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Twana Phonology

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FOREWORD

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DEDICATION

This thesis is dedicated to four people: to my late father and mother, Isadore and Elizabeth (née Zamick) Drachman, to whom I owe by nature and nurture whatever talents I have; to my wife Angeliki (née Malikouti), who urged and sustained me, both throughout my studies and to the completion of this work; and to "Grandma" Louise Pulsifer, oldest living member of the Skokomish tribe, whose patience in infirmity made it possible for me to glean some understanding of the workings of the Twana language.

ACKNOWLEDGEMENTS

The field-work on which this thesis rests was supported by the Survey of Northwest Languages sponsored by the National Science Foundation and administered by the University of Washington at

Seattle, Washington.[1] Professor Lawrence C. Thompson, Director of the Survey over the three summers during which I was in the field, gave me much kind support and encouragement, as well as the benefit of his considerable experience with the languages of the area.

Deeper in its own way is my debt to Professor Eric P. Hamp, of the University of Chicago. It was very largely due to his influence that, at the hoary age of thirty-seven, I set out to make linguistics my career rather than my hobby. Yet more concretely, it was due to his efforts that I was awarded NDEA Fellowships enabling me to complete four years of study at the University of Chicago. Having advised and befriended me in all my studies, he also in the end guided me to the completion of this thesis, even from abroad.

To Professor James D. McCawley I owe my initiation into the motivations and mechanisms of generative grammar, through the gift of many patient hours of argument and explication.

Last, but by no means least, I owe to Professor George V. Bobrinskoy the gift of his friendship and wise encouragement throughout my career at the University of Chicago, in matters both academic and personal.

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[1]The Survey has now moved its base to the University of Hawaii.

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CHAPTER I

INTRODUCTION

I.1. Scope and Intention

Twana (or, Skokomish) is a Salish language, spoken until the early years of the present century along the Hood Canal, on the Olympic Peninsula, in the State of Washington.

This thesis is concerned with explaining a basis for a 'Phonology of Twana.' However, pending the publication of a full-scale Grammar, a very brief characterization of traditional Amerindian type is here given.

The inventory of surface contrasts contains the following segmentals.[1] p̓ p t̓ t ċ c č̓ č x̌ k̓ k k̓ʷ kʷ q̓ q q̓ʷ qʷ ʔ s š̓ ɬ x² xʷ x̣ x̣ʷ h b² d² (ʒ) (ǰ) (g) (gʷ) (m̓) (m) (n) w̓ w y̓ y l̓ l : e ɛ ə a o ɔ , bracketed segments (probably) only occurring in loan words from European, or other Salish (particularly Puget Sound) languages.

As is common in Salish, multi-membered consonant-clusters are tolerated in Twana, partly consequent on the existence of many morphemes entering into composition with the shapes C, CC. The cluster-resolving status of the 'pepet vowel' (shwa) will be discussed, as will also the light thrown on cluster-limitations by a study of reduplication.

Three degrees of stress (primary, secondary, and 'zero') are found in surface forms.[3] Pitch is not contrastive within lexical items: the syntactical function of pitch is badly understood as yet.

From the point of view of syntactic behavior, the major word-classes of Twana are Nouns, Verbs and particles. However, the same roots

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[1] See Figs. 5, 6, Chap. I, sec. 3.3.3 for surface-contrast grid and Distinctive Feature matrix.

[2] x is of uncertain status (but see esp. p. 89). ʔb/bʔ , ʔd/dʔ occur, but only as sequences (see Fig. 48, Chap. IV, sec. 1.1 for data).

[3] Although, for dictionary items, only primary stress (and its position) need be indicated.

so often partake in Noun and Verb stems that it might well be held that the roots of the language are unmarked for subclass, insofar as roots may be dictionary entries. The most important morphological processes are compounding, affixation, reduplication, and accent-shift.

Grammatical categories marked in both Noun and Verb are Augmentative and Attenuative. In the Noun, possession is also marked. In the Verb, major and minor (subordinate) predication are distinguished: in addition, prefixes mark certain aspects and determiners (including agreement for gender and proximity). Suffixes mark inchoative aspect, transitivity (inherent or derived), reflexive, reciprocal, imperative, causative and desiderative, and actor and goal referents.

Especially noteworthy is a set of lexical suffixes (essentially, 'incorporated' object nouns), common throughout Salish, which may be re-interpreted as 'classifying pronominals.'

Particles include interjections, conjunctions, articles and demonstratives, and 'free' pronouns.[1]

A characteristically 'Coast Salish' trait is that many adverbs behave as auxiliary verbs, preposed to the main verb.[2]

The remainder of this chapter presents the background for the study of the Twana language, and concludes with some remarks on the Phonological Component of a Grammar, together with a discussion of the Inventory of segments.

Chapters II and III present the arguments for the basis for a generative phonology of Twana. The taxonomic inventory assumed in the present chapter is re-interpreted in the light of an examination of various crucial aspects of Twana morphology. In particular, an attempt is made to explicate certain problems which recur in other Salish languages. Such are the behavior of the voiced obstruents b,d, in relation to the glottalization of consonants; the role of the laryngeals h,ʔ, in connection with so-called vowel-length, with the derivation of the mid-vowels, and with glottalization generally; the role of accent-shift, and its relation to vowel-loss; and the special status of shwa.

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[1] See Appendix I, sec. 5.2. Grammatical Morphemes.

[2] Compare Reichard (1958-60), sec. 12.1, on the stability of certain aspects of Salish structure.

Chapter IV considers the Distinctive Features, based on the definitions of Chomsky-Halle (1968), in the light of the definition of Twana segments, the shapes of Twana morphemes, and the rules of Twana phonology so far established. Some important implications of the notion 'neutral speech-tract'[1] for the definition of Distinctive Features are discussed.

I.2. Background

I.2.1. Location, Population, Culture Area, and Chronology

The language known as Twana or Skokomish (transcribed as Too-an-hooch/To-an-hooch, Sko-ko-mish in the Treaty of 1855[2]) was at the time of the first attested white contacts[3] spoken over the whole of the drainage area of the Hood Canal on the Olympic Peninsula in the State of Washington. Although this constitutes a total area of approximately 750 square miles,[4] the number of speakers, at least since the end of the eighteenth century, was probably not more than some 500.[5]

Moreover, as Elmendorf points out, we must distinguish the summer from the winter-distribution of the Twana: in winter, the population was concentrated into some nine 'winter village communities,' four along the West bank of the Canal, three along the Skokomish River, and two on the

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[1] I shall elsewhere show that this notion must be elaborated within a more general account of the Basis of Articulation. In the present context, see Chap. IV, secs. 3.3.1 (the speech-neutral tract) and 3.7.1.2/3 (on the velum).

[2] Treaty of Point No Point (1855). 'Twana' has no satisfactory etymology.

