1 Introduction

The decision to include local literacy as part of a language revitalization effort often entails the creation of a written form of the language, either because no such form has ever existed or because it has fallen into disuse, as noted in Chapter 5. In this chapter, we move to what is perhaps the chief consideration in standardizing language, the development of an orthography. Though some of the same general issues mentioned in the previous chapter are also relevant to orthography development and will need to be revisited, we have opted to devote a separate chapter to orthographies for two main reasons. First, since the creation of symbols to encode a spoken language is a precondition for any literacy in that language, many people involved in nascent language revitalization efforts find themselves confronted with the practical questions of how to go about creating an effective orthography. They have decided to make the first steps towards developing literacy in a local language, but are unsure of how to create materials for reading and writing. Second, most of the available resources on language revitalization do not contain more than cursory discussions about orthography (Hinton and Hale 2001 is a notable exception), even though they identify local literacy as a commonly desired aim of revitalization efforts.

One of the most important aspects of orthography development is the recognition that, beyond purely linguistic considerations, there are a range of social, psychological, economic, political, and historical issues involved in making decisions about how to write a language. Because situations vary dramatically, no single orthographic system can be prescribed as best for all situations. At the same time, some broad conclusions can be made about the process of developing an orthography.

The importance of sociological factors cannot be overstated. Regardless of how linguistically and technically sound an orthography might be, its initial (and continued) acceptance by the people for whom it is designed is critical in determining its eventual effectiveness and use. Therefore, local
leaders and native speakers must be integrally involved in the process of
developing an orthography regardless of their supposed linguistic aware-
ness; the creation of a writing system by an outside linguist or single com-
munity member acting independently, without continual local input and
feedback, easily leads to a failed orthography. As just one of many exam-
pies, two attempted orthographies for Coreguaje did not succeed in large
part because of a lack of consultation with Coreguaje speakers who were
semiliterate in Spanish (Gralow 1981).

An orthography must also be acceptable to authorities (including reli-
gious leaders, familial or clan heads, and civil leaders) who have influence
over the educational practices of a community. Endangered languages are
nearly always spoken by communities embedded in literate (and domi-
nant) societies whose members have tremendous influence over the use and
development of the local language. Orthographers must take into account
how national regulations and laws affect orthographic choices, including
choices about script or the marking of tone. They must also be aware of
conventions, such as spelling or punctuation, that are used in the national
languages or other languages in a region, because local opinion might call
for either conformity with, or divergence from, such conventions.
Therefore, an ideal orthography will be acceptable not only to members
of the local community but also to speakers of the language of wider
communication who are involved with the community, particularly in
the areas of language planning and education. Similarly, it is important
to recognize that the various groups invested in the culture and language of
a local community – professional linguists and anthropologists, aid work-
ers, missionaries, and native speakers of the local language – may have
competing motivations for representing a language in a given way (see
Gordon 1986).

In addition to such sociopolitical considerations, linguistic, cognitive,
economic, and technological factors can play important roles in the choice
of the written form given to a language. Some types of orthographies are
easier to learn for newcomers to literacy (see section 3). The technologies
that will be used for local literacy (e.g. typewriters or computers) may
restrict the symbols that can be employed. Though computers are increas-
ingly able to reproduce a range of symbols that might be used in ortho-
graphy, one must consider whether computers are readily available to
those who will be writing the language. In some cases, an orthography
which is poor on technical linguistic grounds may be more effective than a
linguistically sophisticated one for the simple reason that people can
recreate it on widely available typewriters, thus integrating the literacy
into a formal cultural domain.
2 Writing systems

In developing an orthography, one of the first decisions that must be made is to choose which writing system to adopt; a vast array of different types is currently in use. Four main types of writing systems can be identified throughout the world: logographic, alphabetic, semi-syllabic, and consonantal. In addition, there are a number of mixed systems found across the world. Japanese writing, for example, combines a logographic system with a semi-syllabic one.

Alphabetic systems use single symbols to represent individual phonological segments. The Roman and Cyrillic alphabets are the most common alphabetic systems in use, with the Roman alphabet being used throughout much of western Europe and in other areas of the world that have been influenced by European colonists. The Cyrillic alphabet is used where the influence of the Eastern Orthodox Church has been strong, as in Serbia, Bulgaria, and Russia. Generally, alphabetic systems are preferred for the introduction of literacy in a local language because they tend to use fewer symbols than semi-syllabic or logographic systems, they are more likely to be compatible with typewriter and computer keyboards, and they tend to be used in the languages of wider communication that surround the local language.

Consonantal systems, really a sub-type of alphabetic writing, use symbols to represent only the consonants of a given word, with vowels marked optionally, usually being indicated by diacritics. Because Arabic employs a consonantal script, local literacy programs in Islamic regions of the world may find a consonantal system derived from Arabic script to be an effective orthography.

Semi-syllabic writing systems use single symbols to represent syllables. The oldest of these scripts is the Brahmi script of India, which spread through Asia as the influence of Buddhism also spread. Many semi-syllabic scripts, or syllabaries, have been developed elsewhere, often by individuals in their desire for a unique written form for their languages. These include Cherokee (North America), Vai (Liberia), Djuka (Suriname), and the Ol Chiki syllabary for Santali (India). Syllabaries are well suited to languages where there is a relatively small number of possible syllables, and there is a high correspondence between a syllable and a morpheme – that is, where syllable and morpheme boundaries tend to coincide. Syllabaries typically require more symbols than alphabets. For example, the Cherokee syllabary has eighty-five symbols, but could be written with an alphabet of only eighteen letters (Unseth 1980). Therefore, they should be selected only with the understanding that they tend to take longer to learn.

