The sounds and sound patterns of Tümpisa Shoshone are discussed in this chapter. The segmental phonemes are presented in 9.1, along with a discussion of the possible sequences of phonemes. Phonetic processes are presented in 9.2, and phonological (= morphophonemic) processes are discussed in 9.3. Stress patterns are given in 9.4, and some common contractions are noted in 9.5. In addition, the Appendix contains a basic vocabulary list of approximately 200 words written in both phonemic and phonetic notation. A tape of these words is on file in the Language Laboratory at the University of California, Berkeley.

9.1 PHONOLOGICAL SEGMENTS AND SYLLABIC STRUCTURE

The simple consonantal phonemes are given below.

<table>
<thead>
<tr>
<th>SIMPLE CONSONANTS</th>
<th>Bilabial</th>
<th>Alveolar</th>
<th>Affricate</th>
<th>Palatal</th>
<th>Velar</th>
<th>Velar</th>
<th>Glottal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occlusive</td>
<td>oral</td>
<td>p</td>
<td>t</td>
<td>ts</td>
<td>k</td>
<td>kw</td>
<td></td>
</tr>
<tr>
<td></td>
<td>glottal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fricative</td>
<td>s</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>h</td>
</tr>
<tr>
<td>Nasal</td>
<td>m</td>
<td>n</td>
<td></td>
<td></td>
<td>ng</td>
<td>ngw</td>
<td></td>
</tr>
<tr>
<td>Semivowel</td>
<td>y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>w</td>
</tr>
<tr>
<td>Lateral</td>
<td>l</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
All of them (except Ɂ) occur medially between vowels, and most occur initially in the word. The two velar nasals ng and ngw and glottal stop Ɂ are the only simple consonants that never appear in word-initial position. With the exception of Ɂ, all other simple consonants appear both initially and medially. The lateral Ɂ is a borrowing from English and only occurs initially in a couple of words. Examples of simple consonants are given below.

<table>
<thead>
<tr>
<th>Consonant</th>
<th>Example</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>p</td>
<td>paa</td>
<td>'water'</td>
</tr>
<tr>
<td></td>
<td>papi('ɪ)</td>
<td>'older brother'</td>
</tr>
<tr>
<td></td>
<td>yupani</td>
<td>'autumn'</td>
</tr>
<tr>
<td>t</td>
<td>tapettsi</td>
<td>'sun'</td>
</tr>
<tr>
<td></td>
<td>etün</td>
<td>'gun, bow'</td>
</tr>
<tr>
<td></td>
<td>tutüainna</td>
<td>'to work'</td>
</tr>
<tr>
<td>ts</td>
<td>tsiampu</td>
<td>'hips'</td>
</tr>
<tr>
<td></td>
<td>tatts</td>
<td>'summer'</td>
</tr>
<tr>
<td></td>
<td>pitsinna</td>
<td>'to suckle'</td>
</tr>
<tr>
<td>k</td>
<td>kasattsikantun</td>
<td>'bird'</td>
</tr>
<tr>
<td></td>
<td>tukumpana(pin)</td>
<td>'sky, heaven'</td>
</tr>
<tr>
<td></td>
<td>sokopin</td>
<td>'earth, land, ground'</td>
</tr>
<tr>
<td>kw</td>
<td>kwasi</td>
<td>'tail'</td>
</tr>
<tr>
<td></td>
<td>sakwaapitun</td>
<td>'green'</td>
</tr>
<tr>
<td></td>
<td>tokwi&quot;</td>
<td>'right, correct, true'</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>po'i</td>
<td>mi'a</td>
<td>mo'o</td>
</tr>
<tr>
<td>'road'</td>
<td>'go'</td>
<td>'hand'</td>
</tr>
<tr>
<td></td>
<td>s</td>
<td></td>
</tr>
<tr>
<td>sumuttun</td>
<td>tusinna</td>
<td>wisipin</td>
</tr>
<tr>
<td>'one'</td>
<td>'to spit'</td>
<td>'thread, string'</td>
</tr>
<tr>
<td></td>
<td>h</td>
<td></td>
</tr>
<tr>
<td>hotanna</td>
<td>tahapi</td>
<td>tuhuya</td>
</tr>
<tr>
<td>'to dig'</td>
<td>'snow'</td>
<td>'deer'</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td></td>
</tr>
<tr>
<td>muattsi</td>
<td>soomattsi</td>
<td>tami('i)</td>
</tr>
<tr>
<td>'moon'</td>
<td>'spider'</td>
<td>'younger brother'</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>navipin</td>
<td>tununa</td>
<td>wihnu</td>
</tr>
<tr>
<td>'girl'</td>
<td>'root'</td>
<td>'then'</td>
</tr>
<tr>
<td></td>
<td>ng</td>
<td></td>
</tr>
<tr>
<td>tangappuh</td>
<td>angipi</td>
<td>hipingkuntun</td>
</tr>
<tr>
<td>'knee'</td>
<td>'fly'</td>
<td>'flower'</td>
</tr>
<tr>
<td></td>
<td>NG</td>
<td></td>
</tr>
<tr>
<td>pangwi</td>
<td>pongwo'aittsi</td>
<td>pasingwampi</td>
</tr>
<tr>
<td>'fish'</td>
<td>'mouse'</td>
<td>'sand'</td>
</tr>
</tbody>
</table>
'W
wika 'blanket'
wükkuunappuh 'fog'
yuwikka 'evening'

'y
yahenna 'to laugh'
noyopin 'egg'
toyapi(n) 'mountain'

'l
lokkopü 'locust tree'
laimmani 'lemon'

Only three consonantal segments may appear in word-final position and in final position in the underlying forms of morphemes. They are n and h, as well as an indeterminate consonantal segment written " that causes certain following consonants to geminate (see sections 9.2.2.5 and 9.3.7). The final consonants are often called final features in the literature on Numic languages (see up-to-date discussions in Nichols 1973 and McLaughlin 1987, as well as the original discussion in Sapir 1930:62-70). They are said to be nasalizing, preaspirating, and geminating, respectively.

FINAL CONSONANTS
Nasalizing  n
Preaspirating  h
Geminates  "

In this monograph, the final consonants are not viewed as special "final features" of morphemes, but rather as simple consonants that are somewhat unique in that, unlike other consonants, they may end words and morphemes. They also disappear under certain conditions (e.g., in phrase-final position and before certain consonants), although they may
leave traces on surrounding segments. The final geminating segment is also unique in that it is only manifested in its effect on following consonants and never has any other realization. Final h typically causes preceding short unstressed vowels to become voiceless or at least partially voiceless. Several examples of words with final consonants are given below (see 9.3 for more examples and a detailed description).

**Nasalizing n**
- kawan 'rat'
- motson 'beard'
- nahman 'together (dl)'
- pasakun 'bridge'
- topoon 'desert'
- yūtsūtūn 'airplane'

**Preaspirating h**
- muuppūh 'Joshua tree'
- putisih 'donkey'
- sukkukūh 'there yonder'
- ukkwah 'when'
- üattūah 'ranch, farm'
- wainnih 'wine'

**Geminating h**
- anna" 'together, each other'
- petu" 'daughter'
- tokwi" 'straight, correct'
- tua" 'son'
- Tūmpisa" 'Death Valley'
- wua" 'penis'

Consonant clusters only occur in medial position between vowels; they never begin or end words. Consonant clusters are of three types or series: (1) geminate oral occlusives and
nasals, which are fortis consonants held long but not doubly articulated; (2) a homoorganic nasal plus an oral occlusive, another nasal, or a semivowel; and (3) h plus certain oral occlusives, nasals, or semivowels. The consonant clusters that occur are given below in each series.

CONSONANT CLUSTER SERIES
(Intervocalic only)

<table>
<thead>
<tr>
<th>Geminate occlusive</th>
<th>Alveol-</th>
<th>Labio-</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Bilabial</td>
<td>Alveolar</td>
</tr>
<tr>
<td>pp</td>
<td>tt</td>
<td>tts</td>
</tr>
<tr>
<td>mm</td>
<td>nn</td>
<td>(n)ng</td>
</tr>
</tbody>
</table>

Nasal plus occlusive

| mp | nt | nts | ngk | ngkw |
| mm | nn | (n)ng |
| semivowel | ny ≈ nn | ngw |

Preaspirate occlusive

| hp | hk ≈ h | hkw ≈ hw |
| nm | hn | hy | hw |

Geminate nasals and clusters of homoorganic nasals are indistinguishable phonetically, although they may have different morphophonemic origins (see 9.3). The velar nasal ng is always phonetically geminate, never simple. Also, between vowels the fricative g is always phonetically geminate. Since there are no contrasts between simple and geminate ng and g, respectively, both of them are always written singly. Some examples of consonant clusters follow.
appo'o  'cup, dish, bowl'
úppüinna 'to sleep'

uttunna 'to give'
nattusu'un 'medicine'

pattsipitün 'smooth'
kuttsappūh 'ashes, dust'

kaakki 'crow'
namokko(ttsi) 'needle'

miikkwa 'now, today'
ukkwah 'when'

tommo 'winter'
kammu 'jackrabbit'

onnottsí 'pine cone hook'
punnan 'its own, his own, her own'

tūmpin 'rock'

nampe 'foot'

ontūmpitün '(yellowish) brown'
tuhuntappūtün 'thick'
nts
wantsi  'antelope'
antsaapana  'flicker (woodpecker)'

nok
nangkah  'hear'
pungku  'pet, horse'

nokw
aasiputungkwi(ttsi)  'butterfly'
nangkwa  'towards, in direction of'

hp
ohpin  'mesquite bean'
tüpisihpunki  'stinkbug'

hk
kee piaamüppühkantün  'not having children'
kee nanakahaitüppühkantű  'not having anything'

hm
kuhmattsi  'husband'
tahmani  'springtime'

hn
kohno  'cradle'
pihnaawitün  'bee'

hw
pihwü  'heart'
pahwa  'aunt (FaSi)'

hy
ohyo"  'an edible plant'
pihyaapin  'sugar'
Tumpisa Shoshone has six short vowels and six long vowels; it also has a diphthong which may be short or long. Long vowels are written doubled.¹

<table>
<thead>
<tr>
<th>VOWELS</th>
<th>Front</th>
<th>Back Unrounded</th>
<th>Back Rounded</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short</td>
<td>i</td>
<td>ü</td>
<td>u</td>
</tr>
<tr>
<td>Long</td>
<td>ii</td>
<td>üü</td>
<td>uu</td>
</tr>
<tr>
<td>Mid</td>
<td></td>
<td>e</td>
<td>o</td>
</tr>
<tr>
<td>Long</td>
<td>ee</td>
<td></td>
<td>oo</td>
</tr>
<tr>
<td>Low</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short</td>
<td></td>
<td>a</td>
<td></td>
</tr>
<tr>
<td>Long</td>
<td></td>
<td>aa</td>
<td></td>
</tr>
<tr>
<td>Diphthong</td>
<td></td>
<td>ai</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>aai</td>
<td></td>
</tr>
</tbody>
</table>

All vowels may appear at the beginning of words, at the end, or medially between consonants, although long vowels at the ends of words are relatively rare; e.g.:

- akka: 'that (obj)'
- awappo'i: 'desert spring lizard'
- pihyapi: 'weak'
- ha: question particle

