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Language Documentation & Conservation Special Publication No. 8 (July 2014):

The Art and Practice of Grammar Writing,

ed. by Toshihide Nakayama and Keren Rice, pp. 69-89

<http://nlrc.hawaii.edu/lde/><http://hdl.handle.net/10125/4585>

Sounds in grammar writing

Keren Rice

University of Toronto

While there has been much written on writing grammars in recent years, relatively little has been written on the place of sounds and their patterning in grammar writing. In this chapter I provide an overview of some of the challenges of writing about sounds, and discuss the kinds of information on sounds that are generally included in grammars. I then address what a grammar might ideally include on the sounds of a language, advocating the inclusion of sound files to augment the usual topics, increasing both the scientific merit and the human value of the grammar.

What is the role of phonetics and phonology, or, more generally, of sounds and their patterning, in grammar writing? In this chapter, I address how sounds have been treated in grammars, what aspects of sound must be covered in a grammar, and what areas of sounds are seldom addressed in grammars and should be. In other words, I examine how much and what types of information about sound a well-balanced grammar should contain.¹

This chapter is organized as follows. I begin with a brief overview of recent work on what a grammar is and the larger context for grammar writing today. Following these preliminaries, I review the attention paid to sound in recent work on grammar writing, as well as some of the challenges in writing the sound sections of a grammar. I then provide a brief historical overview of how grammars have presented sound over time. I close with a discussion of what might be the 'ideal' representation of sound in a grammar, and then discuss briefly the core of what information about sound needs to be part of a grammar. The person who is most interested in what to include in a grammar may well want to turn immediately to section 4, skipping some of the background discussion on the role of sound in a grammar.

Grammar writing is a broad topic; in this discussion I focus on writing grammars of languages that are undescribed or underdescribed and, for the most part, grammars of languages that are endangered. This is important to keep in mind, although much of what follows is perhaps relevant, no matter what the status of the language.

1. SOME CONTEXT. This section is divided into two parts. In the first part, I briefly introduce the recent literature on grammar writing to establish a notion of what a grammar is, and in the second part I discuss the audience for a grammar.

1.1. WHAT IS A GRAMMAR? It is useful to begin discussion of sound in grammar writing by providing the larger context of what is viewed as a grammar today. There has been considerable interest in grammar writing in recent years (collections edited by Payne and Weber 2005, Ameka, Dench, and Evans 2006, as well as an earlier book, edited by Graustein and Leitner 1989). In the introduction to Ameka, Dench, and Evans, Evans and

1 Many thanks to Carol Genetti, Toshihide Nakayama, and Noboru Yoshioka for very helpful comments. This work was funded by the Canada Research Chair in Linguistics and Aboriginal Studies.

Dench (2006:1-2) begin by examining what a grammar is and who the audience for a grammar is, as well as the kinds of contributions that a grammar can make. They define the goals of a description grammar and its potential audience – “Each grammar seeks to bring together, in one place, a coherent treatment of how the whole language works, and therefore forms the primary source of information on a given language, consulted by a wide range of users: areal specialists, typologists, formal linguists, historical linguists, and members of the speech communities concerned.” They also describe the many challenges of grammar writing, including respect for the genius of the language balanced with general knowledge of how languages work, finding a balance between rigor and readability, and meeting the needs of a variety of audiences.

Thus, the writer of a grammar has many responsibilities. Balancing these is a tall order, and part of the goal of this chapter is to examine what this balance might be with respect to sounds – What are the essential features of a language in terms of sound? How do these interact with other aspects of the language?

1.2. THE LARGER SETTING FOR GRAMMARS: LANGUAGE, LANGUAGE LOSS, AND AUDIENCES. In recent years, with the recognition of the decrease in transmission of many languages, the importance of grammars has become more and more evident, for both the community of linguists and the community of speakers or would-be speakers of a language.

As noted above, in writing about the audience for grammars, Evans and Dench (2006:1) point out that a grammar is likely to be consulted by a wide range of users, including various types of linguists and members of the speech communities concerned. The last of these is probably a fairly recent addition to the list: grammars today are often viewed as serving the needs of linguists and also as playing a key role in language conservation, language revitalization, and language reclamation. In an chapter on grammars and the community, Mithun (2005:281) asks whether a single grammar can serve all potential users. She goes on to say that, whether it can or not, it is likely to be called upon to do so. Thus, whatever the goals of the grammar writer, those who are engaged in revitalization and reclamation work with whatever materials are available, making them a potential audience. Thus, in thinking about the presentation of phonetics and phonology, we must keep in mind the needs of the various audiences, with the knowledge that the audience might someday be one that is interested in revitalization or reclamation of the language.

2. SOUND IN WORK ON GRAMMAR WRITING: A BRIEF OVERVIEW OF RECENT LITERATURE. In this section I review the type of direct attention that is put to sound in the recent writing on grammars. The two recent books on grammar writing, Ameka, Dench, and Evans (2006) and Payne and Weber (2005), include little material that directly addresses issues around the presentation of phonetics and phonology, or addresses phonetic and phonological issues in any depth.

Ameka, Dench, and Evans (2006) contains articles on a variety of general topics – the art and craft of grammar writing, the roles of native and non-native speakers in grammar writing, cross-linguistic grammatography, linguistic typology, basic linguistic theory, the role of theory in grammar, the grammar-lexicon trade-off, field semantics, diachrony and synchrony, polylectal grammars, writing culture in grammar – as well as articles on some specific topics – word order, function words, converbs, ‘disposal’ constructions in Sinitic

languages, and the morpheme *ma-* in Tagalog. Payne and Weber (2005) includes general articles – contextualizing a grammar, grammar and the community, collective fieldwork, growing a grammar – and articles on specific topics such as from parts of speech to the grammar. No article in either volume specifically addresses issues of sound alone. In Ameka, Dench, and Evans, the only article that has anything specific to say about phonology is the one by Mosel, on grammatography. Her mention is brief: the basics of the sound system of a language and the orthography deserve a place in a grammar. Mosel also addresses where the presentation of phonology fits in a grammar.²

The articles in Payne and Weber (2005) are, by and large, general in focus. Mithun, in her work on grammars and the community, discusses how the sound system of Mohawk might be presented in a layered way, beginning with a list of distinctive sounds, symbols, orthography, and an example, moving to a description of the phonetic properties of stress, tone, and so on, with sections on intonation and perhaps history of transcription practices and cognates in related grammars. This is written as a reflection on layering, not on the content of the phonology section of a grammar.