Logographic systems, rather than representing a sound or a syllable, make use of graphic signs or logograms to represent words or morphemes.
In this system, even if two morphemes are pronounced identically, they will be represented by distinct symbols. The most widely recognized logographic system in use today is Chinese (though many languages in East Asia, such as Japanese and Vietnamese, also make use of logographic symbols borrowed from Chinese). Historically, Chinese logography was very widespread, and through the eighteenth century over half of the world’s books were published in Chinese (Sampson 1985:145). Today, Mandarin speakers outnumber any other language by far, and a total of approximately one sixth of the world’s population speaks some variety of Chinese. In the People’s Republic of China alone, where Mandarin is the official language, there are roughly 200 living indigenous languages, many of which are endangered (Grimes 2000). Thus a significant number of language revitalization efforts which may develop in the near future have contact with the Chinese logographic system, and will need to consider this fact in creating standardized written forms.

That said, logographic systems are particularly difficult to adapt to new languages because the writing does not correspond to the sound system in any way. Moreover, the underlying principle upon which these systems are based (one symbol = one morpheme) is unwieldy for languages with extensive morphology. Finally, the morpheme inventory in any language is much greater than the phonemic inventory, so that the total number of symbols which a learner needs to read in a logographic system can take many years to master. (The characters number in the thousands for Chinese, although some estimates suggest that a total of one thousand may be enough for basic reading.) Accordingly, we do not recommend creating logographic systems for unwritten languages. At the same time, one must be aware of the possible influence they may have on speakers’ perceptions of the act of writing and reading, as well as on their expectations of what an orthographic system should look like.

3 Linguistic and cognitive considerations

It has generally been the working assumption among literacy workers and linguists that the “best” orthography is an alphabetic orthography, specifically one in which every sound is represented by one symbol. The development of new orthographic systems has more often than not relied on the basic guiding principle of sound–symbol correspondence. In other words, one symbol should be designated to represent one (and only one) sound, and one sound should be represented by one (and only one) symbol. While this seems eminently reasonable, there is a thorny theoretical issue of what counts as sound and which sounds in a language should be represented.
The view that has come to dominate takes the position that orthographies should be based on phonemic representation. A particularly useful source in this regard is Rogers (1995), which provides the basis for the discussion here. The idea is that phonemes and morphemes should be represented consistently, even when their pronunciation differs from word to word, as can be illustrated with the English example *electric*, *electricity*, and *electrician*. Though the pronunciation of the letter *c* is quite different ([kl], [s], and [ʃ]), the root is represented identically in the writing system. One advantage, then, to phonemic representation is that the semantic relatedness of words is easy to ascertain. Furthermore, the phoneme system of a language tends to change more slowly than do surface phonetic representations, and so in this sense phonemically based alphabets are more stable. Finally, the same or very similar phonemic systems tend to be found in closely related dialects; therefore using a phonemic system as the basis for the orthographic representation can help resolve the issues of dialect differences (Chomsky 1970; Klima 1972; for a discussion of the issues associated with dialect diversity, see Chapter 7, section 1.3).

While sound–symbol correspondence based on an underlying level of representation is a solid basic principle for orthography development, it is by no means the only consideration. In languages with a high degree of homophony, for example, a rigid sound–symbol correspondence will bring the lexical ambiguity of the spoken form of a language into the written form. A second principle, that different morphemes should be represented differently in writing, should be employed in conjunction with the first. This principle, for example, might sanction the alternate spellings in *blue* versus *blew* for English despite the fact that the words are pronounced identically.

Clearly, this second principle should remain subordinate to the first since such spellings are ultimately arbitrary from a synchronic standpoint. Representing all homophones distinctly in some languages could create an unwieldy system for those learning to read and write. Even so, there is plenty of evidence to support the idea that arbitrariness in a writing system that is used to lessen ambiguities is highly effective for those who have become literate. Traditionally, writing has been viewed as a representation of a language's sound system. Current research on reading, in contrast, suggests that writing is better viewed as embodying the *entire* linguistic system, meaning that it connects with and represents other parts of the language—such as morphology, syntax, or semantics—and not just phonology. Instead of devising an orthography simply by identifying the contrasting phonemes of a language and assigning symbols to each one, written language needs to be viewed as encoding much more than just the
sounds. One result is that an orthography should be designed so as to present a relatively low level of lexical ambiguity and a high degree of consistency of morpheme shape (Gordon 1986). This approach entails attention to the larger-scale encoding of meaning and structure, greater attention to conventional aspects of capitalization, paragraphing, and punctuation as they relate to higher-level units (that is, phrase, clause, sentence boundaries, and so forth).

When considering the way in which written texts encode meaning, it is also important to consider how readers at different proficiency levels decode such meaning. It has been argued that beginning readers are thought to read primarily by decoding sounds, while more advanced readers are thought to read primarily by recognizing larger units of meaning such as the word or phrase (Dawson 1989; Gordon 1986; Rogers 1995). If this is the case, beginning readers learn and use a strictly phonemic system more readily, while more advanced readers benefit more from a morphemic or morphophonemic system with its consistency of morpheme shape. An ideal orthography would capture both; it would be transparent phonemically while also minimizing ambiguity. That is, the spelling system would enable beginning readers to sound out words, i.e. to read phonemically, while advanced readers would be able to capture meaning units quickly.

Yet actually achieving this balance is difficult. Given the complexities of introducing literacy to oral cultures, we suggest that the phonemic representation should have priority. This recommendation is based on a number of considerations. First and foremost, in many endangered language situations, the community is not literate in the local language, and may associate the notion of literacy with the culture of a language of wider communication. Added to this is the fact that in those regions where revitalization is necessary, there is generally at least some and often pronounced attrition, and so many users of the new orthography and literacy may well be second-language learners, who do not know the local language well. It is therefore important to keep the act of learning to read and write as simple as possible, and so orthographies for communities creating revitalization programs should be designed primarily with beginning readers in mind.