- aataa: 'ouch'
- aama: 'horn'
- phyaapin: 'sugar'
- haa('a): 'yes'
- imaa: 'tomorrow, morning'
<table>
<thead>
<tr>
<th>Word</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>epi&quot;</td>
<td>'hereabouts'</td>
</tr>
<tr>
<td>ke = kee</td>
<td>'no, not'</td>
</tr>
<tr>
<td>kope</td>
<td>'face'</td>
</tr>
<tr>
<td>ee</td>
<td>'eh! my goodness!'</td>
</tr>
<tr>
<td>eemua</td>
<td>'crazy'</td>
</tr>
<tr>
<td>peewanna</td>
<td>'to split down the middle'</td>
</tr>
<tr>
<td>weeputa(ttsi)</td>
<td>'baby chuckwalla'</td>
</tr>
<tr>
<td>ith</td>
<td>'right here'</td>
</tr>
<tr>
<td>hipi&quot;</td>
<td>'drink'</td>
</tr>
<tr>
<td>hipittsitsi</td>
<td>'old woman'</td>
</tr>
<tr>
<td>ittün</td>
<td>'this kind'</td>
</tr>
<tr>
<td>kwii</td>
<td>'left'</td>
</tr>
<tr>
<td>ohii&quot;</td>
<td>'cough'</td>
</tr>
<tr>
<td>wiwii(ttsi)</td>
<td>'finch'</td>
</tr>
<tr>
<td>okwai&quot;</td>
<td>'flow'</td>
</tr>
<tr>
<td>po'o</td>
<td>'water tank'</td>
</tr>
</tbody>
</table>
| toko(ttsi) | 'grandfather (MoFa)'
| oompin     | 'small water-worn pebbles'                   |
| kotoo"     | 'make a fire'                                |
| toopi      | 'wolf'                                       |
| poookoo ≈ pawoko | 'bullfrog'                      |
ü
u
hupia
yuhu (pin)

uu
uupasi (ttsi)
huuppin
yuunaah ≈ nuupaah

ü
ünnu (pphuh)
ünntakasün
sütu

üü
üütsa
tüümünna
ünnnü

The short diphthong ai acts as a single short vowel, while the long diphthong aai functions as a simple long vowel. As in other Numic languages, these diphthongs often vary with e and ee, respectively; e.g.:

ainnattsi = ennattsi
nühai = nühe
paitu" = petu"
tsainnaah = tsennaah
naaiyangwi = neeyangwi

However, in a few forms ai apparently never varies with e; e.g.:
isapaippū 'coyote'  
sumpanai 'know'  
yuwaintūn 'warm'

The diphthong ai acts as a single short vowel in that it is monosyllabic. Other vowel clusters in the language are bisyllabic. The vowel clusters that I have recorded are given below.

VOWEL CLUSTERS

<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>úi</td>
<td>úa</td>
<td>ue</td>
<td>úai</td>
<td>uo</td>
</tr>
<tr>
<td>oi</td>
<td>oa</td>
<td>oe</td>
<td></td>
<td>ao</td>
</tr>
<tr>
<td>ui</td>
<td>ua</td>
<td>ea</td>
<td>ia</td>
<td></td>
</tr>
</tbody>
</table>

Some examples of vowel clusters follow.

úi
úitsū’in 'be cold'
úppūh 'sleep'

úa
úattuah 'ranch, farm'
tuasūppūh 'frozen'
wūa" 'penis'

úai ≈ úe
tūtūai ≈ tūtūe 'work'
nūaitūn ≈ nūetūn 'wind'

uo
mukuoto'eh 'be dizzy, faint'
<table>
<thead>
<tr>
<th>Grapheme</th>
<th>Dictionary Entry</th>
</tr>
</thead>
<tbody>
<tr>
<td>oi</td>
<td>'orange'</td>
</tr>
<tr>
<td>ointsi</td>
<td>'wash'</td>
</tr>
<tr>
<td>koitsoih</td>
<td>'pig'</td>
</tr>
<tr>
<td>koitssi</td>
<td></td>
</tr>
<tr>
<td>oappi</td>
<td>'yellow paint'</td>
</tr>
<tr>
<td>tsoapittsi</td>
<td>'ghost, spirit'</td>
</tr>
<tr>
<td>woapin</td>
<td>'worm'</td>
</tr>
<tr>
<td>oe</td>
<td></td>
</tr>
<tr>
<td>koe</td>
<td>'guts'</td>
</tr>
<tr>
<td>ao</td>
<td></td>
</tr>
<tr>
<td>nanaohpu</td>
<td>'scattered'</td>
</tr>
<tr>
<td>paoppi</td>
<td>'blood'</td>
</tr>
<tr>
<td>tsao</td>
<td>'good, well'</td>
</tr>
<tr>
<td>ui</td>
<td></td>
</tr>
<tr>
<td>pui</td>
<td>'eye'</td>
</tr>
<tr>
<td>kuittsun</td>
<td>'buffalo'</td>
</tr>
<tr>
<td>muiyainna</td>
<td>'to become intoxicated'</td>
</tr>
<tr>
<td>ua</td>
<td></td>
</tr>
<tr>
<td>tua&quot;</td>
<td>'son'</td>
</tr>
<tr>
<td>tuukua(pin)</td>
<td>'meat'</td>
</tr>
<tr>
<td>mukua</td>
<td>'mind, soul, spirit'</td>
</tr>
<tr>
<td>ea</td>
<td></td>
</tr>
<tr>
<td>toseaki</td>
<td>'spur' Vt</td>
</tr>
<tr>
<td>ia</td>
<td></td>
</tr>
<tr>
<td>iampü</td>
<td>'wild'</td>
</tr>
<tr>
<td>pia</td>
<td>'mother'</td>
</tr>
<tr>
<td>tsiatiyaippüh</td>
<td>'starving, hungry'</td>
</tr>
</tbody>
</table>
9.2 PHONETIC PROCESSES

The pronunciation of particular phonemes and processes affecting their pronunciation are detailed in this section.

9.2.1 Vowels

Vowels have the values indicated in the chart in 9.1 except as discussed in detail in this section.

9.2.1.1 Vowel Devoicing

Short unclustered vowels are devoiced in several environments. Devoicing may be either complete or partial. When it is partial, the vowel starts out voiced and then fades off voiceless.

Short unclustered vowels are usually devoiced at the ends of words in phrase-final position and when spoken in isolation. Though devoicing is the norm in this environment, the process is optional. Even potentially stressed vowels may be devoiced finally (see 9.4); e.g.:

\[
\begin{align*}
\text{tūnūnə} & \Rightarrow [t\text{̃}n\text{̃}nə] \quad \text{\textquoteright root'} \\
tūmpe & \Rightarrow [t\text{̃}mpe] \quad \text{\textquoteright mouth'} \\
mūsīpi & \Rightarrow [m\text{̃}sīəl] \quad \text{\textquoteright sharp point'} \\
mō'ō & \Rightarrow [m\text{̃}\text{̃}o] \quad \text{\textquoteright hand'} \\
kammu & \Rightarrow [k\text{̃}m\text{̃}m] \quad \text{\textquoteright jackrabbit'} \\
piappūtūn & \Rightarrow [piap\text{̃}r̃] \quad \text{\textquoteright big'}
\end{align*}
\]

Short unclustered vowels are often devoiced between two voiceless consonants. Although devoicing in this environment is frequent, it does not seem to be obligatory; e.g.:

\[
\begin{align*}
namokkuttsi & \Rightarrow [n\text{̃}wok\text{̃}k\text{̃}t\text{̃}s] \quad \text{\textquoteright beads'} \\
su'ukkuttih & \Rightarrow [su\text{̃}uk\text{̃}k\text{̃}t\text{̃}h] \quad \text{\textquoteright kick'} \\
pisittaippūh & \Rightarrow [pi\text{̃}s\text{̃}t\text{̃}\text{̃}i\text{̃}p\text{̃}h] \quad \text{\textquoteright rotten'}
\end{align*}
\]
PHONOLOGY

mi'akkinna \([\text{mI}'\text{ak}.\text{IN}.\text{A}]\) \(\approx [\text{mI}'\text{ak}.\text{IN}.\text{A}]\) 'to go (pl)'

tûhûttsittsi \([\text{t}$$\text{ihi}-\text{C}.\text{I}]\) \(\approx [\text{t}$$\text{ihi}-\text{C}.\text{I}]\) 'small'

tûppisippuh \([\text{t}$$\text{e}'\text{p}.\text{I}/\text{p}.\text{I}]\) 'trash'

Sometimes initial unstressed short vowels are devoiced; e.g.:

isapungku \([\text{I}$$\text{sa}'\text{g}k\text{U}]\) \(\approx [\text{I}$$\text{sa}'\text{g}k\text{U}]\) 'dog'

un taman \([\text{f}$$\text{n}d\text{aw}A]\) \(\approx [\text{f}$$\text{n}d\text{aw}A]\) 'your tooth'

kukkwèngwùnu \([\text{k}$$\text{u}k$.\text{Wi}'\text{g}wènI]\) \(\approx [\text{k}$$\text{u}k$.\text{Wi}'\text{g}wènI]\) 'to smoke'

Vowels are virtually always devoiced when preceding final \(\text{h}\), whether or not they occur in a syllable that would otherwise be stressed according to the alternating stress pattern discussed in 9.4; e.g.:

ukkwah \([\text{u}k$.\text{w}A]\) 'when'

wàinnih \([\text{w}$$\text{a}i$.\text{NI}]\) 'wine'

sikkih \([\text{s}$$\text{i}k$.\text{I}]\) 'right here'

tsawinnuh \([\text{z}$$\text{aw}IN$.\text{U}]\) 'to be good'

tiyyaitaippuh \([\text{t}$$\text{i}yai$.\text{a}ip$.\text{I}]\) 'dead'

And frequently, though not always, they are devoiced before internal \(\text{h}\); e.g.:

mi'appuhantun \([\text{mI}'\text{ap}.\text{t}$$\text{h}$$\text{and}d\text{I}]\) \(\approx [\text{mI}'\text{ap}.\text{t}$$\text{h}$$\text{and}d\text{I}]\) 'went'

putisihpa'in \([\text{p}$$\text{u}$$\text{ri}$'$\text{i}$$\text{ph}$$\text{a}'\text{I}]\) 'have a burro'

pihya:pin \([\text{pihya}$'$\text{I}]\) \(\approx [\text{pihya}$'$\text{I}]\) 'sugar'

tûppisihpungki \([\text{t}$$\text{e}'\text{p}.\text{I}$$\text{g}$$\text{okI}]\) 'stinkbug'

9.2.1.2 Vowel Nasalization

Vowels are heavily nasalized before and after nasal consonants, although nasalization is usually heavier before nasals than after them; e.g.:
umatun [iʔɑɾt] 'rain'
tumpi [tɛmbi] 'rock'
pasingwambi [pɑsiŋwɑmbi] 'sand'
tommono [tɔmˈɔnɔ] 'year'
tahmani [tɑŋwɑnã] 'springtime'
wiñnu [wiŋnU] ≈ [wiŋnU] 'then'

As the last two examples illustrate, nasalization occurs even though an h intervenes between a vowel and a nasal consonant. A vowel may be nasalized before final n despite the fact that the n disappears in phrase-final position; e.g.:

piyun [pʰyi] ≈ [pʰyi] 'duck'
kwasu'un [kwaːsuʔu] ≈ [kwaːsuʔu] 'dress'

9.2.1.3 Lowering of o

Short o may be either mid [o] or lowered to [ɔ]; long oo is virtually always [ɔ]; e.g.:

motson [mɔzɔ] ≈ [mɔzɔ] 'beard'
kope [kʰŋe] ≈ [kʰŋe] 'face'
woosuwiñun [wɔːsuwiɾt] 'eight'
suunnootun [siːɾɾi] 'ten'

9.2.1.4 í Dropping

The vowel í is often dropped when it is the second vowel in a cluster with o or y and it precedes the affricate ts, single or geminate. Despite the fact that í is dropped phonetically, the following ts or tts still remains palatalized by the process described in 9.2.2.3. The fact that the í still causes palatalization indicates that it is present in underlying form and that the process is phonetic rather than phonological (= morphophonemic); e.g.:
9.2.2 Consonants

Phonetic processes relating to Tümpisa Shoshone consonants appear at first to be rather complex in that a number of consonant phonemes are represented by a good many different allophones. However, the allophonic relationships generally are governed by several rather simple phonetic processes. The details are presented in this section.