[3] Vancouver (1789), Elmendorf (1960).

[4] From the point of view of linguistic contact, such a figure is seriously misleading. As Elmendorf explains, it is important to note that 'ethnic acquaintance' depended not on mere distance but, because of the terrain and mode of transport, on the river drainage systems and on the existence of trails crossing low watershed areas.

[5] Elmendorf (1960) gives the Twana population for mid-nineteenth century as about 1,000, of whom about one-half lived in the Skokomish River drainage area. There are some 500 on the Skokomish Roll today, very many of whom do not live on the Reservation. Cf. p. 6. fn. 2.

South arm of the Canal:[1] in the summer, on the other hand, mixed groups from the various winter-villages inhabited different sites at different times, but most groups found themselves along the Canal at that time, or at their favorite berry-picking grounds. The culture in question, it is to be remembered, was 'food-gathering';[2] that is, hunting, fishing, and berry-picking were its main means of subsistence.

Comment on the possibility of recovering at least hints on certain dialect diversity within Twana will be found in the discussion of the corpora (Chap. I, sec. 2.4). At this point, suffice to say that what differences there probably were between the dialects of (say) Quilcene in the North, Skokomish upriver from Annas Bay, and Duhlelap to the South-East,[3] were levelled progressively from 1859, when all Twana speakers found themselves on the Skokomish Reservation.

Chronology of the Twana culture area

1785-1800	Exploration of NW Coast. Nootka Sound as trade-center.
1790's-1850's	Trade with Hudson's Bay Co. at Ft. Nisqually.
1790	Voyage of Vancouver. First account of Twana.
1800-1810	Founding of Duhlelap winter village. See Fig. 1, site 9.
1811	Foundation of Astoria, on the Columbia River.
1800-1840	Spread of Chinook Jargon to Twana through trade, via Lower Chehalis and Satsop.
	Smallpox epidemics, via same route, affect Twana; thence to Clallam and northwards.

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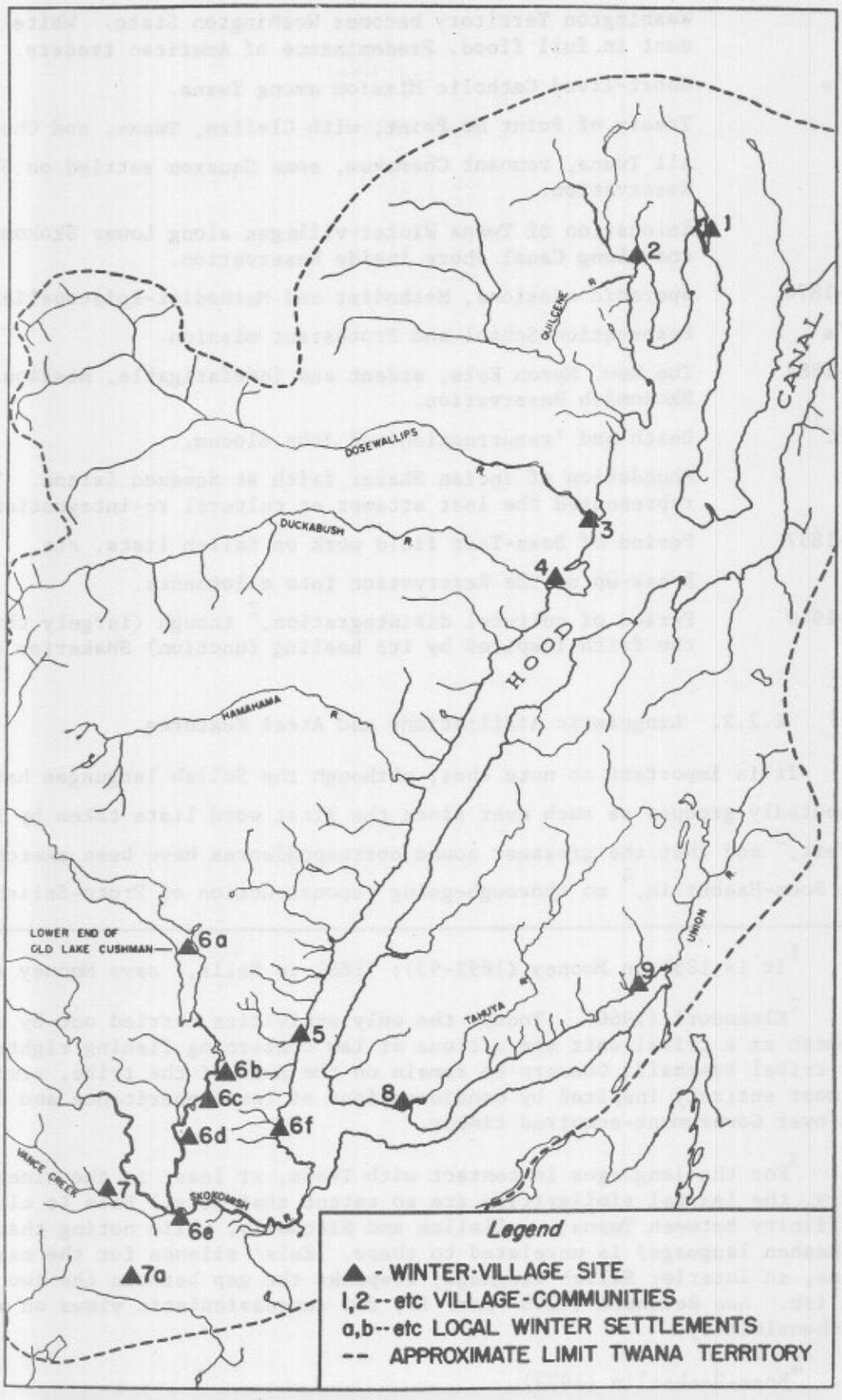
[1] See Fig. 1, p. 5. Figs. 1 & 2 are taken from Elmendorf (1960).

[2] This accords with the characteristics of the culture-area including California, the Basin, the Plateau, and the North-West.

[3] Elmendorf's (1960) informant told him that the Duhlelap settlement was founded by people from the Skokomish River, probably no earlier than the 1810's. The likelihood of considerable dialect divergence (apart from the 'interference' from the now-adjacent Squaxon village of Allyn) between 1810 and 1859 is small. However, the Duhlelap did resist fusion for a while by settling at Potlatch in the 'removal' period. There may be a link between this fact and the reference to 'Hoodsport talk' by Mrs. Pulsifer (see Chap. I, sec. 2.5).

Note that the name Duhlelap has no Twana etymology, and is known to the Skokomish by the name tx^{w}lélap. This look like a Common Puget Sound compound (cp. Nisqually; lél 'far,' -ap Common Salish bound pronominal 'end'). Twana 'far' is łe'éł, and the prefix would in Twana be dx^{w}-.