4 Social issues

As was noted in section 1, social, historical and religious associations cannot be ignored in the choice of scripts. Coulmas (1999), for example, highlights the historical association of scripts with particular religions, observing that the Arabic script is commonly connected with Islam and
its influence in the Middle East, North Africa, Central, South, and Southeast Asia; the Indic-derived systems with Hinduism and its influence in South Asia, as well as with Buddhism and its influence in South and Southeast Asia; the Chinese-derived writing systems with Confucianism; and the alphabetic scripts (both Cyrillic and Roman) with Christianity and its influence in Europe, Africa, the Americas, and the Pacific. The importance of the religious associations of scripts can also be seen in Baker’s (1997) observation that Christian missionaries have often deliberately avoided Arabic scripts and preferred instead local semi-syllabic scripts or the Roman alphabet in their work in countries in Africa and Southeast Asia.

The history of script usage in the languages of the former USSR also manifests the importance of political factors. Many groups in the late 1930s were forced by the national government to change the script used for their languages from Arabic or other scripts to the Cyrillic script used for Russian. This was mandated both to bolster national unity and to facilitate the transition to learning Russian. As a result, people had to relearn entirely how to write their languages, and in many cases serious difficulties arose in trying to develop adequate orthographies using just the Cyrillic alphabet. For example, in creating a writing system for the Kabardian language, digraphs, trigraphs, and even tetragraphs had to be used in order to overcome the limitation in the number of consonants available in the Cyrillic alphabet. In recent years, as groups are considering changing their scripts again, they are faced with a choice between what can be characterized as “pan-Islamic unity” in the selection of the Arabic script or “modernity and secularism” in the choice of the Roman script.

Besides scripts carrying certain religious and political associations, other choices in orthography are also often considered as markers of identity in different ways; choices in orthography reflect the desire of a group to distinguish itself from surrounding groups or, sometimes, to align itself with certain groups. Some Mayan groups have consciously distinguished their orthography from Spanish by including in it selected ancient Mayan glyphs in order to build a sense of pride and unity behind their alphabet (Henne 1991). They have also wanted to change their alphabet to be distinctive, in order to isolate themselves from the Western religious, intellectual, and economic influences which permeated their literature published in a Spanish-based orthography. Certain symbols can have particular significance for an individual group. For speakers of different Bamileke languages in Cameroon, for example, the shared symbol “iconifies the strong cultural unity of the group with respect to the languages outside the group” (Bird 2000:21). Quechua speakers who want to defend themselves against the influence of Spanish provide another example
Saying languages

(Hornberger 1995:198). Instead of making a five-way distinction between vowels, as in Spanish, they want only a three-way distinction to be made.

Besides orthographic choices in specific symbols, script choices can also be motivated by identity distinctions. For example, Coulmas (1999) points to the fact that so many groups have developed their own scripts, syllabaries in particular, as evidence of the importance of a script as a marker of identity. The Inuit of Canada exemplify this, having chosen a Cree-derived syllabary over the Roman alphabet for writing Inuktutut because of its symbolic power to mark identity. Script choice is particularly notable in India where, despite the government’s efforts to use the Devanagari script as the national script or its efforts to enforce conformity with regional scripts, many groups still insist on using their own independent orthographies. Thus, many examples of choices made in orthography design reflect the importance of orthography as a marker of identity.

Just as two different writing systems can be used to distinguish two separate languages, different orthographies can also be used to distinguish two different communities who speak a single language. The term digraphia is used to refer to the use of two different graphical systems for writing one and the same language (Zimm 1974:58). Well-known examples are the use of Devanagari for Hindi and Arabic script for Urdu, 1 or the use of the Roman alphabet for Croatian and Cyrillic for Serbian. Both of these digraphic situations arose from a complex set of political and historical factors (see Robert King [2001] for Hindi-Urdu; and Magner [2001] for Serbo-Croatian). The differences underlying the choice of scripts are not trivial; as King (1998:84) points out, “[t]he power of language as icon must never be underestimated. Like it or not, the Urdu script means Muslim, and the Devanagari script means Hindu.” These issues must not be ignored when developing a writing system.

Yet another issue is the orthographic conventions of the language(s) of wider communication used by the local speakers. Rice (1995), for example, cites the failure of the French-based phonetic alphabet developed for Athapaskan languages in part because the language of wider communication in the area is English, and Athapaskan speakers are more familiar

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1 India provides an example of country where a multiple number of scripts is used, and where one language is written using different scripts. There are 18 officially recognized languages in India and 398 total languages spoken (Grimes 2000; Singh 2001). The 18 official languages are written in a number of different orthographies. These include five varieties of the North Brahmi scripts (Bengali, Gujarati, Gurumukhi, Nagari and Oriya), and four varieties of South Brahmi scripts (see Singh 2001:66). Of the many languages spoken in India, 58 are taught as subjects in the schools but only 47 are used as languages of instruction (Annamalei 1991). These are the most frequently written languages, but publishing is carried out in 87 different languages (McConnell and Mahapatra 1990).
with English orthographic conventions (this in addition to its lack of adherence to the one symbol, one sound principle). Although in some cases, usually for purposes of identity, a local community may opt to use an orthography which is very different from that of the language of wider communication, in most situations similar orthographies are desirable. Speakers of endangered languages are commonly literate, or semiliterate, in the language of wider communication, and so adapting its orthography can spread the process of learning to read and write a local language. Moreover, because the very notion of literacy is often associated with the language of wider communication, it often makes good sense from the view of the community itself to use similar orthographic systems when possible.

There are several different ways in which the phonemic system of the local language may compare to the language of wider communication: (1) the orthography of the language of wider communication may contain a single symbol to represent a sound type found in both the language of wider communication and the local language; (2) the language of wider communication orthography may use more than one symbol to represent a single sound type found in both languages; (3) the language of wider communication may use one or more symbols for sound type(s) not found in the local language; and (4) the local language may have phonemes not found in the language of wider communication. (Tone represents a particular instance of the fourth scenario and is discussed separately in section 6 of this chapter.) When the first case holds, it is generally advisable to use the symbol of the language of wider communication alphabet to represent the same sound types in both languages. In the second case, however, decisions are more complicated. If the language of wider communication uses multiple symbols to represent the same sound, which one should be selected for the local language? The decision should be based on a combination of factors. The most significant of these is the overall distributive restrictions of any given symbol, i.e. the symbol with few or no restrictions should be preferred over others (such as the letter k over c to represent a voiceless velar stop if the language of wider communication is English). Other issues include the overall transparency of each symbol in terms of the orthographic system as a whole, and the need to use the other symbols to represent other sounds in the local language.