9.2.2.1 Resonant Devoicing

The resonants w, y, m, n, ng, and ngw are devoiced before voiceless vowels (as discussed in section 9.2.1.1). Sometimes resonants start out voiced but end up voiceless before voiceless vowels; this is especially true with geminate nasals; e.g.:

<table>
<thead>
<tr>
<th>Word</th>
<th>Allophone</th>
<th>Equivalent</th>
</tr>
</thead>
<tbody>
<tr>
<td>wūsu'ukuttih</td>
<td>musuWI</td>
<td>[mūsuWI] 'kick'</td>
</tr>
<tr>
<td>musuwi</td>
<td></td>
<td>[mūsuWI] 'moustache'</td>
</tr>
<tr>
<td>kapaayu</td>
<td>kaśāŁU</td>
<td>[kaśāŁyŁ] 'horse'</td>
</tr>
<tr>
<td>nūmū</td>
<td>nīWI</td>
<td>[nīWI] 'person'</td>
</tr>
<tr>
<td>təŋgumů</td>
<td>təŋ'GM·Ł</td>
<td>[təŋ'Gn'Ł] 'man'</td>
</tr>
<tr>
<td>kohnō</td>
<td>kōnN</td>
<td>[kōnN] 'cradle'</td>
</tr>
<tr>
<td>tommono</td>
<td>təm'ńjN</td>
<td>[təm'ńjN] 'year'</td>
</tr>
<tr>
<td>utūinna</td>
<td>ūrİN·A</td>
<td>[ūrİn'Ł] 'to be hot'</td>
</tr>
<tr>
<td>tůnga</td>
<td>tůŁŁ</td>
<td>[tůŁŁ] 'and, also'</td>
</tr>
<tr>
<td>pangwi</td>
<td>pāngWI</td>
<td>[pāngWI] 'fish'</td>
</tr>
</tbody>
</table>
9.2.2.2 Simple Oral Occlusive Voicing

Simple oral occlusives $p$, $k$, $ts$, $t$, and $kw$ are voiced when they occur between two voiced segments such as voiced vowels and voiced resonants. Voicing typically occurs within the word, but it also occurs across word boundaries as long as the words are constituents within the same phrase. Some examples are given below, and many more are presented in section 9.2.2.4 on Softening (= Spirantizing); e.g.:

- Sohopimpu $[s\ddot{h}\sigma\beta\ddot{m}p\ddot{u}] \approx [s\ddot{h}\sigma\beta\ddot{m}p\ddot{f}]$ 'cottonwood'
- Um pampippuh $[\ddot{t}m \dddot{b}\ddot{m}b\ddot{r}\acute{f}]$ 'your hair'
- Utuintun $[\ddot{t}\dddot{r}\dddot{\ddot{s}}\ddot{m}d\ddot{t}] \approx [\ddot{t}\dddot{r}\dddot{\ddot{s}}\ddot{m}d\ddot{t}]$ 'hot (place)'
- Pahonto'i $[p\dddot{a}\ddot{h}\ddot{\ddot{o}}\ddot{n}\dddot{d}\ddot{o}I]$ 'smoking pipe'
- Un tohop $[\ddot{t}n \dddot{d}\ddot{h}o\ddot{\ddot{s}}I] \approx [\ddot{t}n \dddot{d}\ddot{h}o\ddot{\ddot{s}}I]$ 'your thigh'
- Ansaapana $[\ddot{a}\dddot{n}\dddot{g}\ddot{a}\dddot{\ddot{s}}\dddot{\ddot{\ddot{a}}}n\ddot{a}]$ 'flicker'
- Mo'intsoko $[m\dddot{\ddot{a}}\ddot{m}n\dddot{j}\ddot{\ddot{g}}\ddot{\ddot{\ddot{c}}}]$ 'wrist'
- Ko'ontsammi $[k\ddot{o}\dddot{a}n\dddot{\ddot{a}}\dddot{m}l\ddot{M}\ddot{i}]$ 'Saline Valley people'
- Un tsooppuh $[\ddot{t}n \dddot{z}\ddot{\ddot{g}}\ddot{\ddot{p}}\dddot{f}]$ 'your shoulder'
- Nangkawina $[n\dddot{\dddot{a}}\dddot{g}\dddot{\dddot{w}}\dddot{\dddot{h}}\dddot{i}n\dddot{A}]$ 'to speak'
- Tungkahni $[t\dddot{\dddot{g}}g\dddot{a}\dddot{n}\dddot{h}\dddot{i}]$ 'cave'
- Ung kope $[\dddot{\dddot{g}}\dddot{\dddot{g}}\dddot{\dddot{g}}\dddot{e}]$ 'your face'
- Nasungkwa'anna $[n\dddot{\dddot{a}}\dddot{\dddot{s}}\dddot{g}\dddot{g}w\dddot{\dddot{a}}\dddot{\dddot{h}}\dddot{\dddot{a}}n\dddot{N}\dddot{A}]$ 'to feel'
- Ung kwaimpu $[\dddot{\dddot{g}}\dddot{\dddot{g}}\dddot{\dddot{g}}\dddot{\dddot{b}}\dddot{\dddot{h}}\dddot{\dddot{m}}\dddot{f}]$ 'your back'

It should be noted that geminate oral occlusives are never voiced.

9.2.2.3 Palatalization of Sibilants and Nasals

The sibilants $\sigma$, $\ddot{t}g$, and geminate $tt\sigma$ are palatalized after front vowels, whether short or long. Palatalization occurs both within the word and across word boundaries. It occurs on $tt\sigma$ even if there is an intervening $\ddot{n}$ between $tt\sigma$ and the preceding front vowel; e.g.:
Retrogressive palatalization also occurs. If a sibilant stands before a front vowel and another sibilant palatalized because of the front vowel preceding it, then the first sibilant is usually also palatalized; e.g.:

tühüttæittsi [tʃʰiʃːiːtʃ::i] 'small'
toppottsæittsi [tʃpʰiʃːiːtʃ::i] 'short'
tatuttsæittsi [tʃɾuʃːiːtʃ::i] ≈ [tʃɾuʃːiːtʃ::i] 'thin'

Occasionally, initial ts is palatalized before i or ii, although palatalization is not obligatory in this situation; e.g.:

tsíatiyaippuh [ʃiariyaipʰ:e] ≈ [ʃiariyaipʰ:e] 'starving'
tsíkka'ah [ʃik'aʔe] ≈ [ʃik'aʔe] 'cut'
tsipakkiiña [ʃip'aYiːN::a] ≈ [ʃip'aYiːN::a] 'split (pl)'
tsíitsakannümpu [ʃi:zaYanmbt] 'fork'

Geminate nn is palatalized to [n̥ː] after front vowels; e.g.:

innümpu [ʃn̥ːmbt] 'thief'
senni [ʃeʔn̥ːi] 'like this'
wainnih [ʃain̥ːi] 'wine'
Single ŋ is also palatalized to [ŋ] after front vowels; examples are given with the discussion in the next section, on Softening.

9.2.2.4 Simple Oclusive and Nasal Softening
(= Spirantization)

In general, single stopped consonants, both oral occlusives and nasals, are softened, spirantized, or unchecked between vowels. This happens whether or not there is an intervening h between the preceding vowel and the (underlying) stopped consonant. The softened occlusives are also voiced between voiced segments, as discussed in 9.2.2.2; otherwise they are voiceless.

This softening process needs to be qualified and clarified in a number of ways, depending on a number of factors and the particular segments involved. First, geminate occlusives and geminate nasals are never softened between vowels. And single occlusives and nasals are not softened in phrase-initial position or after a nasal, but remain checked in these positions.

p, b, and kw are voiced fricatives between voiced vowels, and usually they are voiceless fricatives when next to a voiceless vowel (such as a final voiceless vowel). However, before final voiceless vowels, sometimes they do not become fricatives and remain voiceless lenis stops; e.g.:

| taysp | [tāsp] | "sun" |
| yapn | [yāp] | "autumn" |
| tāhp | [tāhp] | "snow" |
| hupap | [hūpap] | "soup" |
| puhkantn | [puhka] | "shaman" |
| kimakinna | [kimak] | "to come here" |
| hupiatuk | [hūpiar] | "sing" |

Examples:

- tape(ttsi) ≈ [tāsp] ≈ [tāpe] 
- yupani ≈ [yāp] 
- tahapid ≈ [tāvp] 
- hupapin ≈ [hūpap] 
- puhakantun ≈ [puhka] 
- kimmakinna ≈ [kimak] 
- hupiatuki ≈ [hūpiar]
tukwanni [tûjWän-i] ‘night’
yûkwi(nna) [yûjWIN-A] ≈ (to) say’
[yûjW] ≈ [yûkW]

When p occurs between a vowel plus h and another vowel, the hp cluster coalesces phonetically to the voiceless bilabial fricative [¢]; e.g.:

ohpimpū [òjWìmpû] ‘mesquite tree’
tuppisihpungi [tùp'ISìpûŋkÎ] ‘stinkbug’

Following nonfront vowels, t is an unchecked flap (rather than a fricative). It is a voiced flap [r] between voiced vowels when it follows nonfront vowels, and a voiceless flap [R] next to a voiceless vowel after nonfront vowels. Following front vowels, t is an interdental fricative, either [8] between two voiced vowels or [Ø] next to a voiceless vowel; e.g.:

poto’inna [pûrojWIN-A] ‘be a spring’
patûasûppûh [pàriasìp'û] ‘ice’
útûînna [ùrûIN-A] ‘to be hot’
sutûmû [ùrûMû] ‘those’
sutû [ùrû] ≈ [ùRû] ‘that’
pakatûn [pûarû] ≈ [pûarû] ‘body of water’
tsitoochin [ûtìóchì] ‘push’
petûmû [pèúMû] ‘daughters’
petû” [pèú] ≈ [pèû] ‘daughter’
nuetûn [nùeû] ≈ [nùeû] ‘wind’
situ [sùú] ≈ [sûû] ‘this’

The affricate ts is softened to a voiced lenis alveolar fricative [z] between voiced vowels when the preceding vowel is nonfront. It is devoiced but remains lenis next to a voiceless vowel after nonfront vowels. After front vowels, ts
is alveolo-palatal [z'] and is either voiced between vowels or voiceless if next to a voiceless vowel; e.g.:

- tatsiumpi [täziambi] 'star'
- potso'innna [pözo'änA] 'to be wet'
- tatsa [täza] = [tägA] = [tägA] 'summer'
- motson [mözö] = [mögO] = [mögO] 'whiskers'
- petsünna [pëžëN·A] 'to holler'
- üm pitsi'i [îm bizi'I] 'your breast'
- üng witsa [îŋ wiža] = [îŋ wižA] = [îŋ wíCA] 'your shin'

The nasal m is softened to a voiced nasalized [w] between voiced vowels, and to a voiceless [w] between vowels when one is voiceless. Softening of m occurs even if h intervenes between m and the preceding vowel; e.g.:

- ün tami'i [în daži'I] 'your little brother'
- süümoottun [sü:bi:rI] 'ten'
- imaa [iwa:] 'tomorrow'
- ün taman [în daža] = [în dažA] 'your tooth'
- númú [nú:HI] = [ní:HI] 'person'
- kuhmattsi [kúhãg·I] = [kúhãg·I] 'husband'
- ohmaattsi [õhãg·I] = [õhãg·I] 'little baby'

As the second variants of 'husband' and 'little baby' illustrate, sometimes after h the [w] disappears leaving only nasalization on the surrounding vowels.

