73
11	/r/	2,763	2.76	39	/b̂/	663	0.66
12	/ęˑ/	2,613	2.61	40	/uo/	614	0.61
13	/r̂/	2,583	2.58	41	/ĉ/	527	0.53
14	/n/	2,513	2.51	42	/ž/	472	0.47
15	<t̂>	2,494	2.49	43	/ẑ̧/	199	0.20
16	/n̂/	2,395	2.40	44	/ĉ/	145	0.15
17	/ŝ/	2,242	2.24	45	<ɔ>	124	0.12
18	/l̂/	2,155	2.16	46	/z/	122	0.12
19	/p/	2,003	2.00	47	/ẑ/	92	0.09
20	/iˑ/	1,939	1.94	48	/c/	21	0.02
21	/m/	1,689	1.69	49	<f>	18	0.02
22	/aˑ/	1,621	1.62	50	/ʒ/	11	0.01
23	/d/	1,549	1.55	51	/č/	8	0.01
24	/v̂/	1,520	1.52	52	<f̂>	8	0.01
25	/uˑ/	1,472	1.47	53	<ĥ>	3	0.00
26	/k̂/	1,355	1.36	54	<x>	2	0.00
27	/l/	1,355	1.36	55	<x̂>	1	0.00
28	/g/	1,317	1.32	56	<h>	0	0.00

n = 100,001 phonemes; see [Karosienė, Girdenis 1993 (= Girdenis 2001: 64ff.)].

Appendix 5. **Frequency of syllable type for standard Lithuanian**

Syllable type	Syllable count	Relative frequency (%)	Syllable type	Syllable count	Relative frequency (%)
CV	22,813	54.66	VʷC	60	0.144
CVC	7,346	17.60	CCVʷC	59	0.141
CVʷ	2,682	6.43	CCVCC	46	0.110
CCV	2,661	6.38	**CCCV**	34	0.081
VC	2,026	4.86	CCCVC	28	0.067
V	1,434	3.44	CCCVʷ	20	0.048
CCVC	780	1.87	CVʷCC	6	0.014
CVʷC	573	1.37	CVCCC	4	0.010
CCVʷ	494	1.18	CCCVCC	2	0.005
CVCC	405	0.97	CCVʷCC	2	0.005
VCC	138	0.33	CCVCCC	1	0.002
Vʷ	120	0.29			

n = 41,734 syllables. V – vowel, C – consonant, V^w – regular diphthongs; open syllables denoted in bold; see [Karosienė, Girdenis 1994 (= Girdenis 2001: 116ff.)].

Appendix 6. **Frequency of prosodic syllable type for standard Lithuanian**

Unstressed syllables			Stressed syllables				
Short	Long		Short	Long			
	Vowels	Diphthongs		Acute (´)		Circumflex (˜)	
				Vowels	Diphthongs	Vowels	Diphthongs
$(\breve{V})$	$(\bar{V})$	$(\bar{V}R)$	$(\grave{V})$	$(\acute{\bar{V}})$	$(\acute{V}R)$	$(\tilde{\bar{V}})$	$(V\tilde{R})$
13,261 (31.78%)	9,244 (22.15%)	4,776 (11.45%)	3,977 (9.52%)	2,853 (6.84%)	1,518 (3.64%)	3,628 (8.69%)	2,473 (5.93%)
				4,371 (10.48%)		6,101 (14.62%)	
	14,020 (33.60%)			10,472 (25.10%)			
27,281 (65.38%)			14,449 (34.62%)				

n = 41,730 syllables; cf. [Karosienė, Girdenis 1990 (= Girdenis 2001: 19ff.)].

Ratios for major syllable types:
short : long	=	17,238 : 24,492 =	41.30% : 58.70% =	1 : 1.42
short stressed : long stressed	=	3,977 : 10,472 =	9.52% : 25.10% =	1 : 2.63
short unstressed : long unstressed	=	13,261 : 14,020 =	31.78% : 33.60% =	1 : 1.06

long:
vowels : diphthongs	=	15,725 : 8,767 =	37.68% : 21.02% =	1.79 : 1
stressed vowel : stressed diphthong	=	6,481 : 3,991 =	15.53% : 9.57% =	1.62 : 1
unstressed vowel : unstressed diphthong	=	9,244 : 4,776 =	22.15% : 11.45% =	1.94 : 1

ТЕОРЕТИЧЕСКИЕ ОСНОВЫ ЛИТОВСКОЙ ФОНОЛОГИИ

Резюме

В книге излагается синтезирующая модель теоретической фонологии, сложившаяся как результат многолетних размышлений над звуковым строем литовского языка и его диалектов. Костяком этой теории являются воззрения Копенгагенской школы и связанного с ней выдающегося польского языковеда Е. Куриловича (Kuryłowicz), в особенности принципиальное положение данного направления лингвистической мысли о методическом приоритете синтагматических отношений и явлений нейтрализации над материальными свойствами единиц плана выражения. На этом основании строится система классификации фонем и просодем, определяются их различительные признаки. Не игнорируются и достижения других направлений современной лингвистики, не противоречащие духу (разумеется, не букве) «копенгагенской» концепции, — прежде всего Пражского лингвистического кружка и связанной с ним дихотомической фонологии, дескриптивной лингвистики, Московской школы. Не принимается во внимание лишь так называемая порождающая (генеративная) фонология, поскольку она представляет собой не фонологию sensu stricto, а осложнённое ответвление морфонологии — науки, почти целиком относящейся к морфологии.

1. ВВЕДЕНИЕ

1.1. ИСХОДНЫЕ ПОНЯТИЯ

В данном разделе определяются основные исходные понятия современной функциональной лингвистики: язык и речь,

выражение и содержание, синхрония и диахрония, синтопия и диатопия. Показывается, что наряду с понятиями языка (структуры) и речи целесообразно выделить понятие нормы; синхрония и диахрония понимаются не как состояния самого языка, а как методически целесообразные аспекты и перспективы исследования.

1.2. СООТНОШЕНИЕ ФОНЕТИКИ И ФОНОЛОГИИ

Большинство современных лингвистов, начиная с Л. В. Щербы (в отличие от Н. С. Трубецкого и его последователей), считает эти дисциплины ответвлениями одной науки — фонетики (в широком смысле). Это — единственно правильная точка зрения, поскольку фонология немыслима без фонетики, а фонетика (даже традиционная) — без фонологии (хотя бы интуитивной).

1.3. ФУНКЦИИ ЗВУКОВ И ИХ ПРИЗНАКОВ

Обычно различают три основные функции звуков и их признаков: репрезентативную, экспрессивную и апеллятивную. Поскольку для экспрессивных и апеллятивных целей, как правило, используются одни и те же средства, представляется целесообразным различать только две основные функции: репрезентативную и нерепрезентативную (экспрессивную в широком смысле). Экспрессивные средства языка фонолога интересуют лишь как явления, близкие к фонологическим по форме, но не являющиеся таковыми по роли, выполняемой в языке.

1.4. РАЗНОВИДНОСТИ ФОНОЛОГИЧЕСКИХ ЕДИНИЦ

1.4.1. Самая крупная единица выражения — это высказывание: звуковой отрезок между двумя моментами молчания. Высказывание реализуется фонологическими предложениями (1), предложение — фонологическими словами (2) и фразовой интонацией (3), слово — слогами (4) и определённой моделью акцентуации (5), слог — фонемами (6) и (в некоторых языках) тоном или слоговой интонацией (7); фонему (с известной оговоркой) можно представить как пучок дифференциальных признаков (8). Одни из этих единиц (1–3) всегда являются знаками, другие (4–8) — лишь составными частями выражения знаков. Фонологический

анализ целесообразно начинать со слова — единицы, находящейся на границе между знаками и незнаками.

Единицы 2, 4, 6 являются линейными: их порядок выполняет различительную функцию. Порядок симультанных единиц (3, 5, 7, 8) такой роли не выполняет; среди последних выделяются суперсегментные (просодические) единицы (3, 5, 7), которые реализуются как модификации линейных единиц, более крупных, чем одна фонема.

1.4.2. В некоторых фонологических системах встречаются особые единицы, называемые открытыми стыками. Они вводятся в тех точках слова или предложения, где смежные фонемы реализуются так, словно они не стоят рядом, ср. рус. *к Йре* [кы́р′и^{е}] : *Ки́ре* [ки́р′и^{е}], литов. с.-жем. *nɛbêrs* 'не будет больше распадаться': *n̂ebêrs* 'не будет сыпаться' = /k+ír′e/ : /kír′e/, /neb+ẹ́rs/ : /nebẹ́rs/. Стыки — это обобщённые делимитативные единицы, косвенно выполняющие и различительную роль.

2. ОПРЕДЕЛЕНИЕ ФОНЕМ

2.1. ПРЕДВАРИТЕЛЬНЫЕ ЗАМЕЧАНИЯ

Любое устное высказывание, как физическое явление, уникально и неповторимо. Однако носители языка некоторые физически различные звуки или их комплексы расценивают как одинаковые. Опираясь на этот факт, фонология в бесконечном многообразии физических звуков обнаруживает немногочисленные дискретные единицы, которые носителями языка воспринимаются как неизменные и нетождественность которых связана с нетождественностью содержания.