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2 Here we use the term sound type to cover phonemes which are similar enough to one another to be treated as a single sound by speakers. For example, in one language the phoneme /d/ might be alveolar and in the other dental, but speakers of both languages would recognize either as /d/.
The situation is even more complex when there is a sound (or sounds) in the local language not represented by the language of wider communication orthography. Several choices arise in this case. These include creating an entirely new symbol (e.g. the introduction of ɬ [the numeral 1] in the variety of Cyrillic used to write Chechen); borrowing one from another orthographic system (e.g. the use of the Roman letter ɬ in Serbian Cyrillic to represent an alveopalatal glide); creating a new symbol through combining existing symbols into digraphs or trigraphs as needed (e.g. ɡh for the voiced velar fricative in North Slavey); using a diacritic (e.g. ɬ for the glottal stop in Hawaiian); or reassigning a symbol used for a sound in the language of wider communication which is not found in the local language, i.e. reassigning unused symbols of an alphabet to different phonemic values (e.g. the use of q, x, and c for click sounds in Xhosa and Zulu; Baker 1997). The advantages to this last method are that the symbols will be familiar and available in already-existing typesets, fonts, keyboards, etc. Difficulties have resulted from this approach, however, as documented in the creation of an alphabet for Coreguaje (spoken in Mexico). An initial alphabet used the symbols ɓ, ɗ, and g for unaspirated voiceless stops. When the alphabet was introduced to Coreguajes semiliterate in Spanish, the result was confusion (Gralow 1981); the redefinition of these symbols appears to have impeded, not aided, the acquisition of Coreguaje literacy.

Further comment is needed on the use of diacritics to provide additional symbols to represent phonemes, because this is commonly employed in the development of new orthographies. One should avoid "diacritic overload" on a given symbol with the goal of using no more than one superposed diacritic per letter. In situations where this ideal cannot be met, then particular care is in order to keep diacritic marks from interfering with each other. Though diacritics can be extremely effective in expanding an existing alphabet for use in local literacy, they can be the source of disdain towards a new orthography since it makes the language look "strange" or "complicated." In instances where people are using computers or typewriters in a local language, the need for additional keystrokes in order to write the language can cause annoyance. ³

5 Underdifferentiation and functional load

Many local languages have relatively large phonemic inventories and phonemic systems that differ greatly from those of the contact language

³ Boerger (1996:41), for example, notes the problems of diacritics in the Natangu writing system which could not be easily typed on the English typewriters available to speakers.
of wider communication. In such situations the representation of each individual phoneme by a distinct symbol may be more than readers can handle (as in the case of Zapotec; see section 8). One solution is the underdifferntiation of phonemes in an orthography such that one symbol is used for more than one phoneme. Alternatively, one can limit the overall number of letters by simply not marking certain types of contrasts such as those that result from vowel length, stress, or tone (but see section 6). In an effort to limit the number of letters, it may even be desirable not to represent consonants and/or vowels. A key part of making the decision about whether to underdifferentiate in an orthography is to determine the functional load of a given phoneme in the language.

The classic definition of functional load comes from Charles Hockett's *Manual of Phonology*: "Assuming that two phonemes, \(x\) and \(y\), can contrast at all, then the functional load carried by the contrast will be greater if both \(x\) and \(y\) have relatively high text frequencies than if one has a high frequency and the other a low frequency, and greater under those second conditions than if both \(x\) and \(y\) have low frequencies" (Hockett 1955). From the reader's standpoint, phonemes with a greater functional load are important to represent because they are crucial for distinguishing between different potential meanings. Accordingly, phonemes with greater functional loads should not be unmarked or eliminated by underdifferentiation. These theoretical discussions can be applied to create a more practical diagnostic for determining functional load, such that the following five factors should be considered (adapted from Gordon 1986; Powliison 1968):

1. **What is the level of contrast of the specific phoneme?** With how many other phonemes does it contrast to distinguish words or morphemes? In a nutshell, the more phonemes with which it contrasts, the higher the functional load.

2. **What kind of feature or features distinguish the phoneme from the next most similar phoneme with which it contrasts?** Generally, a difference in point of articulation indicates a higher functional load than a difference in manner of articulation; and either of these differences indicates a higher functional load than a difference in point of coarticulation.

3. **How many phonetic features distinguish the phoneme from the next most similar (contrastive) phoneme?** The more differences, the higher the functional load of the phoneme.

4. **Does the phoneme contrast on one or more levels?** In addition to distinguishing between words, phonemes may also distinguish utterances on a morphosyntactic level. An example comes from Bora, a language of Peru, where the tone in monosyllabic verbs with long vowels serves to distinguish between continuative and intensive
aspects (Gordon 1986). English weak verbs (*sing, sang, sung*) provide another example, where a change in vowel quality indicates a change in tense. If a phoneme distinguishes utterances on both lexical and grammatical levels, its functional load will be greater.

(5) What kind of contextual cues and redundancies exist to aid in distinguishing utterances, independent of phonemic contrast? The more clues given by the context, the less the functional load of a phoneme will be.

The idea of leaving phonemes unrepresented in an orthography is based on the fact that there is much predictability in the distribution and sequencing of specific lexical items. Thus underdifferentiating certain phonemic features does not necessarily hinder their recognition, particularly in languages with large phonemic inventories. Still, it must be recognized that underdifferentiation will create a variety of ambiguities in the written form of a language (Gordon 1986; Unseth and Unseth 1991). As an orthography is developed, the trade-offs of underdifferentiating and ambiguity must be weighed.