Noonan (2005), in his contribution to Payne and Weber, discussed with several linguists what it was important to include within a grammar, and the phonologists and phoneticians he interviewed spoke to the types of things that should be said about sounds:

- Standard IPA symbols
- Detailed instrumental documentation accompanying descriptive statements
- A full description of segmental and suprasegmental contrasts and an explanation for arriving at them
- Description of distributional patterns of elements of the phonology
- Paradigms illustrating morphophonemic processes
- Where practical, audio and video recordings of various genres should be included

This is the most explicit discussion of the needs of a grammar in terms of sound in these books. We will return to these points.

Slightly earlier work on grammars is similar in having little to say directly about sound. A 1989 collection edited by Graustein and Leitner contains articles on a number of topics including grammar at the interface of language, linguistics, and users, and linguistic theories and grammar writing (linguistic pragmatics, functional grammar, cognitive linguistics, modern Praguian linguistics). Only one article, by Lehmann, notes that a grammar includes the phonology with its interfaces to phonetics and orthography. This book, like Payne and Weber (2005), is concerned largely with general issues in grammar writing and not with particular areas.

In general, then, grammar writing has received good attention in recent years. The work on this topic often focuses on issues such as form and function, the empirical founda-

2 Cristofaro (2006: 138) speaks obliquely about phonology in her contribution to Ameka, Dench, and Evans (2006) in the following statement: "... it was not uncommon for grammars written until about the '80s to privilege phonology and morphology over syntax. Thus, several grammars written in that period have long and detailed sections about noun and verb structure, while the space devoted to sentence structure is comparatively limited." Cristofaro's major interest is in morphological and syntactic typology.

tions for a grammar, the cultural context of a grammar, the contributions of grammar to linguistic typology, community use of grammars, and the like. In none of these works is there a detailed reflection on the role of sound in a grammar, what the issues are, and how to work through these issues.

One might ask why this is the case. Why are there discussions of topics such as semantics and diachrony, but not of the presentation of sound? I turn to some speculation on this topic next.

3. WHY LITTLE REFLECTION ON SOUND IN A GRAMMAR? As discussed in the previous section, overall it appears that, in recent work on grammar writing, sound has received little focused attention. Why might this be the case? Is it because there is no debate about what phonology consists of? Is it because the issues around sound have not been thought through recently? Is it because morphology, syntax, semantics, and pragmatics are considered to be more important than sounds? Is it because, as Noonan (2005:312) notes, there are “generally lower standards of training of the field linguist in phonology and, in particular, phonetics”? There are probably a number of reasons and I address a few of them here, looking at the traditional goals of grammars and at issues in representing sound on the page.

3.1. THE DEFINITION OF GRAMMAR. A review of the definition of the word ‘grammar’ is itself instructive in understanding why issues of sound have received less attention than other areas in work on grammar writing. Definitions of the word ‘grammar’ tend to refer to word formation and sentence structure. In a search for definitions of ‘grammar’ (<http://www.google.ca/search?hl=en&biw=1356&bih=728&defl=en&q=define:grammar&sa=X&ei=BcuETfegFMmY0QGulaXWCA&ved=0CBUQkAE>; accessed 19 March 2011), of the definitions that are relevant, most of them are defined along the following lines: ‘the branch of linguistics that deals with syntax and morphology, and sometimes with semantics’, ‘the logical and structural rules that govern the composition of phrases, sentences, and words’. The Wikipedia discussion of grammar includes phonetics and phonology, but in a secondary use – “In linguistics, *grammar* is the set of structural rules that govern the composition of sentences, phrases, and words in any given natural language. The term refers also to the study of such rules, and this field includes morphology, syntax, and phonology, often complemented by phonetics, semantics, and pragmatics” (<http://en.wikipedia.org/wiki/Grammar>, accessed 19 March 2011).

The use of the term grammar to refer to morphology and syntax is reflected in the fact that, at least some parts of the world, grammar and phonetics were considered separate areas for some time. For instance, until 1971 University College London had two departments, one of phonetics and another of general linguistics; these amalgamated in 1971 (<http://www.phon.ucl.ac.uk>; accessed 19 March 2011).

3.2. THE GOALS OF TRADITIONAL GRAMMARS. An important goal of traditional grammars was to describe a language in order to assist in reading that language. For instance, a classic grammar of Old English, by Mitchell and Robinson (1992), notes that the grammar is good for “those wishing to acquire a reading knowledge of the language. But potential specialists in phonology should find it a help in their preliminary studies of

the essential grammar;” obtaining reading knowledge of the language was clearly viewed as primary. In an earlier grammar of Old English, Wright and Wright (1925), the authors say in the preface “... we should strongly recommend the beginner not to work through the phonology at the outset ... In fact, it is in our opinion a sheer waste of time for a student to attempt to study in detail the phonology of any language before he has acquired a good working knowledge of its vocabulary and inflexions.” Beyond a chapter on orthography and pronunciation that includes information on vowels, consonants, and accentuation, the phonology in this grammar deals largely with comparative and historical issues.

With a focus on written languages and a definition of grammar that encompasses morphology and syntax, the stage was set for grammars of unwritten languages to focus on these areas, with limited attention to sound.