2.2. ПАРАДИГМАТИЧЕСКАЯ ИДЕНТИФИКАЦИЯ ФОНЕМ

2.2.1. Основным приёмом парадигматической идентификации является субституция (подстановка): исследуемые звуки подставляются один вместо другого в одинаковом звуковом контексте и полученный результат предлагается информантам. Если предложенное слово воспринимается ими как повторение исходного, то исследуемые звуки являются факультативными вариантами одной

и той же фонемы. Ср. литов. ю.-аукшт. (Швяндубре и др.) [k̂ế·vas] 'отец' = [t̂ế·vas] = [k̟ế·vas], свидетельствующие о тождественности [k̂] = [t̂] = [k̟], или з.-аукшт. (Жагаре, Скайсгирис и др.) [ɫã·šɑš] 'капля' = [ɫã·sɑs] = [ɫã·śɑś], указывающие на то, что [š], [ś] (шепелявое «s») и [s] в этих говорах представляют собой факультативные варианты одной фонемы /s/. Если в результате подстановки получаются слова, которые оцениваются информантами как отличные от исходных по выражению и по содержанию, то исследуемые звуки представляют различные фонемы. Ср. литов. [k] и [t] в *kàs* 'кто; что' ≠ *tàs* 'тот', [s] и [š] в *vès* 'будет вести' ≠ *vèš* 'будет везти'.

Идентификацию фонем в значительной степени облегчают минимальные пары (квазиомонимы) — разные по значению словоформы, отличающиеся лишь одним звуковым сегментом или даже признаком. Наличие таких пар является убедительным доказательством функционального различия звуков. Ср. литов. *bókštas* 'башня' : *pókštas* 'шутка', доказывающие, что [b°] ≠ [p°]. Определение фонем при помощи квазиомонимов иногда называют коммутационным тестом или просто коммутацией.

2.2.2. Следующим шагом в идентификации фонем является определение дистрибуции (распределения) звуковых сегментов. Обычно выделяются два типа дистрибуции: оппозитивная и дополнительная. Оппозитивная дистрибуция — это отношение между звуками, встречающимися в одинаковых позициях (ср. литов. [ž] и [š] в словах *žalià* 'зелёная' : *šalià* 'рядом'); в отношении дополнительной дистрибуции находятся звуки, встречаемые лишь в различных позициях (ср. литов. [n] и [ŋ] в словоформах [raŋkà] 'рука', [baŋgà] 'волна' и [nã·mas] 'дом', [bandà] 'стадо').

Звуки, находящиеся в отношении дополнительной дистрибуции, не могут самостоятельно различать словоформы; их перестановка приводит только к странным и даже невозможным звуковым образованиям. Такие звуки можно считать представителями одной фонемы, если только они обладают общими звуковыми признаками. Так, литов. [n] и [ŋ] являются носовыми негубными сонорными согласными, — следовательно, эти звуки представляют собой разновидности одной фонемы /n/. Ср. также открытое [æ·] и более закрытое [e·] в позициях [—C] и [—Ĉ]

(напр., [n̂æ̃·ša] 'несёт' : [n̂ẽ·še̦·] 'нёс'), которые также представляют одну фонему /e·/.

Звуки, находящиеся в отношении дополнительной дистрибуции и сводимые к одной фонеме, являются её комбинаторными (позиционными) вариантами, или аллофонами. Аллофон, отличающийся более свободной дистрибуцией и более простым звуковым составом, считается основным. Поскольку основной аллофон является как бы нормой фонемы, многие позиционные вариации фонем можно записать сокращёнными «порождающими» формулами типа /n/ → [ŋ] / [—$_g^k$], специально указывая только реализацию второстепенных аллофонов.

При идентификации фонем должны приниматься во внимание и соображения грамматической целесообразности: при прочих равных условиях предпочтение отдаётся решениям, которые способствуют упрощению правил грамматики.

2.2.3. Поскольку фонологический статус звуков определяется их дистрибуцией, фонетически близкие звуки в одних системах могут играть роль самостоятельных фонем, а в других — выступать как аллофоны одной и той же фонемы. Например, в литовском литературном языке (и во многих говорах) наблюдаются отношения кратких гласных, представленные в § 59 (табл. 5). В этой системе [a] и [e] являются самостоятельными фонемами, так как противопоставляются в позиции [#—]. В южно-аукштайтских и некоторых других говорах краткие гласные распределены по-иному (см. табл. 6). Звуки этих говоров почти полностью идентичны звукам литературного языка, однако [a] и [e] в них находятся в отношении дополнительной дистрибуции и поэтому являются аллофонами одной фонемы /a/.

2.2.4. Функция фонем заключается в дифференциации содержательных единиц и в формировании их плана выражения («звуковой оболочки»). Факультативные варианты служат как средство идентификации говорящих; некоторые признаки факультативных вариантов используются как экспрессивные единицы (так называемые эмфатики). Аллофоны, появляющиеся на границе слов или других содержательных единиц, выполняют делимитативную функцию. В большинстве же случаев они оказывают содействие фонемам и другим фонологическим единицам, предупреждая о их наличии в смежных позициях. Иногда

аллофоны даже факультативно замещают те фонемы или их сочетания, под воздействием которых они появляются (ср. литов. с.-жем. [ǫ˙] = /ǫ/ + /n/ в случаях типа [dǭ˙gòs] ‖ [dǭ.ŋgòs] 'небо', [žǫ̂˙słas] ‖ [žǫ̂.nsłas] 'удила́').

2.3. СИНТАГМАТИЧЕСКАЯ ИДЕНТИФИКАЦИЯ ФОНЕМ

2.3.1. Синтагматическая идентификация фонем explicite или implicite основывается на некоторых типологических предпосылках. С одной стороны, почти никогда не ставится вопрос о фонемном составе тех звуковых сегментов, которые во всех известных языках функционируют как двухфонемные, — таких, как сочетания гласных и согласных, щелевых и смычных и т. д. С другой стороны, тщательному рассмотрению, как правило, подвергаются только такие сегменты, о которых заранее известно, что они в одних языках могут функционировать как сочетания фонем (бифонемы), в других языках — как реализация отдельных фонем (монофонемы). К таким сегментам, например, относятся дифтонги, слоговые сонанты, аффрикаты, палатализованные согласные. Но типологические соображения имеют только ориентировочное значение: они помогают обнаружить потенциально двухфонемные сегменты.

2.3.2. Из фонетических критериев двухфонемности доказательным можно считать только принадлежность отдельных частей (компонентов) основных вариантов сегмента к различным слогам: по определению фонема должна реализоваться в одном слоге. Все остальные фонетические (антропофонические) признаки (такие, как исключительно большая длительность, неоднородность артикуляции и др.), как и типологические соображения, играют лишь вспомогательную роль.

Из множества различных фонологических правил и критериев синтагматической идентификации фонем самыми общими являются: (1) принцип минимального инвентаря и (2) принцип регулярности отношений. Первое правило требует считать потенциально двухфонемные сегменты реализацией сочетаний во всех случаях, когда имеются хотя бы малейшие основания. Согласно второму принципу, сегментация должна проводиться так,

чтобы правила, описывающие закономерности сочетаемости фонем, получились самыми регулярными и простыми. Когда соблюдение обоих принципов ведёт к противоречивым решениям, предпочтение отдаётся второму.

По этим соображениям, например, следует отвергнуть двухфонемную трактовку литовских аффрикат: их сегментация искусственно создала бы инициальные сочетания типа *TS-* и пятичленные медиальные группы (напр., *viřkščios* 'стержни'). Аффрикаты [tŝ, dẑ] в исконной лексике встречаются в основном перед гласными заднего ряда и находятся, по существу, в отношении дополнительной дистрибуции с [t̂, d̂], встречающимися перед гласными переднего ряда, — это как будто свидетельствует о том, что [tŝ, dẑ] и [t̂, d̂] являются аллофонами фонем /t̂, d̂/. Однако в современном языке [tŝ, dẑ] иногда встречаются и перед передними гласными, а [t̂] в исключительных случаях даже противопоставляется [tŝ] (в некоторых говорах эти оппозиции стали обычными и /t̂, d̂/ противопоставляются как твёрдым /t, d/, так и аффрикатам).

2.3.3. В остальном синтагматическая идентификация фонем проводится на тех же основаниях, что и парадигматическая. Решающее значение имеют дистрибутивные отношения между подозреваемыми в бифонемности сложными звуками и близкими к ним по звучанию сегментами, бифонемный характер которых не вызывает сомнений. Эти отношения, как известно, могут быть следующих трёх типов: 1) оппозитивные, 2) факультативные, 3) отношения дополнительной дистрибуции.

В первом случае анализируемый звук, несомненно, должен считаться самостоятельной фонемой (ср. польские *Czech* [ček] 'чех' : *trzech* [tšex] 'трёх'). Во втором случае решение принимается в пользу бифонемной трактовки: литов. с.-жем. [ǫ·] = /ǫ/ + /n/ и т. д. Реализациями сочетаний фонем являются северожемайтские и северопаневежские согласные конца словоформ, сохраняющие окраску редуцированных гласных: в некоторых случаях такие согласные свободно варьируют с нормальными слоговыми сочетаниями типа *C* + *V*, признание фонологичности которых нормализует структуру сочетаний согласных.