The nasal ñ is softened after front vowels to a nasalized [y]. This softening takes place even if an h intervenes between ñ and the preceding front vowel. After nonfront vowels, ñ is not softened and remains [n]; e.g.:
wünütün  [wínítʰ]  'standing'
punikkkan  [púníkʰ]  'see, look at'
tokonetaippuh  [tʰjë:në:aiptʰ]  'scratched'
kahni  [kâhnI]  ≈ [kâhnI]  'house'
sunu  [sëyũ]  'therefore'
wüngweninna  [wĩngwëyïNʰ]  'to hang'
kwaana  [kwíyá:]  'eagle'
wiňnu  [wiňyũ]  ≈ [wiňyũ]  'then'
wiňnumpittsi  [wiňyümblóI]  'buzzard'
mii ningwûnu  'it is said they said'
[mi: yĩngwĩn̩]
sümni nüingkûnna  'thus she said to (him)'
[símnɬ yĩŋqgĩNʰ]
pue tukwanni naaskinna  'it's already getting dark'
[pie ūyãňanɬ jâ:yĩNʰ]

The velar nasal ng does not show any indications of softening like other medial nasals. Apparently, because ng is always geminate, never single phonetically, it doesn't soften. Labio-velar ngw, on the other hand, displays some indications of softening in that it varies with m, phonetically [w], after back vowels; e.g.:

ūngwatun  [ěŋwaɾt]  'rain'
≈ ūmatun  [ěwãɾt]
ongwapittsi  [ěŋwãślóI]  'salt'
≈ omaspittsi  [ěwãślóI]
songwo  [sẽŋwã]  'lungs'
≈ somo  [șẽwã]

Otherwise, ngw shows no sign of softening between vowels but apparently is always short, not long.
Geminate consonants, both oral occlusives and nasals, are very fortis and always held long but not doubly articulated. The geminate oral occlusives are also always voiceless and mildly aspirated. Examples of geminate consonants occur throughout this chapter, but a few more are given below.

- tūasūppūh [tθasipʰ] 'frozen'
- upūth莴n [iθipʰiθA] 'sleeping'
- uttuūnna [uθtʰiθA] 'to give'
- kuttinna [kutʰiθA] 'shoot'
- múattsi [mθaθI] 'moon'
- watsuūwitūn [wθaθwθiθ] 'four'
- tükkanā [tθkʰãθA] 'to eat'
- sakka [sakʰa] = [θakʰA] 'that (obj)'
- sikkīh [sikʰI] 'right here'
- Pakkwasi [pθakʰwasi] 'Olanche, Calif.'
- ukkwah [θukʰA] 'when, if'
- kimmanna [kimθaθA] 'to come'
- nummu [nimθu] = [nθμθ] 'we (exc)'

As mentioned earlier, both ng and s are always phonetically long and fortis (like geminate consonants) between vowels. But, since there is no distinction between simple and geminate ng and s, they are always written single (even in phonetic notation they are not written with the raised dot for length, except in the examples that follow): e.g.:

- tānqa [θŋʰa] 'and, also'
- pange [pɑŋʰe] 'up'
- angipi [ŋʰfɒl] 'fly'
- posottū [pθɒsθtʰiθ] 'alkali'
- kasattsī [kɑsθaθI] 'wing'
- esūmpitūn [θeθθmθbθθiθ] 'gray'
9.2.2.6 Velar Occlusive Fronting

The velar occlusives \( k \) and \( kw \), whether single or geminate, are fronted to prevelar position preceding front vowels. Except before front vowels, the velars are back-velar (i.e., somewhat further back than English \( k \) and \( g \)); e.g.:

- **ke\(\text{e}^\prime\)**: [k\(\text{e}^\prime\)] 'no, not'
- **sekkih**: [se\(\text{k}^\prime\)I] 'here'
- **kaakki**: [k\(\text{a}^\prime\)I] 'crow'
- **tokwi\(\text{n}^\prime\)**: [t\(\text{o}^\prime\)W\(\text{i}\)] 'correct'
- **kwii**: [k\(\text{W}^\prime\)i:] 'left'
- **kukkwip\(\text{P}^\prime\)uh**: [k\(\text{u}^\prime\)k\(\text{W}^\prime\)i:p\(\text{P}^\prime\)I] 'smoke'
- **sakkuh**: [s\(\text{u}^\prime\)k\(\text{U}\)] 'there'
- **mi\(\text{a}^\prime\)kwa**: [m\(\text{i}^\prime\a\text{W}^\prime\)a] 'go away'
- **ekup\(\text{i}^\prime\)t\(\text{s}^\prime\)i**: [\(\text{e}^\prime\)\(\text{Y}^\prime\)u\(\text{b}^\prime\)i\(\text{c}^\prime\)I] 'thorn'

9.2.2.7 Consonant Allophone Charts

The distribution of the consonant allophones, as discussed in the preceding sections, is summarized in the charts on the following two pages.

9.3 PHONOLOGICAL PROCESSES

The processes affecting alternations in phonemes are discussed in this section. These processes include the deletion or insertion of phonemes, and the changing of one phoneme to another.

9.3.1 Delabialization and Rounding

When labio-velar ng\(\text{w}^\prime\) is followed by \( a \), it usually loses its labialization and the \( a \) becomes a rounded vowel, either \( u \) or \( o \); e.g.:
# CONSONANT ALLOPHONES BEFORE VOICED VOWELS

## Environments

<table>
<thead>
<tr>
<th></th>
<th>V</th>
<th>N</th>
<th>Nonfront V</th>
<th>Front V</th>
<th>Vh</th>
</tr>
</thead>
<tbody>
<tr>
<td>p</td>
<td>p</td>
<td>b</td>
<td>β</td>
<td>β</td>
<td>φ</td>
</tr>
<tr>
<td>t</td>
<td>t</td>
<td>d</td>
<td>r</td>
<td>δ</td>
<td>r</td>
</tr>
<tr>
<td>ts</td>
<td>z</td>
<td>s</td>
<td>z</td>
<td>z</td>
<td>s</td>
</tr>
<tr>
<td>k</td>
<td>k</td>
<td>g</td>
<td>γ</td>
<td>γ (h)</td>
<td></td>
</tr>
<tr>
<td>kw</td>
<td>kw</td>
<td>gw</td>
<td>γw</td>
<td>γw (h&lt;sup&gt;W&lt;/sup&gt;)</td>
<td></td>
</tr>
<tr>
<td>m</td>
<td>m</td>
<td>m'</td>
<td>ò</td>
<td>ò</td>
<td>hw</td>
</tr>
<tr>
<td>n</td>
<td>n</td>
<td>n'</td>
<td>ñ</td>
<td>ñ</td>
<td>hw</td>
</tr>
<tr>
<td>ng</td>
<td>-</td>
<td>-</td>
<td>ñ'</td>
<td>ñ'</td>
<td>-</td>
</tr>
<tr>
<td>ngw</td>
<td>-</td>
<td>-</td>
<td>ñw - ò</td>
<td>ñw - ò</td>
<td>-</td>
</tr>
<tr>
<td>w</td>
<td>w</td>
<td>w</td>
<td>w</td>
<td>w</td>
<td>hw</td>
</tr>
<tr>
<td>y</td>
<td>y</td>
<td>y'</td>
<td>y</td>
<td>y'</td>
<td>hy</td>
</tr>
<tr>
<td>s</td>
<td>s</td>
<td>-</td>
<td>ñ</td>
<td>ñ</td>
<td></td>
</tr>
<tr>
<td>h</td>
<td>h</td>
<td>h'</td>
<td>h</td>
<td>h</td>
<td></td>
</tr>
<tr>
<td>'</td>
<td>-</td>
<td>-</td>
<td>? - Ø</td>
<td>? - Ø</td>
<td>-</td>
</tr>
<tr>
<td>pp</td>
<td>-</td>
<td>-</td>
<td>p'</td>
<td>p'</td>
<td>-</td>
</tr>
<tr>
<td>tt</td>
<td>-</td>
<td>-</td>
<td>t'</td>
<td>t'</td>
<td>-</td>
</tr>
<tr>
<td>tts</td>
<td>-</td>
<td>-</td>
<td>t'</td>
<td>t'</td>
<td>-</td>
</tr>
<tr>
<td>kk</td>
<td>-</td>
<td>-</td>
<td>k'</td>
<td>k'</td>
<td>-</td>
</tr>
<tr>
<td>kkw</td>
<td>-</td>
<td>-</td>
<td>k&lt;sup&gt;W'&lt;/sup&gt;</td>
<td>k&lt;sup&gt;W'&lt;/sup&gt;</td>
<td>-</td>
</tr>
<tr>
<td>mm</td>
<td>-</td>
<td>-</td>
<td>m'</td>
<td>m'</td>
<td>-</td>
</tr>
<tr>
<td>nn</td>
<td>-</td>
<td>-</td>
<td>n'</td>
<td>n'</td>
<td>-</td>
</tr>
</tbody>
</table>
## Consonant Allophones Before Voiceless Vowels

### Environments

<table>
<thead>
<tr>
<th>#vvl</th>
<th>Nvvl</th>
<th>Nonfront vvl</th>
<th>Front vvl</th>
</tr>
</thead>
<tbody>
<tr>
<td>p</td>
<td>p</td>
<td>φ - p</td>
<td>φ - p</td>
</tr>
<tr>
<td>t</td>
<td>t</td>
<td>R</td>
<td>Θ</td>
</tr>
<tr>
<td>ts</td>
<td>s</td>
<td>z - s</td>
<td>z - c</td>
</tr>
<tr>
<td>k</td>
<td>k</td>
<td>x - k</td>
<td>x - k</td>
</tr>
<tr>
<td>kw</td>
<td>kW</td>
<td>xW - kW</td>
<td>xW - kW</td>
</tr>
<tr>
<td>m</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>n</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ng</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ngw</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>w</td>
<td>w</td>
<td>w</td>
<td>w</td>
</tr>
<tr>
<td>y</td>
<td>Y</td>
<td>Y - N</td>
<td>Y</td>
</tr>
<tr>
<td>s</td>
<td>s</td>
<td>s'</td>
<td>s'</td>
</tr>
<tr>
<td>h</td>
<td>h</td>
<td>h - n</td>
<td>h - ILog</td>
</tr>
<tr>
<td>i</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>pp</td>
<td>-</td>
<td>p'</td>
<td>p'</td>
</tr>
<tr>
<td>tt</td>
<td>-</td>
<td>t'</td>
<td>t'</td>
</tr>
<tr>
<td>tts</td>
<td>-</td>
<td>t#'</td>
<td>t'</td>
</tr>
<tr>
<td>kk</td>
<td>-</td>
<td>k'</td>
<td>k'</td>
</tr>
<tr>
<td>kkw</td>
<td>-</td>
<td>kW'</td>
<td>kW'</td>
</tr>
<tr>
<td>mm</td>
<td>-</td>
<td>m'</td>
<td>m'</td>
</tr>
<tr>
<td>nn</td>
<td>-</td>
<td>N'</td>
<td>N'</td>
</tr>
</tbody>
</table>
This process is virtually obligatory in Death Valley, while in other areas it is apparently optional. Thus, the forms on the left above are from Death Valley, but both variants in each case occur in other areas.