3.3. LINGUISTIC CHALLENGES OF UNWRITTEN LANGUAGES. Turning to languages without a history of writing, the substance of phonology presented a strong challenge for early researchers. Goddard (1996:17) writes about early contact of Europeans with languages of North America, noting the struggles that these languages presented in terms of their sounds:

From the beginning visitors who came into contact with American Indians recorded individual words and word lists. All early recorders struggled with the problem of writing unfamiliar sounds with the imprecise alphabets of standard European languages. This problem of phonetic accuracy remained until a comprehensive scientific understanding of phonetics emerged, beginning in the last third of the nineteenth century. Before there was a general science of phonetics, students of language had no way of accurately describing and hence understanding how sounds were produced by the organs of speech, and hence even when an observer learned to recognize a new sound there was no way of defining a new phonetic symbol for it or of otherwise communicating clearly to others the nature of the sound. Thus there was little effective cumulative knowledge about the sounds used in the languages of the world.

Boas, in his introduction to the *Handbook of American Indian Languages*, reinforces the difficulties with sounds. In this 1911 publication, Boas found it necessary to define the core of phonology as consisting of articulate speech, or sounds produced with the larynx, oral cavity, tongue, lips, and nose, and he further comments that it is important to recall that languages have a definite and limited number of sounds that is never excessively large.

3.4. INTERPRETING TRANSCRIPTION. Even with the development of the science of phonetics that Goddard mentions, writing and interpreting an unfamiliar language presents challenges. One comes from the interpreting of the transcription system. While the International Phonetic Alphabet is designed to give a unique symbol to each sound found in the languages of the world, in practice, full details are often not given in grammars, and may be elusive to the listener for some time. For instance, on seeing the symbol [u], even someone trained in phonetics might not know how high and how rounded this vowel is. Similarly, the symbol [t] is often interpretable as, for instance, either a dental stop or an alveolar stop,

and some might not hear a difference between these. Thus, it is not uniformly the case in practice that a symbol is uniquely interpretable: the transcription itself is an abstraction.

3.5. HEARING SOUND – WHOSE EARS? Another reason that representing sounds is a challenge is that the understanding of sounds is filtered through the hearer's native language. This was noted at least as long ago as Boas (1911:16-17), who remarked:

It has been maintained that this is not a characteristic found in more primitive types of languages, and, particularly, examples of American languages have often been brought forward to show that the accuracy of their pronunciation is much less than that found in the languages of the civilized world. It would seem that this view is based largely on the fact that certain sounds that occur in American languages are interpreted by observers sometimes as one European sound, sometimes as another. Thus the Pawnee language contains a sound which may be heard more or less distinctly sometimes as an *l*, sometimes an *r*, sometimes as *n*, and again as *d*, which, however, without any doubt, is throughout the same sound, although modified to a certain extent by its position in the word and by surrounding sounds. ... This peculiar sound is, of course, entirely foreign to our system; but its variations are not greater than those of the English *r* in various combinations, as in *broth*, *mother*, *where*.

3.6. SUMMARY. The factors identified above, both linguistic and social, and undoubtedly many others, might be expected to make sound an area ripe for reflection. Yet this has not occurred. In the next section, I survey a number of grammars, largely of unwritten languages of North America, to see how the traditions around defining phonology have emerged in the past century.

4. A BRIEF SURVEY OF WHAT IS INCLUDED IN PHONOLOGY: EARLY DAYS. In order to establish what is considered essential in the presentation of sound in a grammar, I undertook a brief survey of a number of grammars, reviewing the sections called phonology, phonetics and phonology, sounds, or something similar. I selected grammars largely, but not entirely, of North American languages. This survey is cursory, and it is difficult to know if the findings would hold if a larger and broader set of grammars were examined. Nevertheless, I think that it is worthwhile to include the survey as it provides us with some notion of what has been taken to be phonology over some time period and how this has evolved.

I began with an early grammar, by Petitot (1876). This is a rather unusual grammar, including detailed information on three Athabaskan languages of northern Canada, plus scattered information on other related languages in the area. It is part of the introduction to a dictionary, and the dictionary forms the bulk of the book. The grammar includes detailed discussion of morphology, establishing paradigms and comparing the different languages. The presentation of phonology is brief: Petitot includes the alphabet that he uses and a description of how the sounds are made.

Beyond Petitot, I began the survey with Sapir's 1912 grammar of Takelma (Takelman). This is an early grammar by Sapir, written as his thesis. The grammar is divided into sections, with the discussion of phonology occupying sections 2 through 24. Sapir begins

by introducing Takelma phonology and comparing it with that of geographically close languages. He describes the vowels, comparing the pronunciation of Takelma vowels with those of English, and he examines phonological processes involving vowels, such as vowel-glide alternations, hiatus resolution, *u* dissimilation, and *i* umlaut.

Sapir also discusses speech effects involving vowels. For instance, he notes that quantity depends on factors such as speech rate and placement of stress-accent, with vowels reducing in quantity when stress-accent is lost, but short vowels sometimes lengthening “when dwelt upon for rhetorical emphasis” (1912:13). In discussion of stress and pitch accent, he notes the difficulties of determining which syllable is assigned stress-accent in uninterrupted speech. He uses musical notation to show tone levels.

Sapir’s discussion of consonants is likewise detailed, including pronunciation and positional constraints on consonants and consonant clusters. He also examines phonological processes such as dissimilation and epenthetic *h*.

Sapir’s Takelma grammar contains the core of what continues to be required of the phonology of grammars – discussion of the sound system, with attention to phonemes, allophones, and distributional constraints, as well as discussion of prosodic characteristics and processes. Sapir sought ways to provide a visual representation of speech, both through the use of a standard transcription system and by using musical notation to indicate tones.

Haas (1940), in a grammar of the isolate language Tunica (her dissertation), provides a detailed survey of the phonology. She includes phoneme charts along with descriptions of Tunica sounds as compared with English. She distinguishes syllable types, noting the existence of both stressed and unstressed syllables, and she identifies what she calls phonomechanics, or phonological processes (vocalic contraction, assimilation, syncope).

While this is just two grammars, the information on phonology found in the Takelma and Tunica grammars forms the core template for the phonology in the grammars that I surveyed. The discussion of phonology includes a list of sounds (consonants, vowels, prosody), their pronunciation, phonotactics, and discussion of allophones and allomorphs.