Анализируемые сегменты соответствуют сочетаниям фонем и в третьем случае. К таким сегментам относятся, например,

литовские дифтонги, второй компонент которых представлен неслогообразующими [i̯, u̯]: [ai, au, ei, ui…]. Встречаясь только перед согласными и в конце словоформ, они находятся в отношении дополнительной дистрибуции с гетеросиллабическими сочетаниями типа [a] + [j], [a] + [v] ([w]), возможными только перед гласными, и поэтому несомненно представляют собой позиционные варианты сочетаний типа /V/ + /j, v/ (т. е. /a/ + /j/, /a/ + /v/, /e/ + /j/, ср.: *saĩtas* 'связь' : *są́saja* 'привязь', *gáuti* 'получить': *gãvo* 'получил', *táu* 'тебе' : *tavè* 'тебя'). В отличие от большинства дифтонгов, слитные [ie, uo] (полифтонги) должны интерпретироваться как самостоятельные долгие гласные фонемы. С этими гласными их связывают различные фонотактические и просодические особенности: возможность их сочетаний с гласными (ср.: *nũoalpis* 'обморок', *príeauglis* 'приплод'), характер реализации слоговых интонаций и т. д. Во многих северных говорах это подтверждается и автоматическим чередованием [ie, uo] с безударными «чистыми» монофтонгами.

Все решения по парадигматической и синтагматической идентификации фонем должны тщательно проверяться при анализе отношений фонологических единиц. Наличие исключительных (тем более — уникальных) сочетаний фонем, как правило, свидетельствует о том, что их идентификация нуждается в пересмотре.

3. ОТНОШЕНИЯ И РАЗЛИЧИТЕЛЬНЫЕ ПРИЗНАКИ ФОНЕМ

3.1. ПРЕДВАРИТЕЛЬНЫЕ ЗАМЕЧАНИЯ

В современной лингвистике различаются парадигматические и синтагматические отношения фонем и вообще языковых единиц.

Парадигматические отношения существуют между единицами, заменяющими друг друга в одной и той же позиции и тем самым различающими более крупные единицы. Ср. литов. *bãras* 'полоса (участок земли)' : *kãras* 'война' : *gãras* 'пар', где в таких отношениях находятся /b/, /k/ и /g/. В каждом конкретном случае всегда реализуется только одна из возможных парадигматических

единиц — остальные же существуют лишь как возможные субституты реализованной единицы.

Синтагматические отношения, в отличие от парадигматических, существуют между такими фонемами или другими единицами языка, которые сочетаются (или в принципе могут сочетаться) друг с другом, образуя более крупные единицы (слоги, слова и др.). Ср. литов. /b/ и /a·/ в слоге /ba·-/, слоги /ba·-/ и /-ras/ в слове *bãras* и др. Обычно эти отношения понимаются как линейные, однако возможны и симультанные синтагматические отношения: они, например, существуют между центром слога и нисходяще-восходящим тоном в кит. *mǎ* 'лошадь'.

Анализ парадигматических и синтагматических отношений лежит в основе классификации фонем и определения их дифференциальных признаков. Поскольку непосредственно наблюдаются только синтагматические отношения, классификацию фонем целесообразно начинать именно с них, а не с более абстрактных и прямому наблюдению недоступных парадигматических отношений.

3.2. СИНТАГМАТИЧЕСКАЯ КЛАССИФИКАЦИЯ ФОНЕМ

3.2.1. Любой язык из огромного количества возможных сочетаний фонем «выбирает» лишь ограниченный их инвентарь, подчиняющийся известным правилам. Только благодаря наличию определённой синтагматической структуры, слова и другие содержательные единицы воспринимаются как целостные образования.

3.2.2. По роли, выполняемой в структуре слога, все фонемы разделяются на два основных класса: гласные и согласные. Центральными единицами слога являются гласные: они могут образовать слог без поддержки других фонем. В литовском литературном языке этот класс представлен фонемами /i, e, a, u, i·, ie, ẹ·, e·, a·, o·, uo, u·/. Согласные — это периферийные составляющие слога, т. е. фонемы, наличие которых в слоге не является обязательным, напр.: литов. /p, t, k, b, d, g, s, š, z, ž, j, v, l, r, m, n…/. Так называемые слоговые сонанты, известные в некоторых языках (ср. др.-инд. *vṛkaḥ* 'волк', чеш. *prst* 'палец'), представляют собой согласные, выполняющие секундарную функцию гласных. В

литовских говорах они встречаются только как факультативные варианты сочетаний типа -*RV*(*C*)#, напр.: литов. с.-жем. [gɔ̃·ndr̩] ‖ [gɔ̃·ndrᵃ] ‘аиста’ (ср. латыш. *katls* ‘котел’, *putns* ‘птица’).

3.2.3. В языках, обладающих только открытыми слогами типа (*C*)*V* (ср. маори *aroha* ‘любовь’, *manawakino* ‘дурной’), о синтагматических классах согласных можно иногда судить только по ограничениям их дистрибуции, зависящим от согласных соседних слогов или от смежных гласных; иногда исключена и такая возможность. Как правило, предпосылкой синтагматической классификации является наличие сочетаний согласных в рамках одного слога.

В слоге литовского языка, кроме гласного, могут встречаться две группы согласных: эксплозивная (начальная) и имплозивная (конечная). Имплозивная группа более тесно связана с центром слога, о чём свидетельствуют влияние имплозивных сонорных на просодические особенности слога и роль этой группы в классических рифмах; эксплозивная часть в этом отношении более самостоятельна.

Классификацию согласных удобно начинать с эксплозивных групп первого слога, поскольку эти группы, как только что отмечено, более обособлены и регулярны, а граница слова несомненно совпадает со слогоразделом.

В литовском языке имеются следующие двучленные эксплозивные группы (если отбросить неассимилированные заимствования и условно не различать твёрдых и мягких согласных): *bj-*, *bl-*, *br-*, *dr-*, *dv-*, *gl-*, *gn-*, *gr-*, *gv-*, *kl-*, *kn-*, *kr-*, *kv-*, *pj-*, *pl-*, *pr-*, *sk-*, *sl-*, *sm-*, *sn-*, *sp-*, *sr-*, *st-*, *sv-*, *šč'-*, *šl-*, *šm-*, *šn-*, *šp-*, *št-*, *šv-*, *tr-*, *tv-*, *zl-*, *zm-*, *zv-*, *žl-*, *žm-*, *žn-*, *žv-*; в диалектизмах и ономастике также встречаются *šk-*, *zg-*, *zb-*, *zd-*. Таким образом, все согласные, во-первых, распадаются на два класса: *R* (= /j, v, l, r, m, n/) — согласные, встречаемые только непосредственно перед гласными, и *C* (= /p, t, k, b, d, g, č, s, š, z, ž/) — согласные, встречаемые не только перед гласными. Во-вторых, класс *C* можно расчленить на два подкласса: *S* (= /s, š, z, ž/), члены которого выступают только непосредственно после границы слова и слога, и *T* (= /p, t, k, b, d, g, č/), охватывающий согласные, встречаемые как непосредственно после границы, так и на втором месте.

Данная классификация чётко соблюдается и в трёхчленных сочетаниях, состав которых описывается формулой *STR- : skl-*, *skr-, skv-, spj-, spr-, str-, stv-*; в диалектизмах и ономастике также встречаются *spl-, škr-, škl-, špr-, štr-, zdr-, zgr-*. Для всех этих сочетаний действительно правило *STR-* ⊃ (*ST-* & *TR-*) (⊃ — символ материальной импликации).

На реальность и необходимость выделенных классов указывают и некоторые другие факты. Все члены класса *R* безразличны к ассимиляции (нейтрализации) по звонкости-глухости: они сохраняют звонкость перед глухими и не озвончают предыдущих глухих. Члены класса *C*, наоборот, подвергаются ассимиляции по данному признаку (ср.: *bė́ga* 'бежит' : *bė́*[k]*ti* 'бежать'); к этому классу всегда относится средний член медиальных трёхчленных сочетаний.

Большинство имплозивных групп конца слова в литовском литературном языке представляют собой зеркальное отражение эксплозивных: сочетаниям типа *STR-* соответствуют *-RTS*, сочетаниям *SR-* — *-RS*, сочетаниям *TR-* — *-RT* и, наконец, *ST-* — *-TS*, ср.: *skl-* : *-lks* (*viĩks* 'потащит'), *sn-* : *-ns* (*piñs* 'будет сплетать'), *kl-* : *-lk* (*pìlk* 'наливай'), *sk-* : *-ks* (*tóks* 'такой'); к этим «закономерным» группам иногда примыкает немотивированная фонема /k/ или /t/.

3.2.4. Структуру любого литовского слога теперь можно описать формулой $(S \vee T \vee R) \vee \emptyset \, V \, \emptyset \vee (R \vee T \vee S) \, (\vee (k \vee\vee t))$ (∨ — дизъюнкция, ∨∨ — строгая дизъюнкция). Слоги, обладающие всеми возможными элементами, кроме немотивированного /k/ или /t/, описывается дендрограммами приведёнными в § 114 (с. 130).