In addition to underdifferentiation, in certain cases it may be appropriate to *overdifferentiate* by using different symbols for allophonic variation or when speakers feel a morpheme should be represented uniformly (Simons 1994). Overdifferentiation may also be chosen intentionally so that an orthography can mirror the orthography of the national language or so that the orthography can be used by different dialects which may differentiate between variations of a form to differing degrees.

In working through decisions about underdifferentiation, overdifferentiation, diacritic use, and so on, tests can be developed to determine how a native speaker perceives contrasts and which contrasts are most significant for disambiguating an orthography (see, for example, Gordon 1986; Hampton 1989; Henne 1991; Mugele 1978; Unseth and Unseth 1991). While an outside linguist may judge certain contrasts to be minor and unnecessary for representation, these contrasts may be exactly the contrasts the native speaker looks for to disambiguate words when reading. In the same way, it is also extremely useful to test native-speaker reaction to symbol choice. Experience from literacy programs around the world has demonstrated how effective native speakers' intuitions are for determining symbol choices for elements such as consonant clusters, glottal stops, nasalization, tone, and vowel harmony. Although linguists, in their desire to develop orthographies that accurately capture the phonemic system of a language, may balk at involving speaker intuitions which may obscure the system, an orthography needs to be designed with potential readers in mind, and so needs to be suited to their needs and perceptions in ways that a linguistic account need not.
6 Tone

In the development of orthographies for languages in certain parts of the world, especially in Central America, Southeast Asia, and Africa, the question of how to mark tone is unavoidable, yet is frequently controversial. Tone languages are often spoken in regions where the language of wider communication is not a tone language, and so one question that often arises is whether tone should even be orthographically represented at all (see, e.g., Crofts 1976). Some of the socio-linguistic, linguistic, and psychological factors that affect the choices made will be discussed below.

Tone systems involve the use of pitch to distinguish units at the word level and at the syllable level. (This is often referred to as *lexical tone*, in particular in the literature on literacy and orthography for tone languages.) There are two basic tone systems for lexical tone. In the first, the tone domain, or the domain in which the phonological pitch operates, is the entire word. In the second, it is the syllable. Probably the most familiar word-based tone systems are those found in Norwegian and Swedish; Slovenian also has a word-based tone. In syllable-based tone systems, each syllable has a relative pitch value, or tone. The marking of tone has often been neglected in the development of written languages. This is often due to the fact that colonizers or missionaries who have designed an orthography have failed to recognize the significance of tonal contrasts, since their own languages do not make such distinctions (Bird 2000; Cahill 2001). In addition, the marking of tone has been neglected because people have argued it was simply too difficult to learn or teach, that it caused texts to be too cluttered, or that it was too difficult to design a good enough system (Hollenbach 1978). These claims are offset by a number of studies which indicate that orthographies which do not indicate tone are harder to master by speakers of tonal languages (Bird 1999).

The issue of whether to mark tone is far from settled. As Baker (1997) points out, the tonal systems of many African languages have not yet been analyzed very thoroughly and that, even for those studied thoroughly, linguists may disagree among themselves about how tones should be marked. Nevertheless, Baker argues that tone should be marked when it is phonemic, and that it is important for there to be a provision for writing tone in any given tonal language, regardless of whether individual people choose to make use of such marking. Koffi (1994) also considers the

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4 See Pike (1948) for the fundamental work on syllable-based tone.
marking of tone to be necessary, stating that grammatical tone should
definitely be marked and that lexical tone should probably be marked as
well, though phenomena such as downstepping should not be marked.
Wiesemann (1989) recommends that, for tonal languages, a minimum of
one tone and a maximum of three tones should be marked. In contrast,
Bird (1999) more seriously questions the effectiveness and necessity of tone
marking, noting that in his own experience in sub-Saharan Africa, speakers
have not achieved proficiency in reading and writing at levels analogous to
speakers of non-tonal languages. Despite many assertions that a failure to
mark tone results in too much ambiguity, he himself argues from his
surveys of the Dschang language that “analysis showed that tone-marking
degraded reading fluency, and did not help to resolve tonally ambiguous
words” (1998:7). He also refers to the linguistic situation in Zambia, in
which seven officially recognized indigenous languages of the country
removed tone marking from their orthographies for the same reason, i.e.
that it actually hindered reading. Based on the conflicting opinions of
many who have experienced developing orthographies for tone languages,
it is clear that decisions about whether to mark tone in the orthography –
and if so, how and how much – should be made with attention to local
attitudes and the specific circumstances surrounding a local language.

Just as people have questioned the claim that the best orthography is one
in which each phoneme is represented by a distinct symbol, similarly
people have questioned whether contrastive tones need to be marked in
all cases. Some argue that tone distinctions should be underdifferen-
tiated and that a native speaker will be able to disambiguate words from the
surrounding context (especially, for example, if the ambiguous words
would occur in different positions syntactically or if they would only be
used in different registers). However, others argue that underdifferen-
tiation causes rereading and a significant slowing down of the reading pro-
cess, even discouraging persistence in reading because of the difficulty of
decoding meaning. Again, the notion of functional load is relevant. 5 In
fact, for documents such as sacred texts, speeches, radio addresses, and
legal documents, additional tone marks are even added sometimes for
people orally delivering these texts, to prevent them from stumbling over
ambiguities (Baker 1997). For each language considered, it is important to
determine whether tone carries a heavy functional load or whether it is not,
in fact, a feature that speakers depend on for disambiguating context.