In surveying later grammars, these core components remain. I looked Broadbent’s 1964 grammar of Southern Sierra Miwok (Utian) and Barker’s 1964 grammar of Klamath (Plateau Penutian), both published in the University of California Publications in Linguistics series. Broadbent includes discussion of consonants and their positional variants as well as vowels, addressing their distribution and variation in quality. She introduces the syllable canon and stress. She discusses intonation and juncture, provides a phonological definition of the word, and discusses morphophonemics. I found her remarks of individual variation to be of particular interest (Broadbent 1963:13): “The phone [s̥] occurred only in the speech of Chief Leeme. The alveolar variant appeared only in forms said to represent the Yosemite dialect, or when the informant was slightly inebriated. Castro Johnson, who lived in Yosemite for several years as a young man, accepted such forms as characteristic of Yosemite speech. Other informants, however, said that they did not represent Yosemite or any other Southern dialect, saying that the alveolar spirant was a Central Sierra feature. Only Chief Leeme claimed to speak the Yosemite dialect; other informants referred to their memory of the speech of undisputed Yosemite individuals, now deceased. If this variable phone was present in Southern Sierra, then, it occurred only in the Yosemite dialect, and its presence there is disputed by the informants currently available. In other dialects, it is

regularly replaced by /h/.” The recognition of variation of various types is another important aspect of phonology.

Barker, in the Klamath grammar, covers much the same topics: he introduces symbols, discusses consonants and their variation, vowels, pitch, stress, and juncture. He presents what he calls anomalous phenomena, and also provides alternative analyses. Barker (1964:48) also comments on other aspects of the material he gathered, noting for instance that “Phenomena such as stuttering, swallowing, coughing, and hesitation vowels are frequent on the tapes.” He recognizes voice qualifiers in the texts (1964:49) – “falsetto utterances for little cute characters, deep bass utterances for older and more respected figures, growled utterances, whispered utterances, and many other varieties” and further notes the use of “Extra vowel length for emphatic purposes is characteristic of Klamath. It is an added device for *narrative style*. It may occur with any stressed vowel and may be of any duration. It may have unusual pitch contours, such as wavering, ululating, etc.” Thus a focus on phonological aspects of performance was important to Barker in addition to more narrowly construed phonological analysis.

These grammars set the stage for later grammars in terms of what is required in the phonology. They include aspects of sounds that can be recorded on paper, including contrastive sounds, allophones, morphophonemics, and prosody, often both at the word level and beyond the word. There is also discussion of variation and of different speech styles. It is interesting to note that many of the grammars of this time period form the basis for the teaching of phonology as it became known in the 1970’s, with an emphasis on word-level phonology – the sound system, allophones, and morphophonemics occupied the attention of phonologists in this time period, with less attention to phonology above the level of the word.

5. AN ASIDE: ‘BEST PRACTICES’ GUIDELINES FOR GRAMMAR WRITING. Perhaps partly due to the activity around grammar writing over the previous decades, Comrie and Smith (1977:5), in introducing the Routledge Descriptive Grammar Series, aim to provide a standard framework for the series to serve as “catalyst in the elicitation of all information that could be of interest for theoretical work ...”. They note that such a framework is useful, but should not be interpreted as a straightjacket.

With respect to phonology, Comrie and Smith (1977:9) write:

In the section of phonology all examples should be accompanied by the relevant phonemic or phonetic transcription (in, respectively, obliques and square brackets) in terms of the IPA phonetic alphabet. In sections not dealing specifically with phonetic detail it may be possible to use an adaptation of the IPA system for typographic convenience (for instance, by using ʃ rather than f , ...). Any departures from the IPA system should, however, be made quite explicit and cleared with the editors in advance.

Comrie and Smith place phonology as the third section of a grammar, after syntax and morphology and followed by lexicon and basic vocabulary. [This has not been very well accepted in the practice of grammar writing; the chapters on phonology generally come

before those on morphology and syntax, although phonology is often also addressed in the presentation of morphology and discussion of phonology in discourse may follow.] In the section on phonology, they call for glossing and using IPA symbols, and they provide a list of descriptive articulatory features to use with respect to place of articulation, manner of articulation, laryngeal features, and so on.

In summary, Comrie and Smith (1977:58-65) propose that the following phonological information be included in the grammar:

- Sections on phonological units (segmental), including allophony, phonetic realization, restrictions with respect to word classes and phonotactics.
- Discussion of phonotactics, including positional restrictions, sequence restrictions (both adjacent and long distance), syllable shape and restrictions, and word class restrictions.
- Discussion of suprasegmental phonology, including length, stress, pitch, intonation, with discussion of distribution, tactics, processes, etc.
- Presentation of morphophonology, both segmental and suprasegmental.
 - Segmental: assimilation, dissimilation, other alternations, metathesis, coalescence, deletion, insertion, reduplication
 - Suprasegmental: changes in stress and tone under morphological processes

Most of the presentation on phonology is contained in this section, with a few references to phonology in sections of the outline on morphology and syntax.

Another grammar guideline, this one from the 1990's, is for the short-lived Cambridge University Press Grammar Series that was edited by Dixon and Rice. In terms of phonology, these guidelines included the following.

- Consonant and vowel phonemes in tabular array, with description of phonetic realizations including allophones and environments and dialect differences; IPA unless a good reason
- Labels for tables, details
- Explicit information on phonotactics, stress, tone, segmental features functioning prosodically, etc.
- Intonation marking commands, polar questions, content questions, etc.
- Criteria for defining word (phonological, grammatical)

These two sets of guidelines are similar, reflecting what we have seen in the grammars reviewed.

6. A RETURN TO THE SURVEY: A FEW MORE RECENT GRAMMARS. The more recent grammars develop the foundations laid out in the earlier grammars. The major changes in grammars come because of both technological and theoretical developments. In terms of technology, it has become increasingly possible to do phonetic analysis. This allows not only for more careful work on phonetics, but also for better work on phonology above the level of the word. Linguistic theory has also developed, paying more careful attention to

the relationship between phonetics and phonology, to phonology above the level of the word and to language variation, among other topics.