3.2.5. «Полные» медиальные группы литовских простых слов (некомпозитов) состоят из четырёх согласных; два сочетания обладают исключительной структурой $-_R^T STR-$ (*irštvà* 'берлога', *žiegždrà* 'гравий'), остальные (если отнести аффрикаты к классу *T*) сводятся к формуле $-RTS_R^T-$, напр., *gar̃gždas* 'галечник', *kulkšnìs* 'щиколотка', *urgzlỹs* 'ворчун'. Их связь с более простыми сочетаниями строго подчиняется импликации $-RTS_R^T- \supset -TS_R^T- \supset -S_R^T-$: существование более сложного сочетания предполагает наличие более простого сочетания, входящего в его состав, напр.:

$$
\left.\begin{array}{l}
\left.\begin{array}{l}
(a)\text{-}lkst\text{-}(a) \\[6pt]
(li)\text{-}nkst\text{-}(a)
\end{array}\right\} : (ny)\text{-}kst\text{-}(a) \\[18pt]
\left.\begin{array}{l}
(a)\text{-}lpst\text{-}(a) \\[6pt]
(si)\text{-}rpst\text{-}(a)
\end{array}\right\} : (sla)\text{-}pst\text{-}(o)
\end{array}\right\} : (sla)\text{-}st\text{-}(ai)
$$

(*alksta* 'голодает', *linksta* 'гнётся', *alpsta* 'падает в обморок', *sirpsta* 'зреет', *nyksta* 'исчезает', *slapsto* 'скрывает', *slastai* 'ловушка')

В более общем виде данная закономерность формулируется так: *RTx* ⊃ *Tx* ⊃ *x*, где *x* представляет или сочетания -*ST*-, -*SR*-, или отдельные согласные типа -*S*-, -*T*-, ср.: (*mu*)-*rks*-(*o*) 'дремлет' / (*ri*)-*nks*-(*i*) 'будешь собирать' : (*stû*)-*ks*-(*o*) 'торчит' : (*vi*)-*s*-(*as*) 'весь', (*vi*)-*lkt*-(*ų*) 'он волочил бы' / (*pe*)-*nkt*-(*as*) 'пятый' : (*pi*)-*kt*-(*as*) 'злой' : (*ra*)-*t*-(*as*) 'колесо'. Таким образом, для медиальных сочетаний действительна эквивалентность -*ST*- ≡ -*SR*- ≡ -*S*- ≡ -*T*-. Поскольку отдельная медиальная согласная фонема несомненно является эксплозивной частью неначального слога, так же должны толковаться и эквивалентные ей группы -*ST*- и -*SR*-; те же части выделяются и в более сложных группах, ср.: *stū̃k-so* 'торчит' и *mur̃k-so* 'дремлет', *pìk-tas* 'злой' и *pir̃k-tas* 'купленный', *slã-stai* 'западня' и *álk-sta* 'голодает'. Следовательно, граница слога проходит в той точке медиального сочетания, где начинается максимальная эксплозивная группа.

3.2.6. Эксплозивные группы согласных типа *STR*- (и *SR*-, *TR*-, *ST*-) характерны для всех балтийских языков, напр.: латыш. *spraûst* 'втыкать', *sleja* 'полоса', *kluss* 'тихий', *skudra* 'муравей', прус. *streipstan* 'сустав', *smoy* 'человек', *blusne* 'селезёнка', *spurglis* 'воробей', — отличаются лишь отдельные конкретные сочетания (ср. прус. *tl*-, не встречаемое в латышском и литовском, литовские *pj*-, *bj*-, *spj*-, *sr*-, отсутствующие в латышском). В основном так же обстоит дело в латинском языке и в восходящем к нему итальянском; некоторые отличия испанского объясняются наличием протетического *e*-, встречаемого перед группами на *s*-.

К типу *STR*- сводятся и эксплозивные сочетания современных германских языков, древнегреческого языка и т. д. Следовательно, отклонения от этой модели (и двухчленных *SR*-, *TR*-, *ST*-) являются важными типологическими признаками многих

европейских (возможно, и не только европейских) языков (ср. отсутствие инициальных групп в финно-угорских, сближающее эти языки с семитскими и тюркскими).

От рассмотренной модели резко отклоняются славянские языки, в особенности западные и восточные.

3.3. НЕЙТРАЛИЗАЦИЯ

3.3.1. В словарном составе языка реализуются далеко не все возможные сочетания фонем: некоторые из них представляют собой так называемые пустые клетки — потенциальные, но практически не используемые фонологические единицы. К ним следует отнести, например, литов. *spl-*, *gm-*, поскольку эти сочетания соответствуют правильным моделям *STR-*, *TR-*, но в исконных словах литературного языка не встречаются.

Нередко пустые клетки заполняются в результате заимствования или спорадических фонетических изменений (ср. литов. *štaĩ* 'вот' ← *šitaĩ*). Сходным образом заполняются и пустые клетки, представляющие нереализованные, но возможные комбинации дифференциальных признаков. Такие изменения порождают новые фонемы и увеличивают симметричность системы. Ср. литов. диал. /č̃, ȝ̃/ или /ĉ, ȝ̂/ → /t̂, d̂/, заполнившее пустые клетки в микросистеме /k/ : /k̂/ = /t/ : □ = /p/ : /p̂/ = /g/ : /ĝ/ = /d/ : □ = /b/ : /b̂/.

3.3.2. Некоторые ограничения сочетаемости фонем являются вполне регулярными, о чём свидетельствуют чередования типа литов. *kìbo* 'прицеплялся, приставал' : *kì*[p̂]*ti* 'прицепляться, приставать', *daũgelis* 'множество' : *daũ*[k] 'много'. Из-за таких ограничений литов. [b, d, g, z, ž] и [p, t, k, s, š] противопоставляются лишь перед согласными фонемами типа *R* и гласными, ср.: *glóstyti* 'гладить' : *klóstyti* 'покрывать', *bū́ti* 'быть' : *pū́ti* 'сгнивать'. В конечной позиции ([—#]) и перед [p, t, k, s, š] встречаются лишь [s, š, k, t, p], перед [g, d, b, z, ž] — лишь [z, ž, g, d, b]. Более жёстким ограничениям подвержены оппозиции непалатализованных и палатализованных фонем, которые реализуются только перед гласными заднего ряда ([—Vᵘ]), ср.: *kiùrti* 'продырявливаться' : *kùrti* 'создавать'. В остальных позициях эти согласные находятся в отношении дополнительной дистрибуции: C / [—$^C_\#$], $\hat{C}$ / [—$^C_{Vi}$].

3.3.3. Петербургская (Ленинградская) школа и представители дескриптивной лингвистики не делают существенного различия между случайными пустыми клетками и регулярными ограничениями дистрибуции.

Более убедительной представляется классическая интерпретация пражан (во многом совпадающая с концепцией Московской школы и принимаемая в глоссематике и стратификационной лингвистике), согласно которой в рассмотренных случаях имеет место особое фонологическое явление — нейтрализация, занимающая, как мы полагаем, промежуточное положение между синтагматикой и парадигматикой. В одних позициях, называемых сильными (или релевантными), оппозиции реализуются и выполняют различительную функцию (ср. литов. [b, d…] и [p, f…] в позициях [—V] и [—R], непалатализованные и палатализованные согласные в позиции [—Vᵘ]), в других, слабых, позициях, или позициях нейтрализации, оппозиции снимаются, или, иными словами, нейтрализуются (ср. литов. [b, d…] и [p, t…] в конечной позиции [—#] и перед согласными типа T и S, дополнительную дистрибуцию непалатализованных и палатализованных согласных в позициях [—Vⁱ], [—Ĉ] и [—C], [—#]).

В литовском литературном языке и во многих диалектах, кроме рассмотренных, к нейтрализуемым оппозициям относятся противопоставления гласных /a/ : /e/, /a·/ : /e·/, реализуемые в абсолютном начале слова и нейтрализуемые после всех согласных, кроме (с известной оговоркой) /t, d/: гласные /a, a·/ встречаются после непалатализованных согласных, /e, e·/ — после палатализованных (словоформы типа вин. п. мн. ч. *giliàs* 'глубокие' и *gilès* 'желуди' различаются только в крайне искусственном книжном произношении). В безударных слогах многих северных говоров снимаются количественные оппозиции гласных. В тельшяйском варианте северожемайтского наречия особым случаем нейтрализации является регрессивная ассимиляция гласных типа *i/ę, u/ǫ* по подъёму: они противопоставляются лишь в конечных слогах и перед внутренним открытым стыком: перед гласными верхнего подъёма и /ie, uo/ встречаются лишь гласные типа [i, u], во всех остальных случаях — [ę, ǫ]. Во многих восточноаукштайтских утянских говорах в безударных слогах снимаются оппозиции /ie/ : /ę·/, /uo/ : /ɔ·/ — вместо них появляются полудолгие [æ·], [a·];

в ширвинтских говорах — /ie/ : /ẹ·/ : /e·/, /uo/ : /ɔ·/ : /a·/, в слабых позициях совпадающие в [e] и [a]; в паневежских говорах, где вместо /ie/ : /ẹ·/ : /i/, /uo/ : /o·/ : /u/ в безударных слогах, как правило, выступают [ẹ], [ọ] или открытые [i̧], [u̧].

Иногда диалекты различаются характером релевантных позиций. Например, в жемайтском наречии согласные типа [p, t…] и [b, d…] различаются не только в позициях [—R], [—V], но и в конечной позиции [—#]; во многих восточных и южных говорах оппозиции некоторых твёрдых и мягких согласных не снимаются в конечной позиции, перед /i, i·/ и /ẹ·/ и (иногда) перед согласными.

3.3.4. Если условно отбросить сильные (релевантные) позиции нейтрализуемых противопоставлений, звуки, выступающие в слабых позициях, оказываются в отношении дополнительной дистрибуции и поэтому могут быть объединены в более крупные единицы — архифонемы. Например, литов. [p] и [b] в слабых позициях можно считать представителями (как бы аллофонами) архифонемы /P/, а [k] и [g] — представителями архифонемы /K/, [n] и [n̂] — представителями архифонемы /N/. Архифонема определяется признаками, общими для обоих (или, точнее, всех) членов нейтрализуемой оппозиции: /P/ — это губной шумный смычный согласный вообще, безразличный к глухости-звонкости и твёрдости-мягкости, /N/ — сонорный носовой негубной согласный вообще, безразличный к палатализации и её отсутствию. В большинстве случаев один из представителей архифонемы по своим физическим признакам почти совпадает с реализацией одного члена нейтрализуемой оппозиции. Например, литов. [p, t…] в позиции [—#] являются такими же глухими согласными, как и реализации фонем /p, t…/ в сильных позициях. Реже как представитель архифонемы выступает промежуточный звук (ср. рус. [ъ] как представитель /o/ : /a/ или 'полумягкие' согласные, встречаемые перед гласными переднего ряда в болгарском языке и в некоторых литовских говорах). Наконец, архифонема может быть представлена факультативно чередующимися звуками, один из которых в основных чертах совпадает с одним членом оппозиции, другой — с другим.