1. Dabob
2. Quilcene
3. Dosewallips
4. Duckabush
5. Hoodsport
6. Skokomish
7. Vance Creek
8. Tahuya
9. Duhlelap

Fig. 1 -- Twana Winter-Village Communities

1853	Washington Territory becomes Washington State. White settlement in full flood. Predominance of American traders.
1850's	Short-lived Catholic Mission among Twana.
1855	Treaty of Point No Point, with Clallam, Twana, and Chemakum.
1859	All Twana, remnant Chemakum, some Squaxon settled on Skokomish Reservation.
	Relocation of Twana Winter-villages along Lower Skokomish River and along Canal shore inside Reservation.
1860-1870	Sporadic missions, Methodist and Methodist-Episcopalian.
1870's	Reservation School and Protestant mission.
1874-1884	The Rev. Myron Eels, ardent and indefatigable, missionary at Skokomish Reservation.
1881/2[1]	Death and 'resurrection' of John Slocum.
	Foundation of Indian Shaker faith at Squaxon Island. This represented the last attempt at cultural re-integration.
1886-1897	Period of Boas-Teit field work on Salish lists, etc.
1887	Break-up of the Reservation into allotments.
1890-1940	Period of cultural disintegration,[2] though (largely through the faith inspired by its healing function) Shakerism survives.

I.2.2. Linguistic Affiliations and Areal Features

It is important to note that, although the Salish languages have been undisputedly grouped as such ever since the first word lists taken by Boas and Teit,[3] and that the grossest sound correspondences have been sketched out since Boas-Haeberlin,[4] no thorough-going reconstruction of Proto-Salish has

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[1] It is 1881 in Mooney (1892-93); '1882 in Eells,' says Mooney (ibid.).

[2] Elmendorf (1960). Today, the only activities carried out by the Skokomish as a tribal unit are actions at law concerning fishing rights, and inter-tribal baseball. Concern to remain on the Roll of the tribe, similarly, is almost entirely inspired by considerations of land-inheritance and law-suits over Government-acquired timber.

[3] For the languages in contact with Twana, at least in the nineteenth century, the lexical similarities are so patent that (e.g.) Eels is clear about the affinity between Twana, Clallam and Nisqually, while noting that Chemakum (a Wakashan language) is unrelated to these. Eels' silence for the case of Spokane, an Interior Salish language, bespeaks the gap between the two divisions of Salish. See Reichard (1960) par. 10, for impressionistic views on mutual comprehensibility.

[4] Boas-Haeberlin (1927).

yet been undertaken. Taking the Boas-Haeberlin paper referred to, it is to be noted that even the major issoglosses k/č, x/š, and i/a show serious inconsistencies as between individual lexical items, and that no attempt is made either to account for these exceptions or to reconstruct whole morphemes where these segments do in fact match.

All the same, Boas-Haeberlin were pioneering inside a language family where the very phonetic nature of the data is generally considered particularly intractable,[1] and it is reasonable to suppose that the major cleavage into 'Coast' as against 'Interior' languages will stand.

The glottochronological assessment of Swadesh,[2] whatever its theoretical status,[3] still confirmed the hypothesized Coast/Inland cleavage, refining the picture only to the extent of separating off both Bella Coola (British Columbia) and Tillamook (Oregon).

The reworking of the glottochronological data by Suttles-Elmendorf[4] confirms Swadesh's branch classification, but modifies his sub-groupings. In particular, Suttles-Elmendorf integrate Twana within Coast Salish in a chain including North-Georgia, South-Georgia, Puget Sound, Twana, and Olympic:[5] Bella Coola and Tillamook remain (though detached) members of the same North-South chain.

The evidence for sub-grouping from comparative grammar, sparse as it is, again at least partly confirms the Coast-Inland cleavage; but little work has been done on sub-grouping,[6] which must await the publication of descriptions of far more languages than we yet possess. It is sufficient to recall, as an example, that Swadesh classified Tillamook as an independent division, while Reichard suggested a special relationship between Tillamook and Interior Salish.

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[1] Compare remarks in Swadesh (1952), par. 2.

[2] Swadesh (1950), repeated in Swadesh (1952).

[3] Cf. Bergsland and Vogt (1962).

[4] Suttles and Elmendorf (1962).

[5] Challenged in Dyen (1962), but re-affirmed by Elmendorf (1968).

[6] The dangers of working with tiny areas of structure, as well as with diverse techniques is well illustrated in Elmendorf's study of the Salish numerals; his 'chain' here changes its internal ordering to: Tillamook, Twana, Puget Sound, Olympic. On the other hand, Suttles' analysis of pronominal-usages shows the most distinctive systems to belong respectively to Bella Coola, Tillamook, and Kalispel/Coeur d'Alene, the language areas which are (at least today) most marginal to the family.

In view of the paucity of our knowledge of the internal history of Salish, any discussion of wider affiliations, whether within 'Mosan' or even 'Mosan-Algonkian'[1] must to a large extent be fruitless at this time. Beyond cataloguing the fact that such hypotheses exist, this thesis can have nothing to say on such a topic.

On the other hand, it is important to point out that the languages of the Pacific North-West constitute an extemely interesting Sprachbund. To cite only phonological evidence,[2] we note that Jacobs (1951) includes the following commonalties (all found in Twana) as characteristic of the area.[3]

1. Mid-palatal as well as velar stops and continuants, both rounded and unrounded.
2. At least two laterals, l and ɬ. Some add λ'.
3. At least $p',t',c',k',k^{w'}$, in addition to 'plain' counterparts.
4. The glottalized resonants y',w',l'.
5. Lack of interdental or labio-dental continuants.
6. Tolerance of complex consonantal clusters.
7. Variation of vowel-quality correlating with stress.

As will be recalled (see Chap. I, sec. 1) Jacobs' points 4 and 7 are of special interest for Twana. The question of clusters is also to be dealt with.

I.2.3. Contact Languages

As has been shown above, little can be said of possible earlier groupings within Salish which might correlate with any putative Twana Ur-Heimat.[4] We confine ourselves, therefore, to two kinds of contact-language situation: the immediately adjacent language areas; and the influx of European

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[1] Swadesh (1953). For earlier references to these larger groupings, see Boas (1911), Frachtenberg (1920), Sapir (1929) and Andrade (1933).

[2] For morphology, consider Reichard (1958-60), 12.1, Newman (1968), Hamp (1968).

[3] Passing over special exceptions, such as the lack of labials (saving only w) in Tillamook.

[4] For a putative Salish Ur-Heimat, see Jacobs (1937), and Elmendorf (1962).

loans (perhaps largely) through the Chinook Jargon, the lingua franca of the area for some 100 years.