9.3.2 Lowering of \(i\) and \(u\)

Short \(i\) is often lowered to \(e\) after a glottal stop. This is especially common in phrase-final position, but it seems to be optional in any position. Lowering of \(i\) also occurs after \(h\), but in this environment lowering is not particularly common; e.g.:

\[
\begin{align*}
\text{ko'i(ttsi)} & \approx \text{ko'e(ttsi)} & \text{'peak, point'} \\
\text{ma'i} & \approx \text{ma'e} & \text{'with'} \\
-pa'in & \approx -pa'en & \text{'have'} \\
\text{po'i(ttsi)} & \approx \text{po'e(ttsi)} & \text{'road, path'} \\
\text{to'i} & \approx \text{to'eh} & \text{'emerge'} \\
\text{yahinna} & \approx \text{yahenna} & \text{'to laugh'}
\end{align*}
\]

Short \(u\) is occasionally lowered to \(o\) in final position, although this seems to be rather rare and sporadic; e.g.:

\[
\begin{align*}
\text{namokku} & \approx \text{namokko} & \text{'money'} \\
\text{tümuhu} & \approx \text{tümuhu} & \text{'rope'} \\
\text{pungku} & \approx \text{pungko} & \text{'pet, horse'}
\end{align*}
\]

9.3.3 Vowel Harmony

When the vowels \(a\) and \(u\) occur in prefixes, they usually assimilate the rounding feature of round vowels in the following syllable. Typically, \(a\) becomes \(o\) and \(u\) becomes \(u\), although sometimes \(a\) becomes \(u\) when the vowel in the following
syllable is ū, and sometimes ŭ becomes ŭ when the vowel in the next syllable is ŭ. This particular type of vowel harmony is especially common with verb prefixes such as voice-changing na- pmpr and tu- absolutive antipassive, and instrumental prefixes kū- 'with teeth/mouth', ma- 'with hands', ta- 'with feet', ta- 'with rock-like instrument', tsa- 'by grasping', and wū- 'with an (elongated) instrument' (see sections 3.2.1.2 through 3.2.1.4). Although the rounding process is quite productive and certainly common, it is not entirely obligatory. Many forms display variation, and a few seem not to be affected by the process; e.g.:

- nokoitsoih 'bathe, swim' Vi
  < na- pmpr, koitsoih 'wash' Vt
- nosuntamah ≈ nasuntamah 'remember'
  < na- pmpr, sun- 'with mind', -tamah 'secure, tie' V instr
- tukoitsoih ≈ tukoitsoih 'wash' Vi
  < tu- absol aps, koitsoih 'wash' Vt
- tumo'ih 'write, draw' Vi
  < tu- absol aps, mo'ih 'write, draw' Vt
- kuso'eh = kūso'eh 'bite' pl
  < kū- 'with teeth/mouth', so'eh 'occlude'
- kusungkwa'ah 'taste'
  < kū- 'with teeth/mouth', sungkwa'ah 'feel, touch'
- mokotsa" = makotsa" 'smash with hands'
  < ma- 'with hands', kotsa" Vi 'get smashed in'
- mokopiih 'distribute (pl)'
  < ma- 'with hands', -kopiih V instr 'break (flex obj) into pieces'
- tokkotsa" 'smash with foot'
  < ta"- 'with foot', kotsa" Vi 'get smashed in'
- toppotsiki 'throw (pl)'
  < ta"- 'with rock-like', -potsiki V instr pl 'throw'
tottompokkah 'fasten'
< ta"- 'with rock-like', -tompokkah V instr 'fasten'
tsokkopiih 'break (flex obj) into pieces'
< tsə"- 'by grasping', -kopiih V instr 'break (flex obj) into pieces'
tsokkontonah 'wrap'
< tsə"- 'by grasping', -kontonah V instr 'wrap'
wusungkwa'ah 'touch/feel with'
< wu"- 'with an (elongated) instrument', sungkwa'ah 'feel, touch'
wummopo'ah 'cover'
< wu"- 'with an (elongated) instrument', mopo'ah 'cover' < ma- 'with hands', po'a(n) N 'covering'

Aside from the vowel harmony exemplified above, sporadic vowel assimilation of other sorts occurs in a number of forms; e.g.:

maponih(an) ≈ mapunih(an) 'take aim'
< ma- 'with hands', puni' 'see', -kan stv
tsokottih 'bump'
< tsə"- 'by grasping', kutti'h 'hit'
pookoo ≈ pawoko 'bullfrog'

9.3.4 Velar Labialization

Velar consonants are normally labialized after round vowels. The process is productive but does not seem to be entirely obligatory, since a number of forms display variation with and without labialization; e.g.:

ekon ≈ okwon 'tongue'
nukkwi (< *nukki) 'run'
ukkuh ≈ ukkwuh 'there yonder'
    cf. akkuh 'there'
sukkwa ≈ sukka 'that yonder (obj)'
cf. sakka 'that (obj)'
kimmanookwinna 'come along hither'
< kimmah 'come', nooh 'in motion', -kin 'come to'
tupoong kwa 'in the desert'
< tupoon 'desert', ka("') 'at, in, to'

9.3.5 Volatile Glottals

The two glottals ~ and h are extremely volatile between vowels. Both of them may be omitted optionally in this environment. When they are dropped, the surrounding vowels usually remain two different syllables with a distinct syllabic pulse between them. Additionally, sometimes a small amount of creaky voice is heard between the two vowels where a glottal has been omitted; e.g.:

- mi'akwa [mίʔaYwa] ≈ [mίYaYa] 'go away!
- po'ittsi [pόʔieI] ≈ [pόieI] 'path'
- mo'o [mόʔo] ≈ [mόo] 'hand'
- po'attsi [pόʔasI] ≈ [pόasI] 'covering'
- pahompi [pahombi] ≈ [pόmbi] 'tobacco'
- tahapi [tahaBI] ≈ [tάBi] 'snow'
- tuhuya [tήHYa] ≈ [tíHYa] 'deer'
- wahappin [wάhapI] ≈ [wάapI] 'piñon tree'

Dropping of h is especially common in the two verb suffixes -tuhantun ≈ -tuentun obligatory future and -ppuhantun ≈ -ppuantun ≈ -ppantun. In the latter case, especially in the speech of younger speakers, when the h goes, so does the preceding vowel ū, which is usually phonetically voiceless when it is unstressed and the h is present.
9.3.6 Final Glottal Stop Plus Echo Vowel

A glottal stop and voiceless echo vowel are often inserted at the ends of words in phrase-final position and at the ends of words spoken in isolation. The glottal stop and echo vowel are normally not added to stems with inflectional suffixes or to stems that end in a vowel preceded by a glottal stop (e.g., not to *poj' 'road'). When the glottal stop and echo vowel are added, the final vowel of the stem is not devoiced by processes described in 9.2.1.1. The two processes, devoicing of final vowels and adding a glottal stop plus echo vowel, are in complementary distribution. They both mark the end of a phrase or a word spoken in isolation. A glottal stop and echo vowel may be added to stems that end in final consonantal segments (see 9.3.7), but the final consonants are always deleted first.

The insertion of glottal stop and echo vowel is especially common on nouns that do not have absolutive suffixes (except -ppü; see 5.6). In this regard, the glottal stop and echo vowel seem to function much like the absolutive suffixes; e.g.:

\[
\begin{align*}
tami & > \text{tami}'i [\text{tâw}i?] 'younger brother' \\
papi & > \text{papi}'i [\text{pâp}i?] 'older brother' \\
nammi & > \text{nammi}'i [\text{nâm}i?] 'younger sister' \\
tümmu & > \text{tümmu}u [\text{tûm}u?] 'enemy' \\
atapu & > \text{atapu}'u [\text{ârâp}u?] 'mother's brother' \\
wa'ippü & > \text{wa'ippu}'u [\text{wáp}i?] 'woman' \\
tûhüya & > \text{tûhüya}'a [\text{tûh}i?] 'deer' \\
\end{align*}
\]

\[
\begin{align*}
\text{petü} & > \text{petü}'u [\text{pët}u?] 'daughter' \\
tua" & > \text{tua}'a [\text{tua}?] 'son' \\
poton & > \text{poto}'o [\text{pö}o?] 'staff, cane' \\
\text{motson} & > \text{motso}'o [\text{mõzo}o?] 'beard' \\
\text{taman} & > \text{tama}'a [\text{tõm}a?] 'tooth' \\
\text{wainnih} & > \text{wainni}'i [\text{wáin}i?] 'wine'
\end{align*}
\]
Although a final glottal stop and echo vowel are most typically found on nouns, they may occur on other word classes as well; e.g.:

- ma > ma'a [måʔA] 'with (instrument)'
- man > ma'a [måʔA] 'on the surface of'
- tommo > tommo'o [tôm·ôʔO] '(in the) winter'
- tokwi" > tokwi'i [tôy'iʔI] 'right, correct(ly)'
- piaapputū'ū > piaap·āriʔI] 'big'
- hipi" > hipi'i [hiʔiʔI] 'drink'
- tonna" > tonna'a [tôn·åʔA] 'stab'

A glottal stop and echo vowel are rarely used on verbs, because verbs almost always have inflectional suffixes or nominal and participial forms that are used in isolation. But as the last two examples above indicate, verbs with a glottal stop and echo vowel have occasionally been recorded.

Words ending with long vowels may take a glottal stop plus echo vowel; or instead, a glottal stop may be inserted in the middle of the long vowel, breaking it into two short vowels. Nonidentical vowel clusters normally do not take a glottal stop plus echo vowel. Rather, a glottal stop is inserted between the two nonidentical vowels. In the case of both long vowels and nonidentical vowel clusters, the vowel after the inserted glottal stop is devoiced; e.g.:

- kee > ke'e [kéʔE] 'no, not'
- haa > haa'a [håʔA] 'yes'
- tii > tii'i [tiʔI] 'tea'
- paa > paa'a [påʔA] 'water'
- pia > pi'a [piʔA] 'mother'
- koe > ko'e [kõʔE] 'guts'
- tukku'a > tukku'a [tuk'ãʔA] 'flesh, meat'
- üppūh > üppū'i [ip'ãʔI] 'sleep'
9.3.7 Final Consonantal Segments

The three segments $\mathbf{h}$, $\mathbf{h}$, and $\mathbf{~}$ are the only consonants that may end words and morphemes in their underlying forms. Because they may appear in word-final and morpheme-final position, they behave in special ways and may have special effects on other segments preceding and following them. They all disappear in phrase-final position or when the words they end are spoken in isolation, although they may leave behind residual effects. Thus, $\mathbf{h}$ causes a preceding short unstressed vowel to devoice (see examples in 9.2.1.1), and $\mathbf{~}$ may leave behind nasalization on the preceding vowel (see examples in 9.2.1.2). The final consonant segments also disappear completely before geminate consonants and other consonant clusters. Another peculiarity of the three final consonants is that they behave differently in the verb system than in all other areas of the grammar. When they end verb stems and verb suffixes, their effects are often different from their effects when they end words and morphemes in other word classes. In the next few paragraphs, the peculiarities in behavior and special effects of the final consonants are presented in detail.

The geminating final segment $\mathbf{~}$ basically causes following oral occlusives $\mathbf{p}$, $\mathbf{t}$, $\mathbf{ts}$, $\mathbf{k}$, and $\mathbf{kw}$, and nasals $\mathbf{n}$ and $\mathbf{~}$ to geminate. It is lost completely in phrase-final position and before $\mathbf{~}$, and the two glottals $\mathbf{~}$ and $\mathbf{~}$, as well as before consonant clusters of any kind, whether geminate or nonidentical. Consider the effects on following consonants of the geminating segment ending tua" 'son' and hipi" 'drink', which, when spoken in isolation, are pronounced [tua?] $\approx$ [tua?] and [hi$\mathbf{~}$i] $\approx$ [hi$\mathbf{~}$i], respectively; e.g.:

\begin{align*}
\text{tua" 'son' + } & \text{ pan 'on top of' > tuaappan 'on top of the son'} \\
& \text{ tukkwan 'under' > tuattukkwan 'under the son'} \\
& \text{ ma'i 'with' > tuam ma'i 'with the son'}
\end{align*}
PHONOLOGY

man 'on' \(\rightarrow\) tuam man 'on the son'
-i obj \(\rightarrow\) tuai 'son (obj)'
-\text{-ttsi} diminutive \(\rightarrow\) tuattsi 'little son'

\text{hipi}'' 'drink' +
kahni 'house' \(\rightarrow\) hipikkahni 'bar'
kammah 'be sick' \(\rightarrow\) hipikkammah 'have a hangover'
tsaukupp\(\text{-}su\) 'old man' \(\rightarrow\) hipittsaukupp\(\text{-}su\) 'drunkard'
nooh 'go along' \(\rightarrow\) hipinnooh 'go along drinking'
tu\(\text{-}t\) 'start' \(\rightarrow\) hipittu\(\text{-}t\) 'start to drink'
tu\(\text{ng}\) 'tell to' \(\rightarrow\) hipittu\(\text{ng}\) 'tell to drink'
suwan 'want' Aux \(\rightarrow\) hipisuwan 'want to drink'
happi 'lie (dur)' \(\rightarrow\) hipihappi 'lie and drink'
-kan stv, -\text{-t}\(\text{-}\)u \(\rightarrow\) hipikkant\(\text{-}u\) 'be drinking'
-\(\text{-}k\) hither' \(\rightarrow\) hipikk 'coming drinking'
-kwan 'away', cm\(\text{plt}\) \(\rightarrow\) hipikkwan 'go drinking; drank'
-kwantu'ih 'going to\(\rightarrow\) hipikkwantu'ih 'going to drink'
-taippuh cm\(\text{plt}\), pp \(\rightarrow\) hipittaippuh 'drunk'
-\text{-ppuhant\(\text{-}\)n past} \(\rightarrow\) hipippuhant\(\text{-}n\) 'drank'
-\text{-nna inf present} \(\rightarrow\) hipinna '(to) drink'
-\text{-ngkun cat} \(\rightarrow\) hipingkun 'make drunk'
-\text{-t\(\text{-}\)t\(\text{-}\)u} ag\(\text{-}\)entive \(\rightarrow\) hipittu 'drinker'

Consider also the effects of the geminating segment ending the instrumental prefix \text{tsa}'-' by grasping', which is affixed to many verb stems.