5 For more detailed discussion of the implications of ambiguity for reading skills in tone
languages, see Adegbija (1993); Gordon (1986); Unseth and Unseth (1991), and Wiesemann
(1989).
In the same way that it is debatable whether or not it is necessary to mark tone at all, it is also debatable how much to mark tone if it is only marked partially. Bird (1999) describes several ways tone distinctions can be marked only partially. One suggestion for decreasing the overall number of tone markings is to collapse the distinction between certain tones such that a single symbol may mark more than one toneme. Another possibility is to leave some tonemes, such as the most common one or the one that changes the least, with zero marking. Alternatively, tone may be marked only on syllables where the tone changes, or only on syllables where the tone disambiguates one word from another (Bird 1999; Koffi 1994).

Another important consideration is how marking tone can best serve potential readers, especially if they have different proficiency levels in their reading skills. As discussed in section 3, beginning readers are thought to have the easiest time reading at a phonemic or phonetic level, whereas more advanced readers are thought to read at a morphophonemic level. For this reason, it has been suggested that if tone is only marked according to how it actually sounds on the surface, e.g. as it is affected by tone sandhi, it may serve a beginning reader better, but such surface-level marking may actually slow a more advanced reader, who reads for meaning units rather than for sound units (Snider 1992).

While these psychological considerations are important, there are other factors that may affect how native speakers use tone marking. For example, it is important to consider whether tone is best marked with superscript or subscript numbers, different types of diacritics (especially accent marks), punctuation marks, or otherwise unused graphemes from an alphabet. In making such decisions, it is important to evaluate how realistically the marks chosen will be able to be reproduced, particularly taking into consideration the type of technology available. Linguists working in North America, for example, tend to assume the availability of computer technology and photocopying machines, but in many places in the world communities have access to neither. Mimeographing or photocopying on old machines often results in texts which are hard to read, with faint or blurred diacritics.

7 Standardization of orthographies

There are many good reasons to advocate a single, standardized orthography for related dialects, or what has been called multidialectal orthography design (Simons 1994). Chief among these reasons is the potential for engendering a shared linguistic identity for communities that use different spoken varieties of a language. In language revitalization
situations, where the number of people using a language is often small, cultural divisions stand as obstacles to success, and employing a single orthography offers a way to remove one division. The unifying effect of a common orthography finds compelling empirical support as illustrated (as just two of the plethora of examples) by the English alphabetic system and the Chinese logographic system. Despite the vagaries of English spelling and the difficulties of learning large numbers of Chinese characters, both systems can be read by speakers of vastly different varieties of each.

Regardless of the advantages of a shared writing system, there are potential pitfalls, such as the issue of “skewed systems,” which arise in constructing a multidialectal orthography if the phonemic systems of some dialects differ. Since the phonemic systems have diverged for two or more of the dialects, a shared orthography cannot faithfully adhere to the sound–letter correspondence for all of them. There are two basic options: either one specific dialect can be selected as the basis of the standard and used as the model for writing, or one makes choices in developing an orthography which in one place is most closely matched to the phonemic system of one dialect, but in another place matches the system of a second or third. The resulting orthography will not represent the most psychologically real one for any single dialect, but can still be easily learned and used for all of them. Simons (1994) advocates the second option in all circumstances, because the first requires speakers of the non-standard dialects to learn at least some aspect of the orthography by rote memorization.

To show how an orthography can be created by drawing from multiple dialects Simons discusses the Dani language of Irian Jaya (based on the data in Bromley 1961). There are two main patterns for the stop phonemes in the eight dialects discussed by Bromley. Lower Grand Valley Dani has one pattern, with one stop series and two voiceless continuants, while the remaining dialects have two stop series. The difficulty in orthography design for Dani stems from the fact that there is not a one-to-one correspondence between the two series of stops in the majority of dialects and the stops and continuants of Lower Grand Valley Dani. This can be illustrated with representative data from one of these dialects, Western Dani. The voiced stops of Western Dani /b, d, g, gʷ/ correspond to voiceless stops in Lower Grand Valley Dani /p, t, k, kʷ/. The voiceless stops in Western Dani /p, t, k, kʷ/ either correspond to the same voiceless stops in Lower Grand Valley Dani or to /s/ and /h/. More specifically, Western Dani /t/ can occur as /s/ in Lower Grand Valley Dani, and Western Dani /p, k, kʷ/ to Lower Grand Valley Dani /h/. By comparing the phonemic level to their phonetic realizations, the correspondences become regular and predictable. Word-initially, the voiced stops in Western Dani are phonetically prenasalized and correspond to Lower
Grand Valley Dani voiceless, unaspirated stops. In intervocalic and final position, they correspond exactly between the two dialects (and are continuant and unreleased, respectively, in these positions). In Western Dani, the word-initial voiceless stops are aspirated and occur in Lower Grand Valley Dani as /h/ and /s/.

In creating a single writing system for all Dani dialects, there are two options. Bromley (1961), and Simons (1994) in turn, propose the following system:

\[
\begin{align*}
\text{b} & \quad \text{d} & \quad \text{g} & \quad \text{gw} \\
\text{p} & \quad \text{t} & \quad \text{k} & \quad \text{kw} \\
\text{ph} & \quad \text{ts} & \quad \text{kh} & \quad \text{kwh}
\end{align*}
\]

Readers would then learn rules as to how to pronounce these letters in their respective dialects, i.e. \(ph\) would be [h] in Lower Grand Valley Dani and [pʰ] in the other dialects; \(b\) would be [p] in Lower Grand Valley Dani and [pʰ] elsewhere.

In language revitalization, there may be practical considerations that override Simon's conclusion that a compromise orthography is the best design for multidialectal literacy. If there are significantly different levels of vitality among the dialects, one might decide to base an orthography on the most vital one. In a similar vein, if limitations on available resources (such as money or time) make it unfeasible to move between various areas where the dialects occur, the revitalization effort might be tied to one region, with the dialect of that region serving as the basis for designing an orthography. Often the urgency of starting revitalization while fluent speakers are still alive requires decisions for action that, with the luxury of more time, might be otherwise.