As will be seen from the accompanying sketch-map (Fig 2) Twana was abutted to the North and North-West by Clallam and Chemakum, to the East and South-East by 'Puget Sound', and to the South-West by Satsop, a dialect of Chehalis. Of these, all but Chemakum[1] are Salish, although none would be intelligible to a monolingual Twana-speaker.[2] Apart from the possibility of some Hood's Canal place-names proving ultimately to be of Chemakum origin, no immediately obvious influence of Chemakum is apparent in Twana.[3]

I.2.3.1. Clallam

Eels (1887) asserts that no Clallam (save only criminals, and then only for a short period!) were sent to the Skokomish Reservation, despite the terms of the Treaty.[4] On the other hand, Eels (1886) mentions Clallam as one of the four languages spoken on the Reservation, while Elmendorf (1960) cites the borrowing of the secret-society ritual as well as (perhaps) some of the main elements of their large-scale, inter-tribal give-away feast as evidence of an intimacy of long standing between the two tribes. Inter-marriage and visiting were common by 1850 and it is important to note, from the point of view of possible linguistic borrowing, that the Clallam were the more prestigious.

I.2.3.2. Puget Sound

Puget Sound Salish comprises a chain of mutually intelligible dialects flanking Puget Sound to the North-East, East and South-East,

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[1] Chemakum is of Chemakuan stock, with Quileute as the second member.

[2] A personal opinion, based on observation: my main informant spoke Nisqually to a Nisqually once in my presence; the Nisqually, however, was unable to understand more than occasional single words of Twana. There were probably few Twana who remained mono-lingual.

[3] By 1859 (founding of the Skokomish Reservation) the Chemakum were practically extinct, as a result of wars, though the remnant did manage to flee to the Skokomish Reservation.

[4] The Treaty (of Point No Point) provided specifically for Clallam, Chemakum, Twana, and Skokomish. It is entitled 'Treaty with the S'Klallam, 1855.'

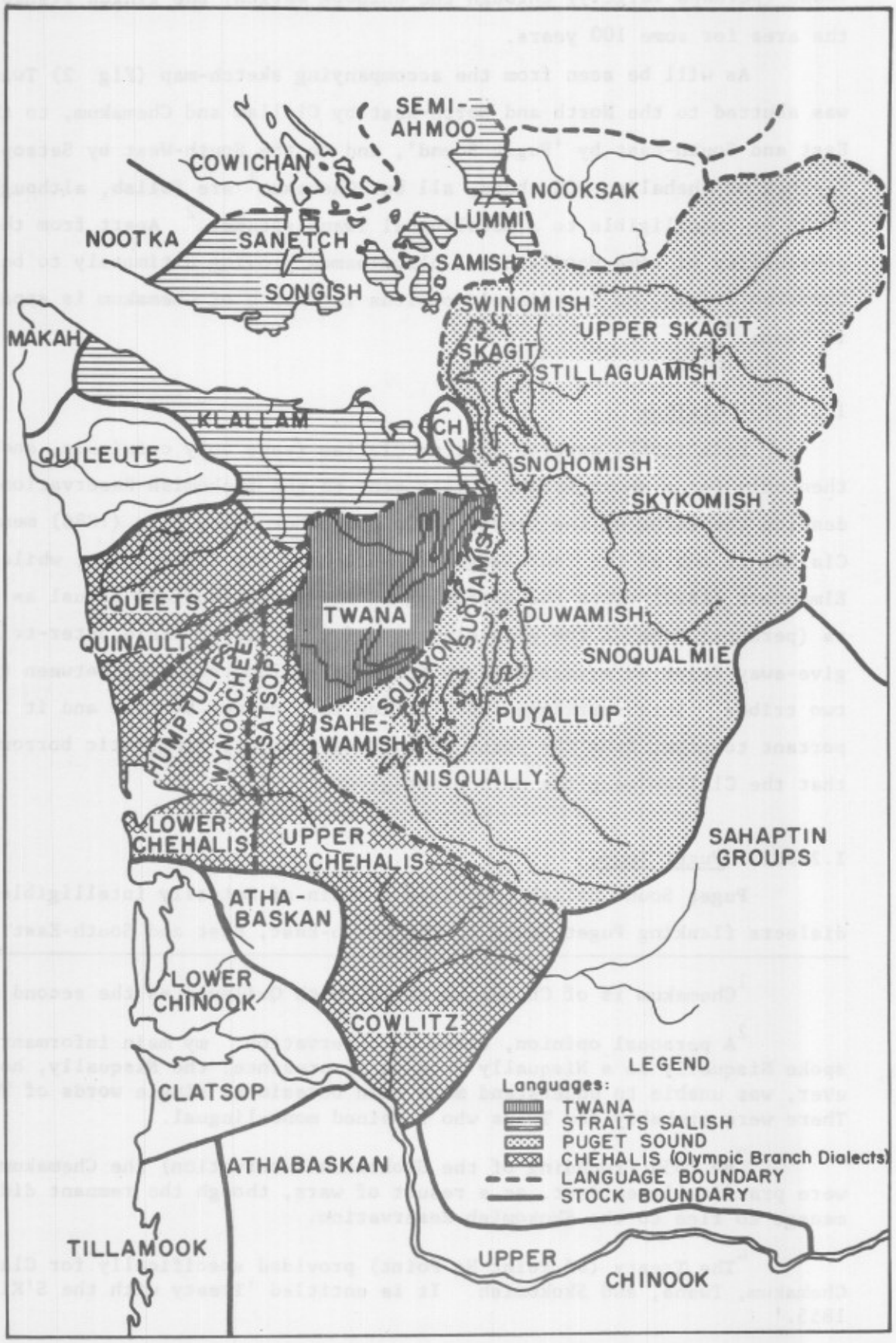

Fig. 2 -- Twana Ethnic and Linguistic Contacts

within a line drawn from Mt. Baker southward to Mt. Rainier then West and North-West to Olympia and Shelton,[1] and flanking Western Puget Sound to the East of the Twana area. The dialects of immediate interest as contacting Twana are Sahewamish (location of modern Shelton), Squaxon, and Suquamish.[2]

While there is no special genetic relationship between Twana and Puget Sound, it is noted that some thirty Squaxon[3] speakers moved onto the reservation at its formation; moreover, the Squaxon were sufficiently close and intimate, partly no doubt through the proximity of (Squaxon) Allyn to (Twana) Duhlelap,[4] to partake in the most intimate of the intercommunity activities, the eating contest.[5]

I.2.3.3. Satsop and Lower Chehalis

To the West, the Olympic Range presented a barrier apparently not permitting more than casual (hunting-party) contact with the Quinault. To the South-West, however, an overland trail must have existed from pre-contact times via the Satsop and Chehalis Rivers to Grays Harbor and the Pacific coast. While intermarriage also occurred between the Twana and the Lower Chehalis (though limited to upper-class families), participation in the eating contests as well as intermarriage characterized the Satsop-Twana relationship as particularly close. There remaining no speakers of Satsop,[6] only close comparative study between Twana, Upper Chehalis and Lower Chehalis will throw any light on possible Satsop influence on the Twana language.