Here I look at grammars of languages spoken in parts of the world other than North America. Chelliah (1997), in her study of Meithei (Tibeto-Burman), discusses the standard phonological topics (consonants and vowels with their distribution and variation, syllable structure, tone, lexical rules, post-lexical rules). In addition, Chelliah includes pitch tracks in order to compare vowels of different tones. Sapir, as noted earlier, used musical scores to show tones in the Takelma grammar, so the need for a representation of tone has long been recognized, but the technological developments of recent years make this easier than it had been in the past.

Aikhenvald (2003), in a grammar of Tariana (Arawak), includes an extensive section on phonology: segmental phonology, syllable structure, stress, the nature of the phonological word and evidence for it, phonological processes, prosodic classes of morphemes, pause marking, phonological phrase, and intonational phrase. Aikhenvald clearly goes beyond the word level in looking at phrasing. It is interesting that she has incorporated phonology of higher structural levels, but in her detailed discussion of discourse organization, she gives rich information about sentence-linking, among other topics, but does not discuss phonological issues relating to discourse. Aikhenvald's careful attention to the different types of words perhaps reflects discussion on this topic in the theoretical literature. Most striking about the presentation of phonology in the Tariana grammar is the discussion of phrasing beyond the level of the word.

Dixon (2004) is an award-winning grammar of Jarawara of Southern Amazonia (Arawá). The contents of the sections on phonology are by now familiar – vowels, consonants, historical development, phonotactics, loans, stress, grammatical and phonological word, phonological rules. It is interesting to note that this grammar was awarded the Bloomfield Book Award by the Linguistic Society of America in 2006, with the following citation.

R. M. W. Dixon's *The Jarawara Language of Southern Amazonia*, written with the assistance of Alan R. Vogel, is an invaluable record of a language in serious danger of extinction. The complexities of the language are unraveled with a clarity and insight that allow the reader to share in what the author describes as 'the intellectual pleasure of working out such a magnificent system'. (<http://www.linguisticsociety.org/content/leonard-bloomfield-book-award-previous-holders>)

While definitely worthy of this award, the phonology section is presented in great depth but is at the same time quite traditional in nature.

Genetti's 2007 grammar of Dolokha Newar (Tibeto-Burman) is the most recent grammar that I examined. This is another award-winning grammar, receiving the inaugural Gabelentz award from the Association for Linguistic Typology in 2010. The grammar includes the standard: consonants, vowels, processes, phonotactics, syllable structure, word structure, stress. In addition, it contains detailed information about prosody, with discussion of intonational units, phrasal accents, terminal pitch contours, and units about the level of the word. Genetti (2007:89) notes that "... prosody is one of the central systems by which speakers parse and organize connected speech. It is used both to break the speech

into manageable chunks (intonation units) which are easily processed cognitively. It is also used to highlight and background particular units, and particular words within those units. And, crucially, it is used as a ‘signpost’ which provides cues to the hearer about the relationships between units, as well as whether or not the material constitutes embedded direct quotation. However, the signpost function does more than simply provide cues to the hearer. It also allows for higher level prosodic structuring, as speakers use transitional continuity to combine single intonation units into structured groups. ... There is one other important function of prosody which I am not able to address, that of conveying affect, or the emotional state or attitude of the speaker.”

Genetti (2007:485) provides detailed discussion of the relationship between prosodic and syntactic structuring: “It is at the sentence level that one can witness the interaction of the clause-combining strategies ... and the genius of the design principles that form the basis of the grammar. ... the syntactic structuring ... gives a partial view of how speakers are segmenting the speech stream ... and relating those units Simultaneous to the syntactic structuring of speech is the prosodic structuring of speech. examining the interaction of the syntactic and prosodic levels allows us greater insight into how speakers simultaneously utilize these distinct domains in the formation of sentences and the construction of narrative.” She presents diagrams to indicate prosodic phrasing; an example is given below.

... ^	daNga astonishment	par-ai feel-BV	ju- be-FS	ju-eni be-PART	“lo EXCL	ba#!bu. ^ baby
... ^	thijin 1pINC.ERG	u this	anaut3ha# strange	kha# matter	khoN-gu. __ see-1pPST	

He felt astonished: “Lo baby! We saw a strange thing...” 491

This grammar thus integrates aspects of sounds fully, both contextualizing the importance of phrasing and making the reader broadly aware of its importance not only at the word level but at higher levels as well.

7. INTERIM SUMMARY. All of the grammars that I reviewed include something that we can call phonology. When we move away from the grammars based on written languages (Old English) to those on languages without a written tradition, discussion of sounds is present in some form or another. The earliest grammar that I surveyed, Petitot, presents the system of sounds. By Sapir, sounds had come to include not just segments but also prosody, and the topic of variation in both particular sounds and discourse context became important. More recently, sound at a level larger than the word has been discussed in more detail.

As noted earlier, changes in the treatment of sounds in grammars likely reflects different developments within the field. On the technological front, linguists have been keen to record from the moment this became possible, and, with the development of the ability to do acoustic analysis, at least some linguists have included acoustic representations of sounds in grammars. With programs such as Praat, many grammars now include some spectrograms and pitch tracks. The better understanding of variation brought about through sociolinguistic work has allowed for a deeper study of variation. Phonological

theory has allowed for different ways of talking about sounds and for recognition of the role of sound throughout the grammar. At the same time, grammars have changed phonological theory, with aspects of language hitherto unobserved accommodated in the theory. The increased work on typology makes linguists aware that appropriate data on a wide variety of languages is required to answer important questions. Evans and Dench (2006:16) note that in semantic fieldwork “Recent advances ... have begun to give us better techniques for tackling these problems” (production of good meaning-based grammars). Just as with semantics, both the scope and methods of phonology have evolved.