### 7.1 Motivations for Standardization

One of the most common reasons for promoting a written standard is the desire for political or cultural unity. As Romaine comments, “Linguistic diversity is still seen as an obstacle to development” (1994:89). This belief in the unifying power of a common written standard has motivated many governments to enforce standards of script and orthography. One of the best examples of such a policy is in the People’s Republic of China, where a common logographic script unites linguistically divergent and geographically distant dialects that are mutually unintelligible in spoken form but mutually intelligible in written form. While China has effectively united different groups through a common orthography, countries such as India have failed to do so, due to the irreconcilable split between the two scripts used for Hindi and Urdu.
Having a standardized written form with a single standardized writing system facilitates communication in a variety of ways. It is important in the distribution of medical resources, and can also be so in the development of infrastructure. A written standard often proves to be invaluable in education as well. Teachers need some way of guiding their students in making choices when writing, i.e. some form to teach their students, with the most obvious being a standardized form (Rice 1995; Schiffman 1998). Having a standard orthography can increase the functional domains of a language’s use, which in turn increases its status within the community and reinforces community values (Adegbija 1993:167). Thus, standardization can play an important role in reinforcing a group’s sense of identity, and may also enable a group to gain recognition and official status, thereby even further enhancing a sense of identity and pride (Schiffman 1998).

7.2 Implications of standardization

Although standardization has undeniable benefits, it does not come without its social consequences. One of the most apparent is the development of consciousness and belief about “right” and “wrong” forms of language. Prescriptive judgments about linguistic forms are introduced with the written form; native speakers tend to have fewer fixed notions of correctness before a language is written. In this sense an orthography constitutes a “normative idea that has no counterpart in the linguistic reality of the speech community” (Coulmas 1999:137). This is demonstrated in Canger’s account of publishing a book in Nahuatl (Canger 1994). In initial attempts to elicit opinions about correct forms of speech, the native speakers’ responses indicated much looser standards for correctness than after publication of the book. The linguistic choices of the written form were perceived as authoritative by the community.

There is an additional concern that the process of standardization actually leads to language loss in multiple ways. Standardization has been argued to contribute to the loss of linguistic diversity, as a written standard inhibits the amount of variability allowed in language and thereby inevitably causes some varieties to be lost. Mühlhäusler (1996:225–34), for example, argues that standardized phonemic writing systems can only help fossilize language and reduce variation, because they are inherently at odds with the accommodation of variation and change. In spoken communication, a wide range of dialectal variation can be maintained, but literacy favors standardized languages, and discourages variation, as seen in the principles presented in section 7.1. Moreover, standardized conventions for local languages are often expressly modeled after the writing conventions of national languages or languages of wider communication for the purpose of facilitating
acquisition of these languages, which in turn can facilitate the loss of the original languages. As noted in section 4, an important consideration in the choice of orthography is whether or not it will provide a good bridge to a majority language. In order to resist such a transition to a language of wider communication and the loss of their own language, some groups have specifically avoided modeling their standardization choices after standards for national languages. Oko speakers of Nigeria, for example, while modeling some aspects of their orthography after Yoruba, have also conscientiously distinguished their orthography in order to avoid assimilation (Adegbiwa 1993:156, 161).

Standardization can also lead to language loss because of the status it gives to one variety over others. Because writing one variety of a language can elevate the status of that language, other surrounding languages or varieties may be lost because they lack relative prestige and thus are not preferred for use. The development of the Wemo dialect of Kate (Papua New Guinea) and of Yabem (Papua New Guinea) is a prime example (Mühlhäusler 1996; Romaine 1994). These two dialects of different languages were chosen above others by missionaries working in the areas; all other dialects of the languages have since seriously declined in use and are almost entirely lost as a result. Similarly, the Mbauan dialect of Fijian was chosen as a missionary lingua franca, which has consequently led to the decline of other languages and dialects with the spread of the written standard (Mühlhäusler 1996). In contrast, the speakers of dialects of North Slavey decided not to unify their dialects under a single orthography, even though their language committee was in favor of unification and standardization. They opted instead to insure that the linguistic and cultural identity of the individual groups would not be lost (Rice 1995).

Ultimately, the preference for one variety over another can lead to social stratification (Coulmas 1999; Mühlhäusler 1996; Schiffman 1998). People inevitably have unequal access to a standard form of a language; because standard forms are elevated in prestige, use of or failure to use standardized varieties can then begin to index social class, and thus standardization leads to certain forms of inequality. In countries such as Papua New Guinea, society was not historically stratified through the use of a standardized variety; rather, it was only after colonization that hierarchy in language, and correspondingly in society, was introduced. The imported models of a centralized government, wage economy, social and economic development, and Western-style education, have combined to result in a social hierarchy which is at odds with traditional culture and social organization in Papua New Guinea and is reflected in language use (Romaine 1991).

For local languages involved in revitalization, we note that social stratifications and power imbalances already exist, almost always to the
detriment of speakers of a language, regardless of dialect. Therefore, while the introduction of a standard written form will produce new stratification within, and sometimes among, the communities where an endangered language is used, it has the greater potential to rectify the more obvious asymmetry of power that holds between members of the community and those outside it. The encroachment upon local communities of languages of wider communication and the cultures they represent, the ever-growing impact of globalization, means that local communities cannot afford not to consider a written language and, along with it, standardization, if they are to resist linguistic assimilation.

7.3 Process of standardization

Several factors should be in the forefront when standardizing an orthography. One of the most important factors is the political. Sometimes, governments have overt regulations governing choices in orthography, while at other times non-binding guidelines for developing a standard may exist. In the recommendations for standardization that were put forward by committees developing alphabets for African languages, for example, it is noted that the same sounds in different languages within a country or subregion should be represented with the same letters and that, if a single language is found in two different countries, the same symbols should be used for the same sounds in both countries (Baker 1997). Finally, there are often political implications implicit in orthography choices that must be recognized. Creating an orthography that is highly distinct from a regional or national writing system can be seen as subversive or defiant to the goal of national political unity. In certain parts of the world, there may be limited tolerance of such acts.