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[1] Hess (1966).

[2] As Elmendorf (1960) points out, it is interesting that the name Suquamish admits of an etymology in Twana but not in Suquamish.

[3] 'Squaxonites, speaking Nisqually.' See Eels (1886). Puget Sound has (1965) perhaps four speakers.

[4] At least since the early nineteenth century when it was probably founded as a Skokomish 'colony.'

[5] Elmendorf (1960), Table 4, p. 303.

[6] 'Satsop was a minor dialect situated geographically and linguistically medially between Upper and Lower Chehalis.' Kincade (1963-64).

In the light of the foregoing, it is not difficult to see that cultural and linguistic factors conspired to force Twana speakers to learn at least one, perhaps two or even three 'foreign' languages,[1] quite apart from the question of the chronology of the spread of English. In the 1880's the missionary Myron Eels preached in Chinook, while it is clear from present-day informants that "everyone knew the Nisqually language, but they spoke to the 'Pastəds' (white people) in Chinook, the older ones who didn't know 'Pastəd' (English)."

Multi-lingualism being thus the norm for such a culture-area, rates of diffusion of loan material, whether lexical or morphological, might well be considerable.[2]

On the other hand, the circumstances making for diffusion can hardly at the same time be responsible for what amounts to an opposite trend, viz. the widely-commented-upon lexical diversity between Salish languages.[3]

I.2.3.4. The Chinook Jargon

There is some evidence that Twana familiarity with the lingua franca of the North-West coast, the Chinook Jargon, was in the first place by direct contact of Twana traders, via the Satsop Trail mentioned above. Elmendorf's informant suggests that such trading visits to the Columbia River were 'either post-white in date or stimulated largely by white trade.' If this is true, we can date the influx of European (and other Chinook-

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[1] It is interesting to note that 'No one from outside ever learned Twana. Everyone said it was too hard' (informant comment). Cp. also Elmendorf's informant (1960).

[2] For an extension of this argument to the whole of the Pacific North-West Sprachbund, see Jacobs (1951). Elmendorf (1951) suggests name-taboo as an important source of lexical replacement in Twana. However, he offers but one convincing example, the replacement of čátas 'stone' by q̓ʷəlé?las 'cooking stone.' Even in this case, Elmendorf confesses that the taboo was not extensively agreed to. In any event, the present writer's main informant retains the 'original' form, and did not recall a taboo on this word.

[3] In contrast to the supposed stability of the grammar--a supposition which we can hardly claim has been very thoroughly substantiated, despite Reichard's list of features already referred to.

mediated) loans into Twana[1] as beginning in the late eighteenth century. On the other hand, Eels (1887) tells us that of the Reservation population, 'all but the very old and the very young speak Chinook.' This suggests that Chinook had gained widespread use in Twana territory only by the 1820's or 1830's.[2]

Mention has already been made (see Prefatory Note) of the non-native segmental phonemes involved, and further discussion will follow in the phonological analysis. Some interesting cases occur of loan words containing unassimilated non-native segments yet exhibiting complete assimilation to native morphological patterning.[3]

I.2.4. Previous Study of Twana

In describing a language no longer viable, and moreover a language with only two or three living speakers, one welcomes any source of materials from which to determine how far the present informants' speech is idiosyncratic in any important respect.

In the present case, six such sources exist.[4]

1. Eels 1877, 1881, 1887, 1889.
2. Boas-Teit 1890's (?):(B) Boas-Haeberlin 1927.
3. Gunther 1945.
4. Elmendorf 1946, 1951, 1954, 1960, 1961(A), 1961(B), 1962(A), 1962(B).
5. Swadesh 1951, 1952.
6. What in effect constitutes a sixth source of data is the existence of a tape recording[5] of the speech of Liza Purdy, the (deceased) mother of one of the living speakers. We shall refer to this material as Corpus 6.

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[1] From the point of view of geographical proximity, forms via Upper Chehalis are likely to be present.

[2] Conversely, this also suggests the rate at which English was becoming the 'native' language of the Skokomish Twana. Mrs. Pulsifer (the main informant), though multi-lingual (Chap. I, sec. 2.5) knows but little Chinook Jargon.

[3] See Chap. IV, esp. secs. 3.7, 3.8.

[4] For full references, see bibliography.

[5] Generously made available for copying by Mr. Leon V. Metcalf of Seattle, Washington (1963).

We here characterize the contents of each source in a very general fashion.

We first omit from discussion part of Corpus 2. This consists of lists of lexical items, gathered by the authors in the course of field-work, and potentially of great interest but not available to me at the time of writing. Some of the items of Corpus 2 are reproduced as examples in Boas-Haeberlin (1927). We shall refer to this latter 'corpus' as Corpus 2(B).

Corpus 5 (1951) is likewise not available. It consists of 200 Salish cognate sets, a sample of which appear in Swadesh (1952). This sample will be referred to as Corpus 5.

Corpus 1 designates the word-lists scattered through Eels' publications on the Twana. It is of interest as containing items (such as month-names) no longer remembered[1] by speakers even at the time of Elmendorf's field work (mainly 1939-40), although Eels' orthography presents considerable difficulties. A feature unique to this corpus is that it contains (1881) a 'Grammar of Twana.' Although unfortunately only two pages in length, this Grammar contains a number of points of interest. Again despite orthographic problems, three short Hymns in Twana (Eels, 1889) are of great interest.

Corpus 3 contains botanical terms, some of interest morphologically, although here again orthography is a problem.

Corpus 4 consists of several hundreds of words, together with a number of phrases and sentences and a few song-texts, scattered through the publications of Elmendorf. Elmendorf discusses a single lexical suffix (1960, p. 129); he also cites 'bound forms' and suppletives in numerals 1-10 (1962B).

Only Swadesh (1952) and Elmendorf (unpublished) make any attempt at phonological analysis,[2] but both stop short having stated the inventory of phonemes. Differences in phoneme inventory between the two will be discussed under Segment Inventory (Chap. I, sec. 3.3). Neither 4 nor 5 contains any systematic discussion of morphology.

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[1] Some month-names were recalled by Mrs. Pulsifer when read to her from this list.

[2] Eels (1881) does give 'the letters of Twana.' His transcription and the interest in his forms generally will be discussed in another place.

I.2.5. Field Situation and Informants

On the Reservation itself, Twana has long ceased to be a language in daily use, and the number of very old people who remember even single words[1] is progressively diminishing with their death. What is worse, almost all the very few speakers are either involved in or intimidated by the waning but still practiced Indian Shaker faith, the practitioners of which are resolutely opposed to the disclosure of what are for them 'the secrets of the tribe.'[2]

The extreme case of secrecy is exemplified by Lee Cush, the Shaker minister (73 years old), whom I have heard praying (1964-1965) in Skokomish as well as in the Chinook Jargon, but who refused to allow recordings or even to discuss the language. His attitude is particularly regrettable in that his father[3] had been among the last residents at Quilcene, and it is possible that his speech may contain elements of interest for Twana dialectology.