Фонема, близкая по фонетической реализации к представителю архифонемы, независимому от влияния смежных фонем,

является беспризнаковым (немаркированным; слабым) членом оппозиции; фонема, не имеющая такого соответствия в слабых позициях, называется признаковым (маркированным; сильным) членом оппозиции. Беспризнаковые фонемы отличаются от признаковых и большей частотой встречаемости. Например, литов. лит. /k, t, p, s, š/ следует считать беспризнаковыми по отношению к /g, d, b, z, ž/, так как у них имеются близкие соответствия в конечном положении; о таком же соотношении с.-жем. /k, t, p, s, š/ и /g, d, b, z, ž/ свидетельствует только частота глухих согласных, значительно превышающая частоту звонких.

3.3.5. Соотношение беспризнакового и признакового члена оппозиции называется корреляцией, а вся микросистема однородных пропорциональных соотношений такого типа — коррелятивным рядом, напр.: /p/ : /b/ = /t/ : /d/ = /k/ : /g/. Признаковый член корреляции отличается от беспризнакового члена (и соответствующей архифонемы) признаком корреляции. Поэтому, например, можно считать, что литов. /b/ = /p/ (/P/) & 'звонкость' (признак корреляции)[2], /n̂/ = /n/ (/N/) & 'палатализация'. Следовательно, беспризнаковый член корреляции по своему фонологическому содержанию совпадает с архифонемой (ср. раннюю интерпретацию Н. С. Трубецкого). Всё же более удобной и реалистической следует считать современную установку чешских фонологов, считающих представителей архифонем аллофонами фонем, близких им по фонетической реализации.

3.3.6. Коррелятивные отношения могут связывать не только пары фонем, но и более крупные их группы — пучки корреляций. Ср. др.-инд. /p/ : /pʼ/ : /b/ : /bʼ/ = /t/ : /tʼ/ : /d/ : /dʼ/…, нейтрализуемые перед паузой в пользу [p], [t]… Четырёхчленные пучки образуют и литовские корреляции звонкости и палатализации шумных согласных. Эти пучки полностью реализуются лишь перед гласными заднего ряда. Если обозначить символом /P/ архифонему корреляции /p/ : /p̂/, символом /B/ — архифонему /b/ : /b̂/ и /P/ — архифонему всего пучка губных смычных согласных, получается картина отношений, представленная в § 151 (с. 172).

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[2] Фонологическая звонкость — это и колебания голосовых связок, и сопровождающая их менее напряжённая артикуляция, и ослабленная экспирация. Палатализация также представляет собой не только дополнительную артикуляцию спинки языка, но и отсутствие веляризации.

3.3.7. Нейтрализация имеет исключительно важное значение, потому что она даёт возможность уточнить классификацию фонем, полученную в результате анализа синтагматических отношений. Она, как правило, выявляет классы фонем, подвергающихся (и не подвергающихся) некоторой нейтрализации, и классы фонем, под воздействием которых возникают определённые слабые позиции. Например, вышеупомянутая ассимиляция гласных типа с.-жем. *i/ę, u/ǫ* прежде всего расчленяет все гласные на фонемы, не подверженные этой нейтрализации (/a, e…/), и фонемы, ей подверженные (/i, ę, u, ǫ…/); среди последних отдельный признаковый класс составляют /i, u…/, перед которыми возможны лишь фонемы типа /i, u…/. Кроме того, в этом диалекте (как и в литературном языке) корреляция палатализации согласных реализуется только перед /a, ǫ, u…/ — перед /e, ę, i…/ она нейтрализуется, что свидетельствует о наличии двух крупных классов гласных: беспризнаковых /a, ǫ, u…/ и признаковых /e, ę, i…/. Это в конечном счёте даёт такую картину отношений: /(a : (ǫ : u)) : (e : (ę : i))/. Самой беспризнаковой в данной системе является фонема /a/, о чём, кстати, свидетельствует и её исключительная частота в связной речи (≈ 13,09 % всех фонем).

Крупный пучок корреляций образуют литов. /s, ŝ, š, ŝ̃, z, ẑ, ž, ẑ̃/: перед родственными шипящими аффрикатами /č̂, ẑ̃/ оппозиции всех этих фонем снимаются в пользу [ŝ̃, ž̃] (ср. *zỹzia* 'жужжит' : *zỹ*[ŝ̃]*čiau* '(я) жужжал бы'). Самую признаковую фонему этого пучка /ž̃/ можно описать как комплекс, состоящий из архифонемы /S/ (или самого беспризнакового члена — /s/) и трёх признаков корреляции: 'шипящий' & 'звонкий' & 'палатализованный'. Полную картину отношений между членами этого пучка корреляций можно представить формулой /((s : ŝ) : (z : ẑ)) : ((š : ŝ̃) : (ž : ẑ̃))/. Признаки корреляций в данной микросистеме (как, впрочем, и в других случаях) одновременно являются и дифференциальными признаками нейтрализуемых оппозиций.

3.4. ПАРАДИГМАТИЧЕСКИЕ ОТНОШЕНИЯ ФОНЕМ И ИХ ДИФФЕРЕНЦИАЛЬНЫЕ ПРИЗНАКИ

3.4.1. Парадигматические отношения, или оппозиции, существуют, например, между первыми фонемами таких словоформ,

как литов. *sùsti* 'паршиветь' : [ŝ]*ùsti* 'беситься' : *šùsti* 'преть' : *pùsti* 'пухнуть' : *bùsti* 'пробуждаться'.

Иногда различаются лексикализованные и морфологизованные оппозиции. Например, ко второму типу преимущественно относится литовская корреляция палатализации (тембровая корреляция), северожемайтская оппозиция /i/ : /ẹ/, ср.: род. п. ед. ч. [brûoÎᵉ] 'брата' : вин. п. ед. ч. [brûoÎ̂]; сугубо лексикализована, например, оппозиция литов. /š/ : /z/. Однако эта классификация не является чисто фонологической.

3.4.2. Реальные парадигматические отношения возможны только между членами одного и того же синтагматического класса. Так называемые косвенные оппозиции представляют собой не парадигматическое, а синтагматическое явление.

Поскольку гласные и согласные — это два взаимоисключающих синтагматических класса, их оппозиции по существу невозможны (за исключением редких случаев типа скр. *viṣaḥ* 'отрава' : *vṛṣaḥ* 'бык').

3.4.2.1. Парадигматические отношения фонем (в их связи с синтагматическими отношениями и классами) можно продемонстрировать на примере системы согласных литовского языка.

В позиции [(#)—T] противопоставляются только архифонемы /S/ (= [s, ŝ, z, ẑ]), /Š/ (= [š, ŝ̌, ž, ẑ̌]). Различительным признаком оппозиции условно можно считать альвеолярную (/Š/) и зубную (неальвеолярную; /S/) артикуляцию; приемлема и пара признаков двухфокусный-однофокусный. На самом деле дифференциальные признаки реализуются как сложные артикуляционные или акустические комплексы, включающие и так называемую собственную долготу и интенсивность.

В позиции [S—R] противопоставляются друг другу согласные типа *T*, т. е. /p/ : /t/ : /k/ и (крайне редко) /b/ : /d/ : /g/. Встречаемый здесь [p̂] является представителем архифонемы оппозиции /p/ : /p̂/. Принимая во внимание синтагматические отношения фонем данной позиции и аллофоны (напр., /t/ перед /r/ реализуется как альвеолярный [ṭ]), их можно идентифицировать посредством следующих дифференциальных признаков: а) губной (/p, b/) — негубной (/k, g, t, d/), б) переднеязычный (/t, d/) — заднеязычный (непереднеязычный) (/k, g/). Только губные встречаются перед /j/

и не встречаются перед /v, v̂/; переднеязычные не могут стоять в начальных группах перед /l, l̂/.

В окружении [(#)—R] встречаются и фонемы класса *S*, и фонемы класса *T*. Здесь, кроме вышерассмотренных, функционируют ещё две пары дифференциальных признаков: а) члены класса *S* и члены класса *T* противопоставляются как щелевые (/s, z, š, ž/) и смычные (/p, t, k, b, d, g/); б) внутри каждого класса реализуется корреляция звонких и глухих согласных. Кроме того, изредка в позиции [(#)—R] появляются аффрикаты. Им можно приписать признак 'аффриката'.