In addition to assessing external political implications of an orthography, the linguistic variation found in the language must be considered: people’s attitudes toward different varieties; which variety has the largest number of native speakers; which variety is most widely understood; which varieties are mutually intelligible; whether people already consider one variety to be more prestigious; whether they consider one to be more “pure” or closer to the “original” language; where the varieties are spoken (especially if one variety is spoken in an urban center); and which varieties are used for religious or administrative purposes. Since several of these considerations deal with the perceptions of native speakers (or semi-speakers) and others with intuitions that can only be held by members of a local community or communities, it is essential to have them in the decision-making process. The best way to do so is through committees that are formed in order to make standardization decisions. In such committees,
representative speakers from all varieties should be included (see also Schiffman 1998; Wiesemann 1989).

Committees can be inefficient, and they do not always operate as expected, particularly when cultural taboos or powerful personalities make truly cooperative deliberation difficult or even impossible, but they still represent the best way to reach a consensus on the nature of the orthography that meets local needs. When constructed properly, they also represent the best way to legitimate an orthography within and among communities. The negative evidence justifying this position is certainly abundant. In numerous cases around the globe, a lack of consensus about standardization or a lack of thoroughness in researching which variety to standardize has led to serious problems. As just one example of this, Mühlhäuser (1990) and Henne (1991) illustrate the problems which have arisen when different missionary agencies have developed competing standards for a variety.

Once decisions have been made about which variety might serve best as a basis for developing a standardized orthography, language planners and community leaders need to consider what aspects of the orthography should be standardized. Namely, in addition to standardizing the choice of writing systems and the particular symbols within a system, it is also important to determine what other conventions should be introduced, such as capitalization, punctuation, and spelling. In most cases of language revitalization, provisions should be made from the outset for the introduction and standardization of loan words and neologisms. In all of these decisions, one should keep sight of the conventions used in national languages and languages of wider communication; the standards chosen may need either to reflect these or diverge from them in order to be acceptable to local native speakers.

Finally, the standardized orthography should be tested to determine whether the design works well and to make necessary adjustments. This is a potentially delicate moment in the process of creating an orthography. If reasonable decisions have been made from the outset, only rarely should major changes occur at this time. Early experimentation with the actual use of the writing system should indicate such things as whether particular symbols or diacritics cause confusion. Once a group has accepted a writing system, revision can be problematic. Though such changes are relatively minor in the abstract, actually making them can become challenging, as the conventions quickly take on symbolic value for individuals or constituencies within the speech community. For example, a diacritic mark may have been selected to distance an orthography from that of a language of wider communication. Even if the diacritic is then found to be technically undesirable, a suggestion to change it may meet with heavy resistance
because it is seen as giving in to pressures to accommodate to a surrounding culture. Battles over orthography can become surprisingly passionate. While perhaps unavoidable to some degree, the potential for divisiveness can be lessened by encouraging people to see early decisions about orthography as tentative, and by constantly returning to the unifying vision of why the orthography is being created in the first place.

8 Recommendations

In summary, we offer the following recommendations regarding the development of an orthography in a language revitalization effort:

1. **Alphabets.** Barring an overriding symbolic value that may be derived from the use of a syllabary or logographic writing system, alphabets should be used in creating orthographies. This is due to the particular nature of language revitalization. Revitalization is undertaken when a language is being lost, and so many of its users are semi-speakers, not fully fluent first speakers. A written language is thus by necessity instructive, and both teaches and reinforces a speaker's knowledge of the language. It is thus critical that the language's sounds be discernible from its orthography.

2. **Learnability.** Learnability should be given high priority when designing an orthography. Thus with languages with extensive phonemic inventories one will need to strike a balance between such basic principles as one sound, one symbol and overall learnability. Learning to read and write is painstaking, hard work in any language. Motivation can easily be undercut if the writing system is difficult to learn. While extremely intricate orthographies, such as the Chinese logographic system, are learned by billions of people around the world, they are mastered only after a substantial dose of formal education with the active support of national governments. Languages in need of revitalization exist under a different set of circumstances, so maximizing the learnability of their orthographies greatly enhances the likelihood they will be learned and used.

Within the rubric of overall learnability, we include two subprinciples which support it: one sound, one symbol; and transparency.

One sound = one symbol. Alphabets should be constructed on the basic principle of one sound per symbol, one symbol per sound. In other words, an ideal alphabet would exhibit an isomorphic mapping between sounds and symbols. This is not always possible due to other factors. In Zapotec, for example, the phonemic inventory is considerably greater than in Spanish, which would suggest the need for a greater number of letters or symbols to write Zapotec (Munro and Lopez 2003). When written in accordance with Spanish orthographic conventions, a range
of phonemic contrasts in Zapotec is not distinguished, yet many Zapotec prefer to do just that, under the influence of the prestige of written Spanish. Although most linguists would naturally prefer orthographies to be phonetically designed, on the basic principle that each individual phone should be represented by a single grapheme, local considerations can and sometimes should override this principle, as the Zapotec case suggests.

Transparency. Spelling conventions should coincide with those of the language of wider communication wherever possible. Note that this principle may be offset by desires to maintain a distinct identity from regional or national cultures, which is commonly of import in language revitalization situations. However, since local literacy either does not exist in these situations, or it exists on an extremely limited basis, it is typically best not to inhibit the learnability of an orthography for culturally symbolic purposes. Practically speaking, the symbolic value does not actually provide the intended benefit if people do not learn the writing system.

(3) Acceptability. As is mentioned repeatedly above, in order for a writing system to be successful it must be accepted by those who are being encouraged to learn it and use it. Therefore, acceptability stands above all other priorities in designing a writing system. Because of the tenuous state of many endangered languages around the world, an orthography created for local literacy must also be acceptable to the regional or national governments, depending on what level of control they exercise over education within the community, allocation of resources, access to media, and so on.