The only Reservation informant comparatively uninfluenced by the Shakers is Archie Adams (79 years old). However, he proved to be unable to recall more than a very few single words, and even then offered 'Puyallup' (better, Puget Sound) forms much of the time.

Sickness, accompanied by an inability to concentrate for usefully long periods of time, made Mrs. Emily Miller (73 years old) a less than invaluable informant. Her involvement in the Shaker faith was no doubt (though never overtly so) an additional factor in her seeming unwillingness to act as an informant. Only single words were elicited from her directly. On the other hand, by a dramatic stroke of good fortune--the circumstances

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[1] Two or three words (sex references, and the word Pástəd 'white man') are still current, even among very young children.

[2] Difficult as it is to assess, one must not overlook the influence of missionaries here. Feelings of shame at supposedly heather wickednesses were no doubt partly responsible for a reluctance to recount myths other than those already adapted to missionizing purposes, of which the legend of the Flood is the most notable.

[3] Elmendorf (1960) made a very limited use of Lee Cush's father (Charley). We note that the impediment then, too, was the presence of the son Lee, who was already a Shaker minister.

being her recognition of the voice on the 'Liza Purdy' tape-recording (Corpus 6) as that of her own mother--it was possible to gloss and at least partly analyze three valuable texts.[1]

The main informant was Mrs. Louise Pulsifer (83 years old). Badly crippled, toothless, almost totally blind and in constant pain, Mrs. Pulsifer slowly (over three summers, 1963-1965) remembered her language. Though multi-lingual (speaking Clallam, Puget Sound, Skokomish, and English) she was always scrupulous in distinguishing 'the genuine old Skokomish language' from other speech, even to the point of characterizing Mrs. Miller (for example) as 'from Hoodsport'--a characterization which may throw some light on the dialect of Duhlelap. Despite infirmities and continual harrassment (through jealousy as well as the tribal pride mentioned above), Mrs. Pulsifer dictated forms and tape-recorded and aurally checked texts for as many as six hours a day. Let it be a tribute to her that it is very largely her data[2] that enable us to reconstruct, however roughly, the phonology of the Skokomish language.

One hundred-word (Swadesh-type) lists were elicited from and tape-recorded by the following further informants.

1. Eddie Beattie (77 years old) at Tacoma.[3] Mr. Beattie has been in contact with Puget Sound for so many years that he has largely confused his native Skokomish with it.

2. Mrs. Hattie Cross (70 years old) at Puyallup. Mrs. Cross is the daughter of Henry Allen (main informant of Elmendord [1960]), but has lived at Puyallup (Puget Sound speaking) since she was fourteen years old. She remembers single words of Skokomish, but confuses Skokomish with Puget Sound.

3. Mrs. Irene Teoh/Baptist (50[?] years old) at Wapato, Yakima. Reputedly[4] speaking Skokomish fluently, she nevertheless proved impossible

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[1] To be discussed elsewhere.

[2] Henceforth, 'main corpus' (or 'corpus') refers to Mrs. Pulsifer. Other Corpora will be referred to specifically, where appropriate.

[3] Later, at Puyallup (1965).

[4] Testimony of Mrs. Pulsifer.

to work with (1964) because of the belligerent attitude of her husband.[1]

I.2.6. Character of the Main Corpus

The main corpus consists of (a) word-lists and sentences, all also tape-recorded, together with paradigms, some tape-recorded; (b) texts, all tape-recorded (but not all transcribed).

I.2.6.1. The Word Lists

The field work for this thesis was supported by the Survey of Northwest Languages, financed by the National Science Foundation, administered (1963-65) by the University of Washington. This project has a double aim. It seeks first to furnish full descriptions of a number of stategically-chosen Salish languages, of which Skokomish Twana is one. It then proposes to attempt the reconstruction of Proto-Salish on the basis of these descriptions. To the latter end (that is, to ensure the comparability of materials from the languages to be described), a basic list[2] of some 700 lexical items and morphological features was selected, all likely to be reproducible in all the languages concerned. This list is entitled 'The Northwest Word List,' and its content constitutes the core of the vocabulary lists. It was supplemented by items found in texts, elicited during the analysis of texts or general discussion of the culture, or simply volunteered by the informant. The field situation made it unwise to spend much time in systematically constructing a dictionary of Skokomish. Some three thousand lexical items are filed, in addition to which there

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[1] Mrs. Baptist, having separated from her husband, later (1965) lived at Toppenish, Yakima. It is hoped to work with her in the future; she is likely to prove an important source, especially since 'interference' from Yakima languages (non-Salish) should be minimal and easily screened out.

[2] The list is in fact divided into two parts: 'Short Northwest word list,' and 'Word list 2.' The first contains 350 items selected from the semantic fields of quantity, people and kin, body parts, colors, natural phenomena, directions, animal life, plant life, materials and food, adjectives, and operations.

The second part of the list contains less 'basic' items, and includes terms for objects and phenomena particular to the area and the culture, e.g., names of berries known to be used as food, words connected with canoe transportation, etc.

Both parts of the list are at present under revision (1968).

were re-elicited the 179 place-names in Elmendorf (1960), together with related items.

Within the limitations imposed by the language[1] and the patience of the informants, paradigms were elicited wherever possible. Although this thesis makes use of only a few paradigm types, it is worthwhile to comment briefly on their importance generally for the establishment of appropriate underlying morpheme-shapes.

Crucial are details of pronominal reference and relation of the syntax of 'free' objects to that of the corresponding embedded pronominalizations of objects (the so-called lexical or 'field' suffixes).

Other important ways in which paradigms are essential are, e.g., in the determination of the position of pronouns with adverbs, and (most perplexing) the elucidation of the transitivity system.[2]

So far as elicited forms are concerned, there is inconsistent treatment of subject and possessor gender as marked in the determiner (article and demonstrative) systems; this may be due to genuine loss of the distinction--we find this loss of distinction in non-human animate noun forms--but it may equally have arisen in the corpus through confusion in eliciting.

In the circumstances, little more has been done with the syntax of Twana than to taxonomize the surface constructions found in texts and citation utterances. The deep semanto-syntax, with its problems of lexical selection, etc., is for the moment beyond our reach. In any case, this thesis has only incidental remarks to make on syntax, in the discussion of phonological boundary markers.[3]

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[1]The universal difficulty in obtaining paradigms for certain crucial parts of Salish morphology has been noted by many workers (e.g., Thompson, personal communication). The problem is acute for the aspectual and subject-object relationships. The more than ordinary burden which this places on text-collection is not aided by the impossibility of recording even a single conversation in Twana. The 'cleanest' texts (i.e., those clearest of false starts, hesitations, etc.) are those concerning Myths and Fables; but these are precisely the texts which it proved impossible to use as jumping-off points in the paradigm quest, since they are in a sense 'canonized' in the informant's memory.