В контексте [T—V] выступают лишь члены класса *R*: /j, v, l, m, n, r/. Относительно самостоятельный подкласс составляют /m, m̂, n, n̂/, не встречающиеся в позиции [ST—V]: они противопоставляются остальным фонемам типа *R* как носовые неносовым (ртовым). Из неносовых /j, v, v̂/ являются щелевыми, а противостоящие им /l, l̂, r, r̂/ — плавными (нещелевыми). Фонемам /m, m̂, v, v̂/ можно приписать уже известный признак 'губной' — /n, n̂, j, l, l̂, r, r̂/ являются негубными. Фонемы /r, r̂/ и /l, l̂/ можно охарактеризовать как альвеолярные (/r, r̂/) и неальвеолярные (/l, l̂/) или же как двухфокусные (/l, l̂/) и однофокусные (/r, r̂/); альвеолярные однофокусные фонемы реализуются как дрожащие. Наконец, перед гласными заднего ряда (в частной позиции [T—Vᵘ]) реализуется корреляция палатализации.

В позиции [S—V] встречаются согласные классов *T* и *R*. Перед гласными заднего ряда реализуется и корреляция палатализации. Согласные класса *R* противопоставляются согласным типа *T* как сонорные шумным или же как промежуточный класс, обладающий как признаком 'согласный', так и признаком 'гласный'.

Все согласные выступают как члены одной парадигмы и противопоставляются друг другу в позиции [(#)—V] (точнее — [(#)—Vᵘ]), ср.: *sùs* 'будет паршиветь' : *šùs* 'будет преть' : *žùs* 'погибнет': *pùs* 'будет гнить' : *bùs* 'будет' : *dùs* 'будет задыхаться' : *kùs* 'будет поправляться' : *gùs* 'будет привыкать' : *jùs* 'вас (Acc. Sg.)' : *mùs* 'нас (Acc. Sg.)': *rùs* 'будет ржаветь'.

Основой оппозиций согласных в этом контексте являются признаки синтагматических классов: (1) сонорный — шумный и (2) щелевой — смычный. Встречающиеся в интернационализмах щелевые [f, x, h] также могут противопоставляться смычным

(ср.: *fãktas* 'факт' : *pãktas* 'пакт', *hãlę* 'зал (Acc. Sg.)' : *gãlią* 'силу'), однако их следует считать периферийными единицами, не подчиняющимися закономерностям исконных согласных фонем.

Систему дифференциальных признаков согласных литовского языка можно представить соответствующей матрицей идентификации фонем (см. с. 199 табл. 16) и дендрограммой (с. 200). Цифры у разветвлений дендрограммы соответствуют признакам, приведённым в матрице: 1) 'сонорный'–'шумный', 2) 'носовой'–'ртовый', 3) 'щелевой'–'нещелевой', 4) 'аффриката'–'неаффриката', 5) 'губной'–'негубной', 6) 'переднеязычный'–'непереднеязычный', 7) 'альвеолярный'–'зубной', 8) 'звонкий'–'глухой', 9) 'палатализованный'–'непалатализованный'. В дендрограмме видны и коррелятивные отношения фонем. Например, корреляция палатализации характерна для фонем, противопоставляющихся по 9-й паре признаков, корреляция глухих и звонких — для фонем, различающихся по 8-й паре признаков, и т. д.; с 7-й пары начинается известный пучок корреляций /((s : ŝ) : (z : ẑ)) : ((š : ŝ̃) : (ž : ẑ̃))/. Архифонемы определяются как неполностью идентифицированные фонемы. Например, второй согласный словоформ *vèsčiau* 'вёл бы' и *vèžčiau* 'вёз бы' (т. е. [v̑èŝ̃ĉæu]) идентифицируется признаками: '−сонорный' & '+щелевой': остальные признаки подсказываются позицией.

3.4.2.2. Инвентарь гласных фонем состоит из следующих единиц: /i, iˑ, ę̇ˑ, e, eˑ, a, aˑ, oˑ, u, uˑ/ («чистые» гласные) и /ie, uo/ (полифтонги). Кроме того, в заимствованиях встречается периферийная гласная единица [ɔ] (ср.: *jònai* 'ионы', *tòstas* 'тост') и так называемый интернациональный [ė̇] — факультативный гласный, в известных случаях совместно с [e] образующий социально окрашенную Janus-фонему.

Система гласных фонем характеризуется следующими синтагматическими отношениями: 1) фонемы /iˑ, ę̇ˑ, ie, eˑ, aˑ, uo, oˑ, uˑ/, в отличие от /i, e, a, u/, эквивалентны сочетаниям типа *VR*; 2) перед гласными /i, iˑ, ę̇, ie, e, eˑ/ нейтрализуется корреляция непалатализованных и палатализованных согласных, реализуемая перед /u, uˑ, oˑ, uo/; 3) оппозиции /a/ : /e/, /aˑ/ : /eˑ/ нейтрализуются после согласных; эти гласные рифмуются в классической поэзии; 4) гласные /i/ и /iˑ/, /u/ и /uˑ/ образуют пары, противопоставляющиеся по количеству и напряжению артикуляции (ср.: *trìs* 'три

(Acc. Sg.)' : *trỹs* 'три (Nom. Sg.)', *pùsti* 'пухнуть': *pū̃sti* 'дуть'), — у /ę̇/, /o·/, /ie/, /uo/ кратких соответствий нет; об исключительной психолингвистической близости /ie/ и /ę̇/, /uo/ и /o·/ свидетельствуют аудитивные эксперименты и рифмы классической поэзии (во многих диалектах оппозиции /ie/ : /ę̇/, /uo/ : /o·/ подвержены нейтрализации).

Первой синтагматической особенности гласных соответствуют дифференциальные признаки 'долгий' — 'краткий' или 'напряжённый' — 'ненапряжённый'. Количество более значимо для гласных нижнего подъёма, напряжённость — для гласных верхнего подъёма. Второй особенности соответствуют признаки 'передний ряд' — 'непередний ряд': передние гласные являются признаковыми, потому что корреляция палатализации снимается только перед ними. Члены корреляции /a/ : /e/ = /a·/ : /e·/ противопоставляются остальным гласным как нижние ненижним: /a, a·/ — это самые низкие гласные заднего ряда, /e, e·/ — самые низкие гласные переднего ряда. Гласные /i, i·/ и /u, u·/, в противоположность всем остальным, являются верхними, однако для первых двух фонем (в особенности для /i/) данный признак нерелевантен. Среди ненижних неверхних фонем /ie, uo/ отличаются неоднородной артикуляцией — /ę̇·, o·/ являются относительно однородными.

В итоге получается иерархически упорядоченная система дифференциальных признаков и парадигматических отношений, представленная табл. 19 и дендрограммой на с. 213–214.

Ненижние непередние гласные реализуются как лабиализованные, но этот признак автоматически вытекает из пучка признаков '−передний' & '−нижний', поэтому не является дифференциальным. В тех говорах, в которых отсутствуют оппозиции /a/ : /e/, /a·/ : /e·/ и у /i, i·, ę̇·/ имеются непередние аллофоны, лабиализация и её отсутствие играют роль дифференциальных признаков (как и, например, в русском языке).

3.4.2.3. Дифференциальными признаками нельзя считать такие фонетические особенности, которые различают факультативные варианты фонем или аллофоны. Например, во многих восточно-литовских говорах фонема /i/ реализуется не только передним аллофоном [i], но и непередним [ы], фонема /u/ — не только задним аллофоном [u], но и передним [ü] и т. д., поэтому

различительным признаком этих фонем можно считать лишь наличие-отсутствие лабиализации.

В тех случаях, когда нельзя опереться на синтагматические отношения и нейтрализацию, дифференциальные признаки и их иерархия определяются на основании различных нефонологических соображений. Исследуя такие системы (даже при одном и том же наборе признаков), можно получить различные классификации фонем, меняя иерархию признаков. По нашему мнению, даже в таких случаях выбор одной из нескольких возможных моделей не должен быть совершенно произвольным. Сузить рамки субъективного и произвольного можно, во-первых, принимая в расчёт данные фонологической типологии. Во-вторых, серьёзным подспорьем при определении иерархии признаков следует считать исследования частоты фонем в связных текстах. В-третьих, ограничить количество возможных интерпретаций помогают психолингвистические эксперименты, а также исследование эвфонических средств (рифм, аллитераций, ассонансов) фольклорного и индивидуального поэтического творчества.

3.4.2.4. Самая универсальная модель парадигматических отношений — это дендрограмма, по своей форме совпадающая со схемами, изображающими синтагматические отношения.

Основной недостаток дендрограмм заключается в том, что они обязательно приписывают строгую иерархию признаков даже таким системам, в которых на самом деле такая иерархия отсутствует; кроме того, дендрограммы всегда должны быть дополнены матрицами фонем или хотя бы списками дифференциальных признаков.

Более наглядными и компактными, чем дендрограммы, являются таблицы фонем (ср. § 188 табл. 23 и 24), в которых представлены системы гласных и согласных литовского литературного языка (в скобках < > приведены периферийные фонологические единицы, встречаемые лишь в неассимилированных заимствованиях).

Если подобрать соответствующее расположение фонем и признаков, таблицы могут отражать не только парадигматические, но и синтагматические отношения фонем.

Таблицам соответствуют более простые и (если принять известные соглашения) более удобные планиметрические модели.

Особой популярностью пользуются такие модели вокалических систем — треугольники, четырёхугольники, трапеции гласных. Ср., например, четырёхугольную систему гласных литовского литературного языка (§ 189), а также более «нормальные» в типологическом отношении треугольники русских, испанских или грузинских гласных фонем:

$$/i/ \qquad\qquad /u/$$
$$/e/ \qquad /o/$$
$$/a/$$

Сравнительно редко в фонологии применяются стереометрические модели, хотя в некоторых случаях (например, когда система отличается известной сложностью, делающей планиметрическую модель недостаточно наглядной), они могут дать более естественную и содержательную картину парадигматических отношений (§ 190).