\text{tsa}'-' 'by grasping' +
annih 'fall' sg \(\rightarrow\) ts\(\text{a}'\)annih 'push over' Vt sg
hapingkun 'make lie' \(\rightarrow\) tsahapingkun 'put in bed' Vt
ka'sh 'break' V pi sg \(\rightarrow\) tsakka'sh 'break' Vt sg
-kopiih 'break' V pl \(\rightarrow\) tsokkopiih 'break' Vt pl
kua'' 'emerge' V pi \(\rightarrow\) tsakku'a'' 'take out' Vt pl
kwayah 'loosen' V \(\rightarrow\) tsakkwayah 'take off' Vt
kwinu 'go around' V \(\rightarrow\) tsakkwinu(nnukwi) 'wind' Vt
mi'a 'go' \(\rightarrow\) tsammia 'turn over' Vt
nopah 'destroy' > tsonnopah 'tear down' Vt sg
nuwan 'move' Vi > tsannuwan 'lift, move' Vt
paha' 'split' Vi sg > tsappaha' 'split' Vt sg
pahe" 'fall off' Vi > tsappahe" 'drop' Vt sg
sakkah 'crack' Vi > tsasakkah 'break, crack' Vt
-tamah 'secure' V > tsattamah 'secure, tie' Vt
tawin 'be a hole' Vi > tsattawin 'open up' Vt
to'eh 'emerge' Vi sg > tsatto'eh 'take out' Vt
tü'ki" 'put' Vt sg > tsattü'kih 'put, place' Vt
wunungkun 'make stand' V > tsawunungkun 'stand up' Vt
yunah 'put' Vt sg > tsangunah 'put, place' Vt
yuniih 'put' Vt pi > tsanguniih 'put, place' Vt

As the last two examples illustrate, at least sometimes
the geminating segment causes a following semivowel to become
a velar nasal. Usually, ~ plus y becomes ng, and ~ plus w
becomes nw. A few other examples of the nasalization of
semivowels by the geminating segment are given below.

tangunah sg, tanguniih pi 'plant' Vt
< ta"- 'with a hard rock-like instrument',
yunah sg, yuniih pi 'put, place' Vt
kukkwil'ngün 'smoke' Vi
< kukkwil" 'smoke', wünü" 'stand'
ningünü" 'discuss'
< ni"- 'with words', wünü" 'stand'
wüngwennyih 'hang' Vt
< wü"- 'with elongated instrument', -weniyih 'hang'

Sometimes, however, the geminating segment has no effect on a
following w, as tsawunungkun 'stand up' (cited above)
illustrates. And, sometimes the geminating segment causes a
following y to become nn instead of ng; e.g.:

tsinnahi 'make laugh'
< tsi"- 'with a sharp instrument', yahi" 'laugh'
Many verb stems end in geminating " (e.g., hipi" 'drink', sii" 'pee', and tukwii" 'go out [of fire]'), so that the initial consonants of a good many verb suffixes and auxiliary verbs are geminated after these stems. On the other hand, a number of verb suffixes which otherwise would seem to have initial geminatable consonants are absolutely resistant to the effects of the geminating segment. Verb suffixes that are impermeable to gemination are -kin 'come and do', -kwan 'go and do', -tu'ih future, -kwan + -tu'ih 'will go and do', -tūn present participle and habitual, -tūhántūn obligative future, and -ku subordinating. For example, note how " has no effect on the suffixes on hipi" below; compare these examples with those given above for hipi".

hipi" 'drink' +
-kin > hipikin 'come and drink'
-kwan > hipikwan 'go and drink'
-kwan + -tu'ih > hipikwantu'ih 'will go and drink'
-tu'ih > hipitu'ih 'will drink'
-tūn > hipitūn 'drinking'
-ku > hipiku 'when drinking'

Two other verb stems ending in geminating " are given below with an array of suffixes and auxiliaries.

sii" 'pee, urinate' +
katū 'sit' Aux > siikkatū 'squat (peeing)'
tukin 'start' Aux > siittukin 'start to pee'
-kwantu'ih 'going to' > siikkwantu'ih 'going to pee'
-taihwan cmplt > siittaihwan 'already peed'
-ppuhántūn past > siippuhantūn 'peed'
-kwan 'go and', -tu'ih > siikkwantu'ih 'will go and pee'
Generally speaking, the final segment $n$ is realized as a homoorganic nasal before oral occlusives $p$, $t$, $ts$, $k$, and $kw$, and before the two nasals $m$ and $n$; i.e.:

- $n + p \rightarrow mp$
- $n + t \rightarrow nt$
- $n + ts \rightarrow nts$
- $n + k \rightarrow ngk$
- $n + kw \rightarrow ngkw$
- $n + m \rightarrow mm$
- $n + n \rightarrow nn$

Compare the manifestations of $n$ in the following examples based on etun 'gun, bow', pasakun 'bridge', and nian 'my', which when spoken in isolation are pronounced $[e\check{e}i] \approx [\check{e}\check{e}i] \approx [\check{e}\theta i]$, $[\text{päsə} \check{a}] \approx [\text{päsə} \check{a}] \approx [\text{päsəx}\check{a}]$, and $[\text{nīə}] \approx [\text{nīə}]$, respectively.

etun 'gun, bow' +

- pan 'on top of' > etun pan 'on top of gun'
- tukkwan 'under' > etun tukkwan 'under a gun'
- -kantun 'having' > etungkantun 'having a gun'
- ma 'with' > etun ma 'with a gun'
- man 'on' > etun man 'on the gun'
pasakün 'bridge' +  
pan 'on top of' > pasakün pan 'on a bridge'  
tukkwan 'under' > pasakün tukkwan 'under a bridge'  
ka 'to, at' > pasakün ka 'to a bridge'  

nian 'my' +  
pungku 'pet, horse' > nian pungku 'my pet, horse'  
tua' 'son' > nian tua' 'my son'  
tsuhmi (ppuh) 'bone' > nian tsuhmi 'my bone'  
kahni 'house' > nian kahni 'my house'  
kwasu'un 'dress' > nian kwasu'un 'my dress'  
mupin 'nose' > nian mupin 'my nose'  
nampe 'foot' > nian nampe 'my foot'  

When final  palabras appears before a vowel, it normally geminates, although it may also drop; i.e.:  

n + V > nnV  or  n + V > V  

Compare the examples below with vowel-initial noun stems following nian and noun stems ending in n preceding the objective case suffix -a; e.g.:  

nian 'my' +  
etün 'gun' > nian etün 'my gun'  
okwon 'tongue' > nian okwon 'my tongue'  
appp ‘father’ > nian apppp ‘my father’  

NOUN + -a objective case  
etün > etünna 'gun (obj)’  
pasakün > pasakünna 'bridge (obj)'  
kwasu’un > kwasu’unna 'dress (obj)’  
motson > motsonna ‘beard (obj)’  
taman > tamanna 'tooth (obj)’  
yütsütün > yütsütünna ‘airplane (obj)’
Similarly, when final \( \mathbf{n} \) appears before \( \mathbf{h} \), it may either drop or geminate replacing the \( \mathbf{h} \); i.e.:

\[
\mathbf{n} + \mathbf{h} > \mathbf{n} \mathbf{n} \quad \text{OR} \quad \mathbf{n} + \mathbf{h} > \mathbf{h}
\]

E.g.:

\[
\begin{align*}
\text{nian nimpu} & \approx \text{nia himpu} & \text{'my stuff'} \\
\text{ummin nimpu} & \approx \text{ummi himpu} & \text{'your stuff'} \\
\text{nian nungkwappuh} & \approx \text{nia hungkwappuh} & \text{'my leg'} \\
\text{ummin nungkwappuh} & \approx \text{ummi hungkwappuh} & \text{'your leg'} \\
\text{nian nuttsi} & \approx \text{nia huttsi} & \text{'my FaMo'} \\
\text{ummin nuttsi} & \approx \text{ummi huttsi} & \text{'your FaMo'}
\end{align*}
\]

Final \( \mathbf{n} \) may drop before the semivowels \( \mathbf{w} \) and \( \mathbf{y} \) as well. Or, it may remain before them both, becoming \( \mathbf{ng} \) before \( \mathbf{w} \) and geminate before \( \mathbf{y} \) replacing it; i.e.:

\[
\begin{align*}
\mathbf{n} + \mathbf{w} > \mathbf{ng} \mathbf{w} \quad \text{OR} \quad \mathbf{n} + \mathbf{w} > \mathbf{w} \\
\mathbf{n} + \mathbf{y} > \mathbf{n} \mathbf{n} \quad \text{OR} \quad \mathbf{n} + \mathbf{y} > \mathbf{y}
\end{align*}
\]

However, with final \( \mathbf{n} \) as a possessive case marker on nouns and pronominals (see 5.2 and 4), before semivowels there is a semantic distinction having to do with alienability between forms where final \( \mathbf{n} \) is retained and where it is dropped. Compare the following examples.

\[
\begin{align*}
\text{nia yuhupi} & \quad \text{'my own fat'} \\
\text{nian nuhu} & \quad \text{'my fat (of an animal)'} \\
\text{nia witsa} & \quad \text{'my own shin'} \\
\text{niang witsa} & \quad \text{'my shin (of an animal)'}
\end{align*}
\]
nia wua" 'my own penis' (said by a man)
niang wun naa" 'it's my penis' (said by a woman of her man's penis)

I have no idea why this semantic distinction should show up only before forms under possession beginning with semivowels. When there is no possibility of a distinction between alienable and inalienable possession, the retention of final η seems to be the norm, but a few forms display variation; e.g.:

nian nütsütün 'my airplane' < yütsütün 'airplane'
(*nia yütsütün)
niang waa'ettsi 'my enemy' < waa'ettsi 'enemy'
≈ nia waa'ettsi

In constructions not having to do with possession, final η is normally retained before the semivowels; e.g.:

nüü üng wüttühiha 'I'm waiting for you'
  I you-O wait-stv

üng wakantün 'towards you'
  you-O towards

Quite a number of verb stems and verb suffixes end in final η, but it is realized in the verb system in very distinctive ways. At the ends of verb stems and suffixes, final η only manifests itself before t, n, and m, and then only optionally (although it never appears before the completive suffix -tain). Final η does not manifest as a nasal before velars k or kw beginning following morphemes, except before the subordinating suffix -ku. Rather, before velars, final η is manifested in exactly the same way as final h (see discussion below). Thus, in the verb system only:
\[ n + t > nt \text{ OR } n + t > t \]
\[ n + n > nn \text{ OR } n + n > n \]
\[ n + m > mm \text{ OR } n + m > m \]
\[ n + k > h \]
\[ n + kw > hw \]

For example, compare the effects of final \(n\) at the ends of the verbs kamman 'taste' (used with tsao 'good') and üitsü'in 'be cold' in the forms below.