[2]Cf. Hess (1967) for important insights on this as well as on aspect and reference.

[3]The important and complex problem of stress assignment in

I.2.6.2. The Texts

In the light of the imminent extinction of the Skokomish language, it was considered expedient to tape-record as many texts as possible, even though it was not feasible to transcribe and check even the majority of them before leaving the field (1965). Here it is sufficient to characterize the text corpus for its content and its importance to a linguistic analysis of Skokomish.

The types of content are: Myth and legend, ethnography and fables, everyday narrative, biography and autobiography, and songs.[1] Although I have overheard conversations in Skokomish between Mrs. Pulsifer and Mrs. Miller, it never proved possible to transcribe or even tape-record any piece of dialogue in Skokomish. The Myth of The Flood I was able to record on two separate occasions; I shall comment elsewhere on the degree of consistency between the two versions. For the moment, it is to be noted that the comparatively 'fixed' status of such a text suggests we may recover archaic forms from it; conversely, the same fact makes it all the more important to possess day-to-day narratives against which to measure the archaisms, whether of lexicon or of grammar.

Texts were elicited in various ways: by free recall, for the Myths, ethnography, biography and autobiography; for some legends and fables in Elmendorf (1961B) not previously known to Mrs. Pulsfer, by reading the story to the informant in English,[2] followed by free recall; and by reading the Skokomish transcript, and reconstitution of the text as a joint endeavor, in the case only of Eels' (1889) Skokomish hymns. An attempt to control the content of the recall more closely by telling a story sentence by sentence resulted only in very obvious syntactical calques, although the text remains of some value for its unusual lexical content.[3]

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complex forms, such as those with bound pronominal classifiers, is thus only partially solved; it is hoped to elucidate this problem when the syntax has been further studied.

Note that Quileute shows similar problems (Hamp, personal communication). This is probably an areal phenomenon.

[1] I managed to elicit only one song in Twana. Elmendorf (1960) offers an explanation for the lack of Twana song-words.

[2] Mrs. Pulsifer is quite illiterate.

[3] 'The War of the Animals with the South Wind.'

No place is to be found in this thesis for any literary or ethnographic discussion of the texts,[1] although the analysis of the content, stylistics and manner of story-telling here must some day be compared with Elmendorf's account of the same and similar texts dictated in English.[2]

On the other hand, there are several purely linguistic features of these texts that must be noted.

First, the texts contain many hesitations, repetitions and even acknowledged 'errors.' It is difficult to be certain of the status of some of these 'errors'; there is more than a suspicion that, as the informant became more sophisticated in one sense, she also acquired a new notion of correctness, and condemned some of her earlier (and perfectly 'well-formed') contractions and other alternations.

Second, the grossly-overlength vowels and very rich intonation patterns in these texts, some of which are delivered with a surprising amount of subtle variation in speed and rhythm, is often completely at odds with the conception of stress and stress-alternation gained in the eliciting of single words and simple phrases.[3]

I.3. The Phonological Component

I.3.1. General

Within a generative framework, the Phonological (P) Component of a grammar is that part of the total grammar which associates the surface syntactic structure of utterances with their phonetic representation.[4]

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[1] But see the brief comments of this type accompanying the Tale (Appendix I, sec. 2).

[2] Elmendorf (1961 B), esp. pp. 5-7.

[3] No systematic treatment is given of the additional (or alternative) rules required to generate the sandhi variations due to speed of utterance, though sporandic remarks will be found in the Commentary to the Tale (Appendix I, sec. 5). Again, Quileute shows remarkable similarity (Hamp, personal communication).

[4] Chomsky (1965) et al.

We are here concerned with that part of the P-component of Twana having as its input and output strings of segments, labelled and bracketed to show their Immediate Constituent structure; each string represents a morpheme of Twana, bounded by suitable markers, and each individual segment is represented not by an indivisible alphabetic symbol, but by a matrix of binary-feature specifications.[1]

We accept the view that the general conditions under which particular morphemes may be said to belong to a language are a proper part of the description of the competency of a speaker of that language; nevertheless it is neither desirable nor feasible to introduce those conditions into the description in the shape of 'morpheme-structure rules' in the P-component.[2] Thus, it is assumed that, both in the dictionary and as entering the P-component, all segment matrices are fully specified for all binary features relevant to the phonological rules of Twana as a whole. Such an assumption automatically renders impossible certain devices which have been shown to produce illusory economies, either in the dictionary entries or in the rules themselves.

Segment strings thus fully specified are conceived of as submitted to a set of rules which may perform certain operations on them. Those rules may add, delete, or permute segments; or they may change the binary values of specified features within given segments.

In classical phonemic theory, which strictly separated the levels of phonetics and phonemics, all the rules relating each level to the next were necessarily applied simultaneously. We adopt the contrary view, that the prohibition against the mixing of levels not only has no theoretical justification, but that the simultaneous application of rules in fact detracts from their explanatory power, and may even lead to absurdities.

Consider the following simple example from Twana. That s-nominal assimilates its point of articulation to a following palatal is clear from

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[1] Despite scepticism (cp. Ladefoged [1965]), it is generally assumed that 'narrower' phonetic specification is to be gained through the use of non-binary values assigned to distinctive features; for other views, cp. Öhman (1966) on co-articulation, and Kim (1966). See also p. 196, fn. 4

[2] Stanley (1965, 1967). Compare Halle (1959) for the earlier (and contrary) view.

the forms: s-táb 'when'; s-cób? 'crab-apple'; but š-čábšəb 'gift.' An extremely simple rule handles the case; say, for simplicity,

$$s \longrightarrow \check{s} \text{ in env } /\text{-} \;\&\; \check{c}$$

However, taking the stem déč 'graze, scratch' we derive the stative unaugmented form ʔas-déč, but ʔəš-čə-déč with Augment. Clearly, a cluster-simplification rule operating on ʔas-dč-déč precedes the rule for assimilation of s-nominal (see cluster-simplification Chap. II, sec. 7 for discussion). Notice now that any attempt to frame the original rule as applying simultaneously forces us to amend it as follows:

$$s \longrightarrow \check{s} \text{ in env. } \text{-}\&\ (d)^{(?)}\ \check{c}\ .$$

But although this formulation guarantees the correct output, d cannot plausibly be said to be an environment in which s becomes š. Thus a phonology which prizes explanatory power cannot in principle consist of a set of unordered rules.

It is not only through the principle of ordering that a generative phonology gains its explanatory power. The adoption of explanatory power as a criterion also affects radically the choice of the feature-composition of the segments to be distinguished from each other. Again, a simple example from Twana will clarify the point at issue.