3.4.3. Дихотомическая фонология

Из того факта, что анализ синтагматических отношений в большинстве случаев ведёт к дихотомической классификации фонем, можно делать гипотетическое заключение, что все фонологические оппозиции должны быть привативными, а дифференциальные признаки — бинарными, относящимися друг к другу по существу так же, как признак корреляции и его отсутствие.

Эта возможность реализована в дихотомической фонологии, разработанной Р. О. Якобсоном и его последователями. Опираясь на достижения акустической фонетики, дихотомическая фонология считает возможным описать все фонологические системы, пользуясь небольшим количеством универсальных бинарных дифференциальных признаков — элементарных единиц своеобразного универсального «алфавита». Количество этих «элементов» колеблется от исследователя к исследователю — сам Р. О. Якобсон последовательно настаивал на исходной системе, состоящей из 12 пар признаков.

3.4.3.1. Фонологи с самого начала становления дисциплины подчёркивали приоритет акустических характеристик звуков, однако лишь изобретение спектрографа дало возможность быстро и точно расчленить сложные звуковые волны на их составляющие и получить количественные значения этих составляющих —

формант или формантных зон. Таким образом, стало вполне возможным заменить артикуляционные описания звуков и их дифференциальных признаков акустическими. На такую возможность указывает и явная корреляция (в математическом смысле) между акустическими и артикуляционными характеристиками. Это подтверждается и фактами литовского языка (см. § 195, табл. 25).

Если отложить значения первой форманты (F_1) на оси ординат и значения второй форманты (F_2) на оси абсцисс третьего квадранта системы координат, получается картина, по существу совпадающая с трапецией артикуляционных характеристик гласных (см. с. 238).

3.4.3.2. Универсальный «алфавит» признаков, предложенный Р. О. Якобсоном, состоит из 12 пар контрарных или контрадикторных фонетических характеристик. Большинство признаков (9) относится к так называемым признакам звучности (сонорности) — остальные 3 пары относятся к признакам тона.

В работе уточняются литовские названия признаков и даются их краткие характеристики применительно к литовскому языку. Например, указывается, что обе основные форманты (F_1 и F_2) литовских компактных гласных [aˑ, æˑ] близки к центру спектрограммы (в отличие от диффузных гласных), что пару признаков 'компактный' — 'диффузный' необходимо расчленить на два бинарных признака: 'компактный' — 'некомпактный' и 'диффузный' — 'недиффузный'. Обращается внимание на то, что долгие гласные литературного языка отличаются от кратких не только длительностью, но и акустическими признаками 'напряжённый' — 'ненапряжённый': суммарные отклонения формант долгих гласных от «нейтрального» гласного превышают отклонения соответствующих кратких гласных. Отмечается, что признак 'бемольный' — 'простой' в литературном языке и в западных говорах самостоятельного значения не имеет, но сопровождает такие признаки, как '+гласный' & '−высокотональный' & '−компактный' и '−гласный' & '−диезный'. Во многих языках (в том числе — и в некоторых литовских говорах) бемольность и диезность напоминают просодические признаки: оказывают модифицирующее влияние на смежные звуки и даже слоги, ср. египет. араб. *ṭiˑn* 'глина' : *tiˑn* 'фиги (дерево, плод)', литов. с.-жем. [r̂ȇˑt̂ȇn̂ȍ] 'свитком' : [r̂ȇˑtɛn̂ȍ] 'качу, катаю'.

3.4.3.3. Гласные фонемы литовского литературного языка можно идентифицировать по следующим дифференциальным признакам универсального «алфавита», точно соответствующим артикуляционным признакам (см. § 208, табл. 27): 1) 'напряжённый' — 'ненапряжённый', 2) 'высокотональный' — 'низкотональный', 3) 'компактный' — 'некомпактный', 4) 'диффузный' — 'недиффузный', 5) 'неоднородный' — 'однородный' (последний признак не относится к «алфавиту» Р. О. Якобсона, но он необходим для идентификации /ie/ и /uo/).

Систему согласных можно описать посредством 8 пар дифференциальных признаков (см. § 209, табл. 28). Порядковые номера, представленные в первом столбце таблицы, соответствуют следующим бинарным признакам: 1) 'гласный' — 'негласный', 2) 'носовой' — 'ртовый', 3) 'непрерывный' — 'прерывный', 4) 'резкий' — 'нерезкий', 5) 'компактный' — 'диффузный', 6) 'низкотональный' — 'высокотональный', 7) 'звонкий' — 'глухой', 8) 'диезный' — 'простой'.

Основным преимуществом дихотомической фонологии является строго и чётко сформулированный принцип бинарных оппозиций. Кроме того, данная теория удачно согласовала идеи фонологии с достижениями акустической фонетики и создала научный аппарат для фонологической интерпретации результатов акустических экспериментов. Но, применяя этот аппарат, нельзя упускать из виду тот факт, что универсальный «алфавит» представляет собой лишь вспомогательное средство, дающее возможность в предельно экономном и общедоступном виде представить результаты кропотливого анализа синтагматических и парадигматических отношений.

4. СУПЕРСЕГМЕНТНЫЕ (ПРОСОДИЧЕСКИЕ) ЕДИНИЦЫ

4.1. ПРЕДВАРИТЕЛЬНЫЕ ЗАМЕЧАНИЯ

Кроме линейных единиц и дифференциальных признаков, в фонологической системе встречаются и так называемые суперсегментные единицы. Они напоминают дифференциальные признаки, но отличаются от них тем, что различают более крупные

единицы, чем фонема. Такие явления встречаются во фразах, словах, слогах и некоторых сочетаниях фонем.

4.2. НЕПРОСОДИЧЕСКИЕ СУПЕРСЕГМЕНТНЫЕ ЕДИНИЦЫ

Суперсегментными единицами принято считать фразовые интонации и такие признаки слов и слогов, как ударение, слоговые интонации и тоны. Они объединяются под общим термином просодических единиц, или просодем.

Наряду с просодемами иногда можно выделить и непросодические суперсегментные единицы — дистинктивные явления, реализуемые «внуренними» фонетическими признаками, но различающие не отдельные фонемы, а более крупные единицы. Например, в принципе возможна такая интерпретация палатализации согласных литовского литературного языка. В этой системе по существу противопоставляются не отдельные палатализованные и непалатализованные (веляризованные) согласные, а целые сочетания типа $(C')C'V^{\acute{u}} \neq (C)CV^{u}$ (ср.: [graž̃°ù] 'красивым' : [graž°ù] 'красиво'). Во всех остальных случаях палатализация или её отсутствие автоматически определяется позицией. Следовательно, можно считать, что $(C')C'V^{\acute{u}} = /(C)CV^{u}/$ & 'палатализация' ([graž̃°ù] = /graẑ͡ù/; «⌢» — суперсегментная палатализация). Однако это лишь одна из четырёх возможных трактовок литовской палатализации. Палатализацию также можно считать: признаком аллофонов согласных, появляющихся под влиянием самостоятельных передних и продвинутых вперёд задних гласных фонем ([graž̃°ù] = /gražù/); дифференциальным признаком согласных (классическая интерпретация: [graž̃°ù] = /gražù/); наконец, реализацией фонемы /j/ ([graž̃°ù] = /gražjù/), сегментная реализация которой возможна только в поствокальной позиции и начальных группах *pj-*, *bj-*. С точки зрения грамматической (морфологической) целесообразности самым приемлемым всё же следует считать классическое решение (ср.: 1 л. ед. ч. *kalù* 'кую' : *galiù* [gaĺ°ù] 'могу', где [u] и [ù] несомненно представляют собой реализацию одной и той же флексии {-u}).

Ещё меньше было бы оснований принять возможную суперсегментную интерпретацию звонкости шумных согласных (ср.:

/šñip̄štù̄/ ~ *šnibždù* 'шепчу' ≠ /šñipštù/ ~ *šnipštù* 'неудачей', где
«‾» — суперсегментная звонкость) или гармонии гласных, —
все эти явления обязательно относятся к суперсегментным еди-
ницам (так называемым просодиям, англ. prosodies) Лондонской
фонологической школой. Суперсегментные решения правомерны
лишь в тех случаях, когда в сочетаниях нельзя обнаружить фокус
«излучения» исследуемых признаков. В рассматриваемых приме-
рах такие фокусы налицо: в [gaĺ°ù̀] 'могу' (ср. [kał°ù̀] 'кую') -[ù̀]
является банальным алломорфом флексии {-u}: это тот же -[u],
только подвергшийся влиянию палатализации, «излучаемой»
смежной фонемой /ĺ/; чередования типа *kãsa* 'роет' : *kà*[z]*davo*
'(многократно) рыл, копал' убеждают в том, что звонкость [z] во
втором примере является результатом влияния звонкости смеж-
ного фокуса звонкости /d/, относящегося к морфеме -*dav*(*o*).