**tsao kamman 'taste good' +**

- \( -tu'ih \) 'will' > tsao kamma(n)tu'ih 'will taste good'
- \( -tühantün \) oblig > tsao kammantühantün 'must taste good'
- \( -kin \) 'get', -nna > tsao kammahinna 'get tasting good'
- \( -ppühantün \) past > tsao kammappühantün 'tasted good'
- \( -nna \) general > tsao kammanna 'tastes good'

**üitsü'in 'be cold' +**

- \( -tün \) hab/prp > üitsü'întün 'cold, cooling'
- \( -tu'ih \) 'will' > üitsü'i(n)tu'ih 'will be cold'
- \( -tühantün \) oblig > üitsü'i(n)tühantün 'must be cold'
- \( -taippüh \) cmppt prp > üitsü'îtaippüh 'completely cold'
- \( -kan \) stative > üitsü'îhan 'being cold'
- \( -kwantu'ih \) 'going to' > üitsü'îhwantu'ih 'going to be cold'
- \( -ku \) sub > üitsü'îngku 'when it's cold'
- \( -tükîn \) 'start' > üitsü'i(n)tükîn 'start to be cold'
- \( -mî'îa \) 'get' > üitsü'i(m)mî'a 'be getting cold'
- \( -nasungkwa'ah \) 'feel' > üitsü'în nasungkwa'ah 'feel cold'

Also compare the effects of final \(n\) at the ends of the two verb suffixes -ngkun cat (on the verb teewi 'tell') and -tain completive (on nuwu' 'move').
Apparently, then, final rr is changing to h in the verb system, at least before everything but t, n, and m. Final preaspirating h is primarily manifested in its devoicing effects. It causes the devoicing of preceding short unclustered vowels (see 9.2.1.1), especially in word-final position. In word-medial position, vowels preceding h may be only partially devoiced. Outside of the verb system, final h is relatively rare and seems to be dying out in Tumpisa Shoshone. It is viable only on forms built with the past participle, nominalizing, and absolutive suffix -ppuh, the nominalizing locative suffix -ttuah, and the locative adverbial formative -kkuh, although it is maintained on a few other forms as well (e.g. tukkappih 'food', nankigh 'ear', putisih 'burro', nanah 'just, only').

Outside of the verb system, the primary effect that final h has on following consonants is that it usually blocks voicing of following oral occlusives, since when h precedes oral occlusives they do not stand between two voiced segments (which is the determining environment for voicing; see
9.2.2.2). Thus, when final \(\mathbf{h}\) precedes the oral occlusives \(\mathbf{p}, \mathbf{t}, \mathbf{k},\) and \(\mathbf{kw},\) they are normally realized as voiceless \([\mathbf{f}], [\mathbf{r}]\) or \([\mathbf{θ}, [\mathbf{x}], \text{and } [\mathbf{x}^\mathbf{w}],\) respectively. Except for its devoicing effect on preceding vowels and blocking of voicing on following consonants, \(\mathbf{h}\) is lost before all consonants except the nasals \(\mathbf{m}\) and \(\mathbf{n}\) and the semivowels \(\mathbf{y}\) and \(\mathbf{w}\). Before vowels it is normally manifested as \(\mathbf{h},\) although like all \(\mathbf{hs}\) it is unstable between vowels (see 9.3.5); e.g.:

<p>|
| --- |
| üattūah 'ranch, farm' + ka 'at, on' &gt; üattūah ka 'on a ranch' [fat·ta xå] -a obj case &gt; üattūaha 'ranch (obj)' [fat·lahå] |
| patuasūppūh 'ice, frozen' + pai 'around on' &gt; patuasūppūh pai 'around on the ice' [parfasip·f øai] tukkwan 'under' &gt; patuasūppūh tukkwan 'under the ice' [parfasip·f Rük·wA] ma 'with' &gt; patuasūppūh ma 'with ice' [parfasip·fín wå] -a obj case &gt; patuasūppūha 'ice (obj)' [parfasip·fínA] |
| tükkapppih 'food' + pan 'on top' &gt; tükkapppih pan 'on top of the food' [ték·áp·I øå] tukkwan 'under' &gt; tükkapppi tukkwan 'under the food' [ték·áp·I Rük·wA] man 'on' &gt; tükkapppih man 'on the food' [ték·áp·lh wå] naa&quot; 'be' &gt; tükkapppihnaa&quot; 'groceries' [ték·áp·Ihýå] |</p>
<table>
<thead>
<tr>
<th>English</th>
<th>Tumpisa Shoshone</th>
</tr>
</thead>
<tbody>
<tr>
<td>putisih 'burro'</td>
<td>(purîsi')</td>
</tr>
<tr>
<td>pan 'on top' &gt; putisih pan</td>
<td>'on top of a burro'</td>
</tr>
<tr>
<td>ma'i 'with' &gt; putisih ma'i</td>
<td>'with a burro'</td>
</tr>
<tr>
<td>-a obj case &gt; putisih</td>
<td>'burro (obj)'</td>
</tr>
<tr>
<td>niam putisih naa'</td>
<td>[niam bûriŝîh yâ:] 'it's my burro'</td>
</tr>
</tbody>
</table>

Over half of all verb stems in Tumpisa Shoshone end in final h, and most of the remaining verbs end in geminating ~, although a good many end in H, while only a handful end in vowels (e.g., kimma sg 'come', mi'â sg 'go', namo'e 'pick', súngkia 'stagger').

Despite the fact that most verbs end in final h, it only manifests in the verb system when preceding the two velar stops k and kw in suffixes such as:

-kin 'hither'
-kan stative
-kon certaintive
-kwan momentaneous completive
-kwan 'away'
-kwantu'ih 'be going to' future

When such suffixes beginning with velars are appended to verbs or other verb suffixes ending in final h, the h and velars merge:

h + k > h h + kw > hw

The suffixes above are then realized respectively as:

-hin 'hither'
-han stative
-hon certainive
-hwan momentaneous completive
-hwan 'away'
-hwantu'ih 'be going to'

Final h has absolutely no effect on other consonants, nor does it usually cause preceding vowels to be devoiced in the verb system. Furthermore, a number of suffixes beginning with velar stops are completely impermeable to the effects of final h (e.g., -kin 'come and do', -kwan 'go and do', -kwan + -tu'ih 'will go and do' -kon 'around, here and there', -ku subordinating), even though some of these suffixes appear to be virtually identical with suffixes affected by h. Compare the effects of final h on the two verbs given below with an array of suffixes.6

\begin{verbatim}
tükkah 'eat'
-\kwan cmplt > tükkahwan 'ate'
-kwantu'ih 'going to' > tükkahwantu'ih 'going to eat'
-kon certain > tükkahontun 'certainly eating'
-tůn hab, prp > tükkatun 'eating'
-tu'ih 'will' > tükkatu'ih 'will eat'
-nną general > tükanna 'eat'
-ppūhántūn past > tükappūhántūn 'ate'
-\ku subord > tükaku 'when eating'
-\kin 'come and' > tükakin 'come and eat'
-\kwan 'go and' > tükakwan 'go and eat'
tükkin 'start' > tükkatükkin 'start to eat'
wūnu 'stand' > tükkwūnu 'stand and eat'
uwwi 'go around' > tükkanuwi 'eating around'
yungwah 'scoop up'
-\kwan cmplt > yungwahwa 'scooped up'
-kwantu'ih 'going to' > yungwahwantu'ih 'going to scoop'
-kwan 'go and', -tu'ih > yungwakwantu'ih 'will go scoop'
tu'ih 'will' > yungwatu'ih 'will scoop'
\end{verbatim}
Outside of the verb system, final *h* historically has had a similar aspirating effect on following velar stops *k* and *kw*. There are a few frozen lexical items displaying mergers of *h* plus *k* to *h* (e.g., *nanahapantun* 'intermingled' < *nanah* 'just, only' + *kapan*(tun) 'among', and *natuakahantun* 'clown' < *natuakah* 'have face paint on' + -*kantun* 'characterized by'). However, as discussed above, usually final *h* plus velar stops do not merge in forms outside of the verb system.

In order to illustrate the contrasting effects of forms with final consonants and forms ending in vowels alone (without final consonants), a number of words are presented below built on the object noun incorporating verb -*pa'in* 'have' and on the noun and adjective forming suffix -*kantun* 'having, characterized by'. Several different sets of nouns are given before both -*pa'in* and -*kantun*, one set ending in ~, another ending in *n*, another ending in *h*, and still another ending in vowels.

**NOUN + -pa'in 'have' / -kantun 'having, characterized by'

With Nouns Ending in Geminating ~

<table>
<thead>
<tr>
<th>NOUN</th>
<th>-pa'in 'have'</th>
<th>-kantun 'having, characterized by'</th>
</tr>
</thead>
<tbody>
<tr>
<td>tuappa'in</td>
<td>'have a son'</td>
<td>&lt; tua&quot; 'son'</td>
</tr>
<tr>
<td>[tuap'áʔI]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>petüppa'in</td>
<td>'have a daughter'</td>
<td>&lt; petú&quot; 'daughter'</td>
</tr>
<tr>
<td>[péšp'áʔI]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>kunnappa'in</td>
<td>'have firewood'</td>
<td>&lt; kunna&quot; 'firewood'</td>
</tr>
<tr>
<td>[kún'áʔp'áʔI]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>tuakkantün</td>
<td>'having a son'</td>
<td>&lt; tua&quot; 'son'</td>
</tr>
<tr>
<td>[tuak'ántf]</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
wuakkantun 'having a penis = gelding' < wu'a 'penis'
[yi::ak·wanṭe]
yatsükantun 'deflated' < yatsu' (?)
[yazik·wanṭe]

With Nouns Ending in Nasalizing n
etumpa'in 'have a gun' < etun 'gun, bow'
[etumpa?i]
tamampa'in 'have a tooth' < taman 'tooth'
[tamampa?i]
motsompa'in 'have a beard' < motson 'beard'
[motson]
tamangkantun 'having teeth' < taman 'tooth'
[tamangkantun]
nattusu'ungkantun 'doctor' < nattusu'un 'medicine'

With Nouns Ending in Preaspirating h
putisihpa'in 'have a burro' < putisih 'burro'
[putisihan]
patuașuppuhpa'in 'have ice' < patuașuppuh 'ice'
[patuașuppuh]
tsoppippuhpa'in 'have hair' < tsoppippuh 'hair'
[tsoppippuh]
keehiippuhkantun 'having nothing'
[ké:hí:p·i̯xând] < keehii(ppuh) 'nothing'

kee piammúppuhkantun 'not having children = childless'
[ké: pí̯ám·ú̯p·ixántʃ] < piammu(ppuh) 'child'

kee namokkuppuhkantun 'not having money = moneyless'
[ké: yáwók·úp·ixántʃ] < namokku(ppuh) 'money'

With Nouns Ending in a Vowel

kahnipa'in 'have a house, dwell' < kahni 'house'
[káhnı̯pā’I]

paapa'in 'have water' < paa 'water'
[páː’I]

pungkupa'in 'have a pet, horse' < pungku 'pet, horse'
[pʊŋɡuː’I]

kahnikantun 'having a house, dwelling' < kahni 'house'
[káhnı̯’ántʃ]

paakantun 'having water' < paa 'water'
[páː’ántʃ]

tapakantun 'having testicles = stud' < tapa 'testicles'
[tápá’ántʃ]

9.4 STRESS PATTERNS

As in other Numic languages, stress patterns in Túmpisa Shoshone are predictable and follow what Sapir (1930:39) called the law of alternating stresses. Basically, this means that every other mora is stressed, while intervening morae are weak or unstressed. A mora is any single vowel as well as the
diphthongs ai or oi. Long vowels count as two morae, as do
vowel clusters of two vowels (except ai and oi); clusters of
three vowels count as three morae. Counting of alternating
stressed morae may begin either on the first or second mora of
a word, depending on a number of factors discussed below. The
first stressed mora carries the strongest or primary stress;
alternating morae afterwards carry secondary stress only
slightly less than the first stressed mora.