It is worthwhile to close this section on the increasing recognition of the importance of sound with a quote from Dixon (1994:299) (quoted from Mosel 2006:63):

The most important point is that a language can only profitably be studied as a whole. One must recognize and distinguish different levels of structural organization – phonological, morphological, syntactic, semantic, discourse and pragmatic – but each of these continuously interrelates with the others.

Phonology is definitely a level that interrelates continuously with all other levels, and to study the other areas without reference to sound has become increasingly unacceptable as the methods have allowed for this study.

I ask next if we have reached the point that we can say we know what the phonology must include, or are there still strides to be taken.

8. BEYOND THE CURRENT PARADIGM. Do we stop here, saying that we are satisfied with what is represented in a typical grammar in terms of sound? The heart of the study of phonetics and phonology is about sounds, sound systems, pronunciation, interaction of sounds, variation in sounds, and patterning of sounds at all levels from the morpheme to the word to the phrase to discourse. We write about sounds, and represent sounds through symbols on the page, but, with rare exception, we do not represent sounds themselves in a grammar, only approximations through transcription and acoustic representation. Today we have the tools to represent sound more directly, through recordings of the sounds themselves.

Before turning to sound itself, it is worthwhile to review briefly the value of acoustic representations of sounds. One way of representing sounds more directly than transcription is through the use of spectrograms, pitch tracks, and the like. This in itself is very useful: it gives an accurate picture of a sound, helping to deal with the issues of perception noted earlier as well as with issues of reliability and accountability. Acoustic representations require a depth of knowledge to interpret, and they remain a representation of sound rather than sound itself.

Why might a more direct representation of sound in a grammar be of value? I would like to look at this from two perspectives, first the perspective of the linguist and second the perspective of the community of speakers. I begin with the linguist. However, before turning to the value of including sound in a grammar, an important caveat is in order. There are individuals and communities who are happy to work with a linguist, but who do not want their recordings made publically available. Whatever the merits of including sound in a grammar, these are overridden by these ethical issues.

8.1 SOUND AND THE LINGUIST. As discussed in section 2, using words to describe a sound does not necessarily call up the identical sound to all readers. Recordings themselves would allow the reader to hear the sounds directly.

In many languages, there are many sounds that are difficult for a non-native speaker of a language to distinguish. Suppose that two morphemes are distinguished solely by two very similar sounds. If these sounds are conflated by the linguist, not only is the sound system itself misrepresented, but there are potential implications for the morphology as well, with possible misanalysis of two or more morphemes as one. (An alternative analytic problem can arise, with misanalysis of one morpheme as two if allophones are not recognized as such; recordings are not particularly helpful in sorting this out as it is an issue related to analysis rather than to form.) If sound were available, it might be possible to correct such a misanalysis.

Some sounds are particularly difficult to deal with. Tone is a notoriously challenging area, as are other aspects of prosody. Pitch tracks are of enormous value in seeing what tones look like, but they cannot tell most people just what they sound like. See Remijsen (2011) for discussion.

In transcribing, we tend to come to an analysis of what is phonemic and what is allophonic and then adopt a phonemic transcription system, with remarks on allophones and other variation in the section on phonology. While this is an appropriate analytic strategy, there are circumstances under which important information might be lost. As an example, in many dialects of Dene (Slavey; Athabaskan), the palatal glide [j] and the voiced alveopalatal fricative [ʒ] appear to be in free variation in some environments. In the grammar of Slave (Rice 1989), I comment on the variation; in texts in the grammar, I level the variation between these sounds. However, I have a suspicion that remains untested that there is a contextual difference involved in choosing one or the other of these sounds, with the fricative occurring when something is new information and the glide otherwise. It is not possible to determine whether this suspicion is supported based on the transcriptions (or whether other factors might be involved in the variation), as the difference was leveled out; it would be possible to study this systematically if oral texts were part of the grammar. Such situations are relatively common: variation is noted, but not transcribed beyond the discussion about variation. It is then not possible later on to follow up on the variation to see if there are any linguistic factors that might control it.

The study of sound above the level of the word is also difficult to represent on the page, and it remains relatively unusual to find good discussions of sound at this level beyond intonation and some sandhi phenomena. The study of sounds above the word level would be greatly enhanced if sound were available. This is partially addressed through spectrograms. For instance, consider the three pitch tracks below, from Holton (2005), an article on Tanacross Athabaskan. These show the pitch contours for different phrase types – a yes/no question, a declarative, and a content question. While the differences between them are clear, and the inclusion of pitch tracks in a grammar is of great value, just how they translate to speech is not necessarily easily determined.

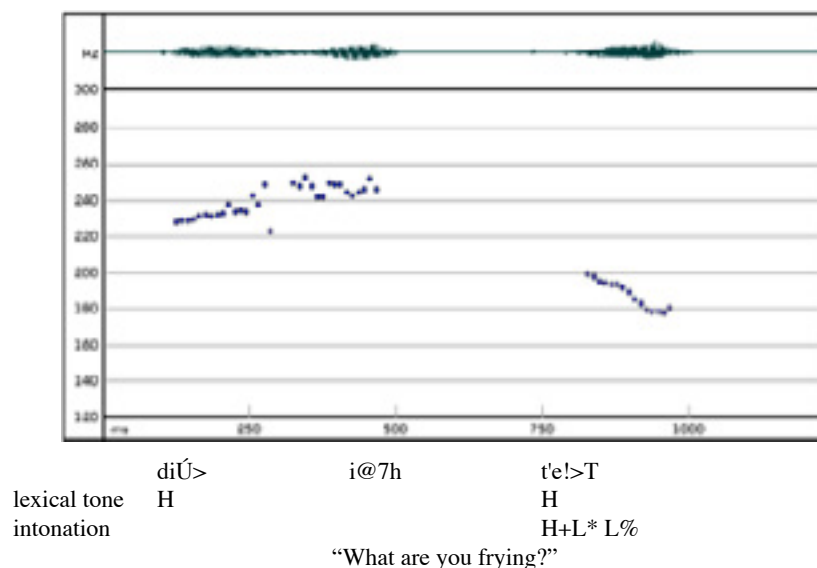


FIGURE 7: Pitch track for content interrogative with high tone stem

The spectrograms are very valuable, but it is probably the rare person who can actually ‘hear’ a spectrogram.