4.3. ПРОСОДИЧЕСКИЕ ЕДИНИЦЫ (УДАРЕНИЕ И ТОНЕМЫ)

4.3.1.1. Наличие в литовском литературном языке просоди-
ческих признаков, относящихся к слову в целом, доказывается
такими минимальными парами, как 2 л. ед. ч. буд. в. *rìši* 'будешь
связывать': 2 л. ед. ч. наст. в. *rišì* 'связываешь'. Приписать их
различительные особенности фонемам нельзя, поскольку «силь-
ные» и «слабые» гласные в таких словоформах находятся в от-
ношении дополнительного распределения. Следовательно, эти
словоформы отличаются друг от друга целиком — как симультан-
ные сочетания одинаковых слогов с различными просодемами —
моделями акцентуации: *rìši* = /r̂i-ši̭/ & /‾|_/, *rišì* = /r̂i-ši̭/ & /_|‾/.
Комплекс признаков, с помощью которого один (центральный)
слог слова выделяется по отношению к другим (нецентральным),
называется ударением. В литовском (и русском) языке количе-
ство предударных и заударных слогов не ограничено общим фо-
нологическим правилом, поэтому возможны оппозиции различ-
ных моделей акцентуации. Это так называемое свободное или,
точнее, дистинктивное ударение. Такое ударение, выполняющее
кульминативную и дистинктивную функции, характерно для всех
литовских диалектов — даже для тех, которым свойственна рет-
ракция ударения с конечных слогов.

В большинстве языков ударение выполняет кульминатив-
ную и делимитативную функции. Сигнализация границ значимых
единиц (как правило, фонологических слов) может быть прямой
(ударяется первый или последний слог, ср. латышский, чешский
и, например, многие тюркские или иранские языки) или косвен-
ной (ударение получает, например, предпоследний слог, как
в польском или современном ассирийском); иногда делимитатив-
ное ударение так или иначе связывается с количественными ха-
рактеристиками слога (ср. монгольскую, латинскую и арабскую
акцентуацию). Существуют и такие языки, в которых ударение
вообще не фиксировано на определённом слоге и полностью за-
висит от фразовой интонации.

Самым распространённым является делимитативное ударе-
ние, фиксированное на предпоследнем слоге, что объясняется ин-
тонационным удобством такой модели. Даже в литовском языке
ударение, несмотря на его явную «свободу», в связной речи чаще
всего падает именно на предпоследний слог.

Во всех языках ударение выполняет кульминативную функ-
цию, которая на уровне предложений и высказываний сливается
с дистинктивной; ср.: литов. *dù rìs* 'двое будут глотать' (2 слова) :
durìs 'двери (Acc. Pl.)' (1 слово), латыш. ʹ*tu* ʹ*pele* ʹ*esi* 'ты мышь
(есть)' (3 слова) : ʹ*tupele* ʹ*esi* '(ты) башмак (есть)' (2 слова). Эти
факты явно свидетельствуют о неправомерности точки зрения,
согласно которой фонологическим является только дистинк-
тивное ударение.

4.3.1.2. Кроме главного, в словах иногда встречаются и вто-
ростепенные ударения. В большинстве случаев они представляют
собой лишь автоматический «отзвук» главного ударения, подчи-
няющийся ему по определённым строгим правилам, но возможны
и самостоятельные второстепенные ударения, отражающие мор-
фологическую структуру слова (ср. немец. ʺ*Bahn*ˌ*hofs*ʹ*vor*ˌ*steher*
'начальник вокзала') или даже выполняющие форморазличитель-
ную роль (ср. литов. с.-жем. им. п. ед. ч. [dộunà] 'хлеб', [šâ.rkà]
'сорока' и вин. п. ед. ч. [dộ.un^a], [šâˑrk^a] или, возможно, такие
старолитовские написания, как род. п. ед. ч. *Dirwôs* 'нивы',
Kammarôs 'чулана' и им. п. мн. ч. *Dirwos*, *Kammaros*).

При наличии главного и второстепенного ударения фоноло-
гическим обычно является главное ударение. Однако возможны и

исключения. Например, в северожемайтских словоформах типа [gæ̀rã·] 'хорошо', [vái̇ḳòks] 'мальчик' главное ударение является лишь делимитативным отзвуком фонологического ударения, находящегося в конечной позиции: ударение первого слога может исчезнуть в эмфазе, оно обязательно переходит на проклитику (ср.: [nègærã·, nè̤vaiḳòks]) и (в восточных говорах) не мешает нейтрализации оппозиции долгих и кратких гласных (ср. [vã·ks] 'ребёнок', [vã·kᵃ] 'ребёнка', но [vàkã·] 'ребята').

4.3.2.1. Ударные слоги, центр которых представлен долгими гласными или сочетаниями типа *VR* (дифтонгами или дифтонгическими сочетаниями), в одних литовских словоформах произносятся резко (напр., [vír̂s̯i] 'будешь варить', [k°ɫ°ó·ŝt̯e̯·] 'покрывал'), в других — плавно (напр., [vir̃.ŝi̯] 'будешь падать', [k°ɫ°õ·ŝt̯e̯·] 'складка'). Это различие выполняет такую же дистинктивную роль, как и дифференциальные признаки, но должно считаться просодической оппозицией, потому что реализуется и на неоднофонемных отрезках (таких, как [(v̂)-ír̂-(ŝi)] и [(v̂)-ir̃.-(ŝi)]).

Данные просодемы принято называть слоговыми интонациями или слоговыми акцентами (ср. литов. *príegaidė* ← греч. *προσῳδία*) и довольно строго отличать от так называемых тонов — просодем слога, не связанных (или слабо связанных) с ударением. Функциональное ядро слоговой интонации или тона составляет тонему; их позиционные варианты называются аллотонами.

В литовском литературном языке существуют две тонемы: акут (резкая, «нисходящая» интонация) и циркумфлекс (плавная, «восходящая» интонация). Без специальных экспериментов можно выделить по меньшей мере три аллотона акута (ср.: [k°ɫ°ó·ŝt̯e̯·] : [vír̂s̯i] : [m̂é.r̂ḳe̯·] 'закрывал (глаза)') и два аллотона циркумфлекса (ср.: [k°ɫ°õ·ŝt̯e̯·] и [m̂er̃.ḳe̯·] 'замачивал'). Система двух интонаций наблюдается во всех литовских говорах: такие интонации, как прерывистая, средняя и др., представляют собой лишь особые аллотоны акута и циркумфлекса. Слоги, центр которых представлен кратким гласным, не сопровождаемым имплозивным сонорным (т. е. так называемые краткие слоги), интонациями не обладают.

Отношения всех возможных просодических типов литовских слогов можно представить схемой, приведённой в § 244: градации схемы соответствуют следующим просодическим свойствам

слогов: *trumpieji* — краткие, *ilgieji* — долгие, *nekirčiuoti* — безударные, *kirčiuoti* — ударные, *akûtiniai* — акутированные («нисходящие»), *cirkumfleksiniai* — циркумфлектированные («восходящие»).

Циркумфлектированные слоги в литературном языке являются беспризнаковыми, а акутированные слоги — признаковыми. Это доказывается следующими фактами: 1) безударные слоги по своим антропофоническим признакам близки к циркумфлектированным, 2) циркумфлектированными являются большинство ударных окончаний, 3) в связной речи циркумфлектированные слоги встречаются чаще, чем акутированные. Однако эти закономерности не являются такими незыблемыми, какими они считались до сих пор: по-видимому, в определённых исключительных случаях интонации могут противостоять друг другу и в безударных слогах (ср.: вин. п. ед. ч. [ŝm̃ḝˌl̃ĭˑ] 'песок' : мест. п. ед. ч. [ŝm̃ḝˌl̃ĭˑ] 'в песке'), а также и в конечной ударной позиции.

4.3.2.2. Наиболее близкой к литовской системе тонем, по-видимому, является система словенского языка. Сербохорватский язык существенно отличается от литовского тем, что в нём тонемы противопоставляются не только на долгих, но и на кратких слогах. Древнегреческий язык характеризуется наличием интонационных оппозиций только в конечном долгом слоге. Весьма близки к литовским слоговым интонациям такие просодические явления, как коррепция и экстенсия рейнских диалектов немецкого языка или оппозиция «толчка» (глоттализации или ларингализации) и его отсутствия в датском языке. Шведские и норвежские словесные интонации (ср. швед. *kòmma* 'запятая' : *kòmma* 'приходить') напоминают не столько литовские слоговые интонации, сколько оппозицию «сильного» (одновершинного) и «слабого» (двухвершинного) словесного ударения, распространённую в восточных и северных аукштайтских говорах (ср. утянские ['dɔ̃ˑra] 'честно' : [ˌdɔ́ˑrà] 'честная').

4.3.3. Формально литовский язык можно считать моросчитающим, поскольку в нём долгие гласные в просодическом отношении эквивалентны двухфонемным сочетаниям типа *VR* (т. е. $\bar{V} \equiv VR$). Следовательно, имеется теоретическая возможность считать элементарной акцентологической единицей (носителем ударения) не слог, а мору — единицу, равную краткому слогу или

«половине» (первой или второй части) долгого слога. При таком подходе слоговые интонации сводятся к контрастам ударной и безударной моры и, таким образом, сливаются с акцентуацией: $\acute{V}R = /\breve{V}\breve{R}/$, $V\tilde{R} = /\breve{V}\breve{\grave{R}}/$, $\acute{\tilde{V}} = /\breve{V}\breve{V}/$, $\tilde{\tilde{V}} = /\breve{V}\breve{\grave{V}}/$, т. е. [b°úrtas] 'чародейство' = /bùrtas/, [t°uř.tas] 'богатство' = /tuřtas/, [r°ú·ksta] 'киснет' = /rùŭksta/, [r°ũ·ksta] 'дымит' = /rŭùksta/. Однако эта интерпретация удачно объясняет лишь редкие случаи метатонии, равноценной переносу ударения, — в большинстве же случаев, как доказал французский языковед П. Гард (Garde), литовские слоговые интонации ведут себя не как комбинации ударных и неударных (или высоких и низких) мор, а как целостные характеристики морфем.

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