Typically, primary stress is on the first mora in the
word, and every other mora afterwards is secondarily stressed.
If secondary stress happens to fall on the last vowel of a
word in phrase-final position, the final vowel may or may not
take stress. If it does, then the final vowel is voiced; if
it does not, then the final vowel is normally devoiced. The
examples below illustrate this common pattern.

nattusu ungkantun  'doctor'
[nát·Usu·ŋgántʃ]

ke e namokkuppukhantun  'not having money'
[ké: ŋášok·up·xántʃ]

natupinniya(nna)  '(to) be named'
[náršën·iyahA] ≈ [náršën·iyahán·A] ≈ [náršën·iyahán·N·A]

tukummahannilgunkunna  'cook for'
[tuyum·āhān·lng·N·A] ≈ [tuyum·āhān·lng·N·A]

tutuaimipuhantun  'used to work'
[tiršām·ip·hand] ≈ [tiršām·ip·shántʃ]

tutuaimipuhantun  'worked'
[tiršāip·shántʃ] ≈ [tiršāip·şántʃ]
	amminoingkunna  'make tired, tire'
[tám·iʃòlŋg·N·A]
Usually, the second mora in the word (instead of the first) carries primary stress when the second syllable contains a long vowel while the first contains a short vowel; e.g.:

kukkwíppuh
[kúkwí:pʰ]
'smoke'

pihnaawitun
[plh́:ła:wθ]
'bee'

pomaappuh
[pʊ̥:wá:pʰ]
'grass, hay'
As the last three examples indicate, when the second vowel is long, the placement of primary stress often varies. In many words, primary stress may be on either the first (short) vowel or on the second (long) vowel. In determining the alternating stress pattern, long vowels count as two morae. But since they are simply one long vowel, if secondary stress would fall on the last half of the long vowel, the stress is manifested on the beginning of the long vowel, not on the end. This then changes the alternating stress pattern such that the second half of the long vowel is treated as an unstressed mora, and then the following vowel becomes stressed.

When the first vowel of the word is in a prefix and the second vowel is the first vowel of the stem, the second mora frequently carries primary stress, rather than the first; e.g.:
This situation is especially common in verbs with voice and instrumental prefixes. However, the placement of primary stress in these cases may vary, so that in many forms with prefixes, primary stress is on the vowel of the prefix rather than on the first stem vowel; e.g.:

<table>
<thead>
<tr>
<th>Verb</th>
<th>English</th>
<th>Original Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>nasuntamahanna</td>
<td>'to remember'</td>
<td>[násundácůhán·A]</td>
</tr>
<tr>
<td>tukoitsoinna</td>
<td>'to wash'</td>
<td>[tuvoirůín·A]</td>
</tr>
<tr>
<td>napakkappūh</td>
<td>'killed'</td>
<td>[náŋák·ap·E]</td>
</tr>
</tbody>
</table>
Primary stress may be placed on the second mora in words which have a geminate stop or g after the first vowel of the root. In these cases, again, stress placement may vary, as some of the examples below indicate.

 Uttunna 'to give' [ut·UN·A] ≈ [UT·UN·A]
 Kuttitina 'to hit' [kut·IN·A] ≈ [KUT·IN·A]
 Tsikka'ah 'cut' [zik·a?] ≈ [zik·a?]
 Nükkanha 'to dance' [nık·N·A] ≈ [nık·N·A] ≈ [Nık·N·A]
 Tükkanha 'to eat' [tık·N·A] ≈ [tık·N·A] ≈ [Tık·N·A]
 Küttsi'anna 'to bite' [kįš·i?an·N·A] ≈ [kįš·i?AN·A] ≈ [kįš·i?AN·A]
 Tosonenna 'to wipe' [tos6nen·N·A] ≈ [tósōnÈ·N·A]
 Masutuhinna 'to rub' [másuruhIN·A] ≈ [másuruhIN·A] ≈ [MásuruhIN·A]
 Toppottsitsi 'short' [top·襍·IČ·I] ≈ [top·襍·IČ·I]
 Tosapitūn 'white' [tosáṡi] ≈ [tosáṡi]
In most compounds, alternating stress works according to the patterns described up through the first stem. Then, counting of stress alternation begins anew on the first mora of the second stem that would normally take primary stress if the second stem were not in compound. However, the first stressed mora in the second stem of a compound is usually only secondarily stressed (i.e., it does not take primary stress as it would if it were a stem not in compound); e.g.:

- **yookontukkupittsi** 'valley bobcat'  
  \[\text{yookon}\text{(pin) 'valley', tukkupittsi 'wildcat}\]

- **toyatukkupittsi** 'mountain lion'  
  \[\text{toya}\text{(pin) 'mountain', tukkupittsi 'wildcat}\]

- **tupoontukkupittsi** 'desert bobcat'  
  \[\text{tupoon}\text{(pi) 'desert', tukkupittsi 'wildcat}\]

- **putisihpa'in** 'have a burro'  
  \[\text{putisih 'burro', -pa'in 'have}\]
The fact that stress alternation begins anew on the second stem in the compounds above probably indicates that they are quite transparent or nearly phrasal in nature. In a few compounds, perhaps more lexically frozen, alternating stress does not begin anew on the second stem. Rather, it works as if there were only a single stem; e.g.:

hupiatuki 'sing'
[hupia(r)iki] ≈ [hupia(r)xI]
< hupia(pin) 'song', tuki" 'put'

nampuninna 'tracks, to track'
[nam(b)unina]  
< nam(pe) 'foot, track', puninna 'to see'
9.5 CONTRACTIONS

Several contractions have been recorded. None of them seem to be obligatory, but they are common in rapid speech. Two frequent contractions are:

\[ u + u > \text{u} \quad \text{and} \quad \text{û} + \text{u} > \text{u} \]

E.g.:

- \( u \) ungappa'en na > ungappa'en na 'spank him'
- \( û \) ungappa'en na > ungappa'en na 'spank you'
- usû un natûkkanna > usunnatûkkanna 'that is what is eaten'

The objective case suffix -nna may optionally be contracted to simply \( n \): e.g.:

- númû tûpan(na) tûkkatû
  we(exc) pinenut-O eat-hab
  'we eat pinenuts'

- satûmû yuhukunnan(na) natûngkanna
  those stove oil-O ask for
  'they ask for stove oil'

- núü Antsia kwasu'un(na) tümüungküppûhantû
  I Angie-O dress-O bought for
  'I bought Angie a dress'

The contraction of -nna to \( n \) may occur whether or not the noun stem ends in the final segment \( n \). For example, -nna is used on both tûpa 'pinenut' and yuhukunna", which do not end in \( n \). Some other common, more or less idiosyncratic, contractions are listed below.
nanangkah > naangkah 'be noise'
summi yukkwi > summukkwi 'say that'
sinni + nukwi" > sinnukwi" 'do like this'
senni + nukwi" > sennukwi" 'do like this'
sanni + nukwi" > sannukwi" 'do like that'
sunni + nukwi" > sunnukwi" 'do like that'

Notes to Chapter 9

1. Even though glottal stop \~ never appears phonetically at the beginning of words, McLaughlin (1987:93) claims that "all phonetically vowel-initial words begin with a \/~\ ...." He bases this claim on the fact that glottal stop "surfaces when the stem is the second member of a compound or when a vowel-final prefix is added" (p. 93). For example, a glottal stop appears when okwetun 'flowing' is preceded by paa 'water' in the compound paa'okwetun 'river'; and a glottal stop appears when the verb annih 'fall down' is preceded by the prefix wu" 'with an elongated instrument' in wu'annih 'knock over'.

Despite these facts, I disagree with McLaughlin. My own view is that the glottal stop in these cases is epenthetic. It appears to maintain the separate integrity of the connected morphemes. It is important to note that both compounds with vowel-initial second stems and words with prefixes ending in a vowel appended to following vowel-initial stems are quite rare. Furthermore, there are hundreds of words that begin with vowels phonetically which never appear with an initial glottal stop. Therefore, in my view, it seems unnecessary and unmotivated to claim the existence of an abstract glottal stop on hundreds of words where it never surfaces.

2. In eastern varieties of Panamint Shoshone (i.e., from Beatty, Nevada, eastward), consonant clusters consisting of glottal stop plus a semivowel (i.e., \~ and \~) occur between vowels in morpheme-internal position. Clusters of this sort are extremely rare, and as far as I know, they only occur in the two words below. Compare the cognate forms from Death Valley, which do not have the consonant clusters.

<table>
<thead>
<tr>
<th>Beatty, Nevada</th>
<th>Tumpisa Shoshone</th>
</tr>
</thead>
<tbody>
<tr>
<td>wa'wata</td>
<td>'mosquito'</td>
</tr>
<tr>
<td>pai'yuu(ttsi)</td>
<td>'kangaroo rat'</td>
</tr>
</tbody>
</table>

In his dissertation, McLaughlin (1987) cites another word, noo'wi'a (sic), with a glottal plus semivowel, but this is a
misrecording of nookwi'a 'small barrel cactus', found in both Death Valley and Beatty.

Also in the eastern varieties, the cluster ht occurs both morpheme-internally and across morpheme boundaries. The two consonants of the cluster always merge phonetically to the voiceless fricative [θ]. Thus, in Beatty the word for 'jaw' is ahtapu [aθaθu], while in Tumpisa Shoshone it is atapu [ɑθaθu]. In Tumpisa Shoshone, the cluster of h plus t only occurs across word boundaries, never word-internally. However, [θ] occurs as an allophone of t, but only after front vowels before voiceless vowels (see 9.2.2.2 and 9.2.2.4).

Similarly, clusters of h plus the velars k and kw only occur across morpheme boundaries in Tumpisa Shoshone. Morpheme-internal clusters of h plus k and h plus kw have merged to h and hw, respectively. And generally in the verb system and in fully lexicalized words, h plus k and h plus kw normally merge to h and hw (see 9.3.5).

3. While in the phonemic orthography long vowels are written doubled (i.e., VV), in phonetic notation length is indicated with a colon following the long vowel (i.e., [V:]).

4. Voiceless vowels are written in phonetic notation with capital letters: e.g., [A], [E], [I], [O], [U], and [?] are voiceless variants of [a], [e], [i], [o], [u], and [u].

As discussed in 9.2.2.1, voiced consonants are unvoiced preceding voiceless vowels.

5. Geminate consonants are written doubled (i.e. CC) in the phonemic orthography used throughout this volume and in the Tumpisa (Panamint) Dictionary (Dayley 1989), but they are indicated in phonetic notation with a following raised dot (i.e., [C']).

6. In order to know what final segment a verb stem (or verb suffix) ends in, whether h, n, or h, it is usually necessary to have examples of the verb with several different suffixes. Verb stems ending in geminating h are the easiest to identify, since the initial segments t, k, and kw of following suffixes such as -tain completive, -kin 'hither', -kwan 'away' and completive, and -kwantu'ih 'going to' will appear geminate (i.e., as -ttain, -kkin, and -kkwantu'ih). Distinguishing between verb stems ending in n or h is somewhat more difficult, since suffixes beginning with a velar stop such as -kin 'hither', -kwan 'away' and completive, and -kwantu'ih 'going to' are manifested as -hin, -hwan, and -hwantu'ih, respectively, after both n and h. Thus, it is necessary to have examples of stems ending in n or h not only...
before suffixes beginning with velars but also before suffixes beginning with t, such as -tun habitual and present participle, -tu'llh 'will', or -tuhantun obligative future. Final h disappears completely before these suffixes, but final n optionally may appear. But even if n does not appear before suffixes beginning with t, it does not mean that there is no preceding n, since the n may optionally be omitted as well. So if an n does not appear, it is necessary to attempt to elicit it in order to see if it may be present. If it cannot be present, then the stem ends in h; of course, if it can be present, then the stem ends in n.