Noonan (2005:354) speaks as a linguist about the standards that are required of a grammar. From the perspective of language loss, he talks of the responsibility of the grammar writer to set their standards high: “... we should be aware that when we are writing grammars of those languages which will likely be moribund or extinct by the end of the century – that is, the great majority of the world’s languages – that we are writing for the ages. So, we must make sure that what we are doing reaches for a very high standard.” This high standard includes the points reviewed in this chapter and others: systematic description of the sounds of the language, their pronunciation, allophony, distribution, variation; relationship to orthography; phonological processes not recognized in the orthography; patterning of sounds with respect to morphology, syntax, discourse; variation; prosody at the word level and above; how sound interacts with information structure; instrumental accompaniment. And, finally, Noonan (2005:365) adds “Where practical, audio and video recordings should be made of various language genres.”

Thus, from the perspective of the linguist, the inclusion of sound would augment and support phonological analysis in many ways, as well as providing for work that meets the highest of standards.

8.2. SOUND AND THE COMMUNITY. Sound is also important from a second perspective. As discussed in section 1.2, whoever the audience for a grammar is perceived to be when the grammar is written, that audience today often includes users who were not necessarily expected to be interested in a grammar, namely members of a community who are interested in language revitalization and reclamation. Parsons-Yazzie and Speas (2007:17), writing about Navajo in a grammar for Navajo speakers and learners, stress the importance

of pronunciation, saying “It is vital that you realize pronunciation is extremely important to the Navajo language.” They add: “It is virtually impossible to learn a language by reading and memorizing material in a textbook. You must use the language to communicate! Practice with your classmates, but also seek out fluent speakers of Navajo and talk with them We know that you will succeed if you persist.”

Rice and Saxon (2002:130), writing about representing variation in a dictionary, say “... invaluable information would be lost from a story’s telling if the pronunciation variants that the storyteller used were washed over by means of standardized spellings. In the Western tradition, on the contrary, the written text is taken as primary and authoritative in almost all contexts.”

Transcription of a language, while important, is nevertheless an abstract representation on the page, not fully interpretable, with something generally lost in the translation from sound to paper. One might even say that transcriptions, while serving a very important function, take some life out of the language. Acoustic representations offer an improvement, but are still an abstraction. While sound accompaniment to a grammar was difficult in the past, current technology has made it reasonable, assuming that ethical conditions are met.

9. WHAT TO INCLUDE? For the graduate student seeking to write a grammar of a previously undescribed language for their dissertation, the demands of what the ideal section on sounds would include could well seem unapproachable. In this section, I briefly review some of the topics that I think must be included, and then raise a few specific questions about sounds that the grammar writer will likely need to think about. This section does not go beyond previous sections in what belongs in the phonology section of a grammar. I hope that the survey presented in section 4 points to the need to discuss inventories, phonotactics, allophony, morphophonemics, and phrase-level phonology, and that some acoustic material and sound would greatly enhance a grammar. To me, there is no substitute for reading grammars to help decide what should be in a grammar, and sounds are no exception to this. For what is considered appropriate in terms of sound today, a good starting point might be the recent PhD theses that have won awards as outstanding grammars from the Association for Linguistic Typology (<http://www.linguistic-typology.org/awards.html>; accessed 4 January 2012) and the Society for the Study of Indigenous Languages of the Americas Mary Haas award (<http://www.ssila.org/>; accessed 4 January 2012). There are also a number of questionnaires that might be of value in thinking about what is needed in phonology; several are available at <http://www.eva.mpg.de/lingua/tools-at-lingboard/questionnaires.php> (accessed 4 January 2012). With the questionnaires, as with the grammars, the user must exercise their own judgment as to what is appropriate for their particular circumstances and for the language under study.

What *must* be included in a section on sounds? Culled from the survey and guidelines by Comrie and Smith, Dixon and Rice, and Noonan, as well as Bower’s textbook on phonology (2007: 70-71), I offer the following.

- Presentation of segmental inventories, together with articulatory descriptions and discussion of allophones and variation, with careful exemplification.
- Presentation of phonotactics and syllable structure, with careful exemplification, including discussion of any morphological factors that affect the distribution

of sounds (e.g., there might be a richer inventory in stems than in affixes). In discussion of phonotactics, it is important to talk about positional inventories, including any differences in inventories that might exist depending on prosodic position.

- Presentation of suprasegmentals, including tone, stress, and intonation, with careful exemplification, augmented with pitch tracks.
- Presentation of phonological rules, with careful exemplification and motivation.
- Phonological analyses are not always as clean as one might like – for instance, it is often difficult to decide on what is phonemic and what is not in a language and there might be sounds that are of very limited occurrence– and these types of complexities should be addressed.

While the above topics largely concern word-level phonology, at least the basics of phonology above the word should be included in a grammar. This could include segmental effects such as sandhi, and suprasegmental effects – groupings of words into phrases and intonation in different sentence types are two important topics. Again, pitch tracks will be extremely helpful here.

The above is a very broad sweep, and there are many particular questions to consider. I pose some here, with brief discussion. As noted above, there is no substitute for reading grammars to come to a sense of how others have addressed these questions, and others.

How much articulatory detail is required in descriptions of sounds? This probably depends on the sound. For coronal sounds in particular, it is probably worthwhile to be as explicit as possible about how the sound is made as there is considerable variation cross-linguistically. For instance, as noted earlier, the symbol *t* is used to represent a stop at either a dental or an alveolar place of articulation, so it is important to give details about what the place of articulation is (assuming that one can be determined). Rhotics should be described in as much detail as possible, as the symbol *r* is used in many different ways. Laryngeal features of stops and affricates should be spelled out – taking *t* as an example again, this symbol is used to represent the expected unaspirated stop but, in many cases, it is the symbol used to represent an aspirated stop, especially when there is not a phonemic unaspirated stop in the system. These descriptions should be given in articulatory terms. There is one type of description to avoid. It is very tempting to make a statement that sound *x* is like a sound in some other language, as, for instance, Sapir did in the grammar of Takelma. These kinds of statements are frustrating for the user – the user might not know that other language and, even if they do, they might not know the dialect that the person is using. IPA provides a kind of standard that, at least for linguists, should give a reasonable idea of what the sound is like. For community users though, IPA can present a challenge. Thus, for both academic and community users of a grammar, there is nothing like sound files!

Related to questions of description of sounds are questions of use of orthography. Some linguists are insistent that examples in a grammar must be written using IPA. If there is an accepted orthography for a language that is fairly phonemic in nature, I myself see nothing wrong with using that system, with careful note of the relationship between the orthographic symbols and IPA, and reminders of relationships as appropriate, through, perhaps, the use of both orthography and IPA at relevant points in the grammar. When there

is variation in pronunciation, it needs to be thought through carefully how to present this, as the orthography may well reduce that variation in the interest of a standard. Dictionaries often present both orthography and pronunciation, and such a system could be used.

Also related to the degree of detail in a description of sound is the use of acoustic material. What might it be helpful to include? At the word level it might be useful to present information about voice onset time in stops as languages vary considerably in this, information about duration of consonants (especially about consonants such as labiovelars compared with labials or velars and about geminates as compared to singletons), information about the duration of vowels (short vs. long vowels, lax vs. tense vowels; phonologically long vowels as opposed to phonetically long vowels; epenthetic vowels as compared to underlying vowels of the same quality), and information about tones. Scatterplots showing the range of variation in vowels in a particular environment can also be useful to the reader in understanding the range of variation. At the phrasal level, pitch tracks can be extremely helpful in representing intonation patterns.

There are many other sorts of questions to grapple with. How many examples should be included? There should be sufficient examples to show the sound contrasts that are found, the positions in which the sounds are contrastive, allophony, and variation. With variation it is valuable to identify whether the variation is found across speakers, or whether within speaker variation is present as well, and, if the information is available, discussion of how common the variants are is of value. In exemplifying processes, I think it is important to provide as full data sets as possible. For instance, in a field methods class one year, we studied a language where, in vowel-vowel sequences, one of the vowels deleted. It was important to find data to illustrate all possible vowel-vowel combinations in order to see what happened to each one; a statement with just a few examples was not, we agreed, appropriate as the reader would not know if we had actually found the data to test each one. In such a case, if there were sequences that were absent for some reason, it would be important to comment on that as well. We also found variation in some cases in how a particular sequence was resolved; this too requires comment.

Another important question to consider is the type of formalism used. The goal is to be as clear as possible. If the formalism increases the clarity, it is appropriate. However, formalism for the sake of formalism is not such a good idea – a grammar is meant to be a contribution that lasts over time, and formalism tends to be much more transitory. There are some cases of formalism that I find very useful. Valentine (2001), in his grammar of Nishnabemowin, an Algonquian language, shows how vowel deletion works through the use of metrical trees in a way that is clear and illuminates the process. Complex rules, on the other hand, do not generally provide insight, and a clear description, together with comprehensive data, usually is more helpful.

Again, there is no substitute to studying grammars to determine what the content of a grammar should be with respect to sound systems. The description should provide the reader with the core information about what it is that the language under discussion is all

about. This, supplemented with sound files, should bring the language alive in the minds, and ears, of the reader.³

Why so much, the person interested in morphology and syntax might ask. Isn't it sufficient to give sound charts and examples of contrasts and their distribution and to discuss phonotactics, syllable structure, and introduce morphophonemic processes? The problem with leaving the phonology sketchy in this way is that, as the quote from Dixon (1994: 229) given earlier makes clear, the components of language interact, and without firm grounding in the sounds of the language, the language is reduced to language on the page, not language in the real world.

10. SUMMARY AND CONCLUSIONS. The role of sound in grammar writing has evolved as the field has developed: grammars increasingly attend to variation, to phonology above the level of the word, and to phonetic detail. Acoustic representations provide further information than transcription in understanding details of pronunciation. Yet the very representation of a system of sounds on the page is problematic in being an abstraction rather than the sounds themselves. From the perspective of linguists, the use of these representations, as invaluable as they are, raises issues around verifiability, accountability, and scientific rigor, as linguists have long been aware; the inclusion of sound in addition to transcription and acoustic material helps to address these issues. From the perspective of a community, there are issues of abstractness, and a lack of a kind of reality as the language is transferred to the page.

Enhancing the presentation of sound, both by describing the role of sound at all levels and by making sound available, will allow a grammar to better meet the needs of a linguist, leading to higher quality description. It will allow for better studies of areas such as phonetic typology and the role of prosody in information structure. Enhancing the phonology will also better meet the needs of the speaker/heritage learner, with the language becoming 'real' through the inclusion of sound, just as it becomes real through the use of real examples, drawn from texts, conversations, and other natural speech. Sounds can include examples of different syllable shapes, examples of sounds contrasted with other sounds, examples of sounds in context, examples of connected speech, examples of different speakers. Coupled with time-aligned transcription/orthography, and video when feasible, a grammar would present a richness that is unprecedented.

I have advocated that, in addition to the usual information included about phonology in a grammar— phonological inventory and realization, with careful description; phonotactics; allomorphy; extended to levels beyond the word, including segmental and prosodic properties, and so on; there be an extension to include sound. Such a grammar would be of both scientific merit and human value.

3 Talk of sound files raises what can be a complex question. While sound files without any background noise might be the ideal in some ways, in reality, it is often very difficult to make recordings without a rooster crowing, a dog barking, the radio playing, a baby crying, rain on the tin roof, and so on. The sound is valuable even if the conditions are not ideal.

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rice@chass.utoronto.ca