We shall suggest that glottal stops are in certain cases lost when adjacent to m, n in 'native' morphemes but not in 'non-native' morphemes. To distinguish these situations, we shall not set up 'M/N' and 'm/n,' which can fairly be characterized as an unrevealing analysis;[1] rather, we shall attempt to justify the view that we have to do with voiced non-obstruents which become voiced obstruents, as against voiced non-obstruents which remain so. This question is discussed at length in the text (Chap. II, sec. 8).

Finally,[2] it must be pointed out that an even stronger claim has

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[1]For a 'pre-generative' insistence on plausibility of explanation as against mere inventory-economy, see Bazell (1954). Here, we shall not say 'the Morphophonemes M/N become b/d in certain environments, otherwise m/n; the Morphophonemes m/n always become m/n.' The morphophoneme, thus used, has predictive power, but no explanatory power.

[2]Further remarks concerning the structure of the P-component will be found in the text and footnotes passim. The impact of 'marking' on phonological theory, and the implications for the analysis of data such as that handled by this thesis are not yet clear enough to warrant further discussion here.

been made than the simple renunciation of the separation of levels in phonology: this is the counter-claim that phonology is not an autonomous part of the grammar of a language. On the contrary, it has been shown that the proper formulation of the rules of the P-component presupposes a knowledge of the kind and amount of constituent structure falling within the domain of particular rules.

This insight concerning the nature of phonology is formalized in three ways. First, in the annotation of rules to indicate their domain in terms of the ranks of boundaries; for example, while Twana Nasals become obstruents, they may retain a nasal onglide in 'word-initial' position. Similarly, rules may be marked to apply only at stem boundaries, etc. Second, many rules are limited in their application to certain morphological categories; in Twana, the loss of a morpheme-initial vowel (Rule 4, Rule Summary 6) occurs only in the Attenuative formation.

Third, we must consider the notion that rules are to be applied cyclically[1] (i.e., as a block, to ever-larger amounts of constituent structure). There is some indication that Twana rules operate cyclically (Chap. II, sec. 20), but a richer analysis of surface constituent structures and their derivation will no doubt clarify this matter.

I.3.2. The Data To Be Utilized

Chapters II and III present the arguments which will motivate the final selection of the total roster of binary features to be used for the phonology of Twana, that is, those features to be used in both dictionary representations and rules.

I have chosen to explicate in detail the 'productive' aspects of two important morphological processes in Twana, viz., those of the Augment and the Attenuative,[2] the motive for choosing these particular processes being as follows.

The morphophonemics of the Augment presents a suitable mass of

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[1] Chomsky, Halle, Lukoff (1956) contains the earliest account of the notion and its application to English. Cf. Chomsky-Halle (1968) Chap. III.

[2] For instance, we do not discuss the phonology of some small classes of suppletive 'augments' and 'attenuatives' only referring to these insofar as we shall suggest in principle how the dictionary is marked to handle them.

consistent and controllable data, from which it is possible to explain the sources of a large proportion of the occurrences of glottal stop in association with l, w, y found in Twana forms, as well as the alternations in the position of these glottal stops in the segment-strings concerned. The same body of data also enables us to explain and formulate rules for three important types of cluster-resolution in Twana, viz., metathesis, simplification, and glide-insertion.

This main topic, the Augment, together with the discussion of other related phenomena (such as stress-alternation) also found elsewhere in Twana morphophonemics, will occupy the whole of Chapter II, which thus largely defines the consonants of Twana.

Chapter III, in turn, deals with the morphophonemics of the Attenuative. This will enable us to develop in a motivated manner the proper specification of the vowels of Twana; in particular, plausible sources[1] will be suggested for the vowels ɛ and ɔ̂, as well as such alternations as e/ə ~ ɛʔɛ, ɛʔ ; and o ~ ɔʔɔ̂, ɔ̂ʔ .[2] However, the derivation of these alternations is intimately bound up with the behavior of h and glottal stop. We shall thus deal first with the phenomena of ʔ/h-affection and vowel-assimilation, integrating the rules we develop into the set already established for the Augment, and then relate the rules as a whole to the problems of the Attenuative.

Chapter IV will then attempt to integrate the understanding gained on the behavior of Twana segments, and will take certain crucial rules as examples before finally summarizing the characterization of Twana segments in Distinctive Features.

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[1] In the present context, 'source' is simply a short-hand for 'underlying representation recoverable through the existence of alternations governed by rules of the grammar.' There is no implication of 'historical source,' although neither is this in principle denied: compare Bloomfield (1939).

[2] It is thus a convenient, although not in the least misleading simplification, to omit from consideration in Chap. II (The Augment) the very few forms in which ɛ and ɔ̂ must be treated. In this way, we avoid the disjointedness which would result from a partial discussion of the Twana vowels at this point, and accordingly relegate that topic to the Introduction to Chap. III (The Attenuative).

For the moment, it is recalled that the vowel phonemes of Twana, defined in terms of surface contrasts, are e, ɛ, ə, ɔ̂, o, and a.

I.3.3. The Segment Inventory

I.3.3.1. Swadesh's Inventory

Taking the phoneme chart of Tweddell[1] as a base, Swadesh comments: 'If one omits the voiced ʒ ǰ g̬ʷ from the Snoqualmie table, one gets the system found in Twana.' Swadesh's analysis here is thus based entirely on 'various MSS in the Boas collection of the American Philosophical Society, especially Boas' Comparative Salishan vocabularies (ca. 1925),'[2] since no large-scale work on Twana had been published at that time.[3]

p̓	t̓	ƛ̓	c̓	ç̓	k̓	k̓ʷ	q̓	q̓ʷ	ʔ
p	t	ƛ	c	ç	k	kʷ	q	qʷ	
b	d	[ʒ	ǰ		gʷ]				
(m)									
		ɬ	s	ʃ	x	xʷ	X	Xʷ	
w		l		y					
u				i				a	

Fig. 3.--Swadesh's version of Snoqualmie Segments (with modifications for Twana)

Swadesh has correctly seen that the voiced obstruents ʒ ǰ gʷ are found only in loan words. It is also easy to understand the inclusion of the affricate ƛ, which in fact only occurs (a) as a rare free (ill-understood) variant of ɬ, and (b) for t + ɬ at morpheme boundaries.

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[1] Tweddell (1950), p. 3 (consonants), p. 9 (vowels).

[2] Swadesh (1952), p. 238.

[3] I.e., 1952. Elmendorf's field-work was done between 1939 and 1956. His doctoral dissertation was written in 1948. I am not aware whether Swadesh had access to this work, nor whether any phonological matters are discussed in it. The earliest phonological analysis made by Elmendorf is probably that summarized in the chart accompanying his word-lists of 1954 (see discussion below, Chap. I, sec. 3.3.2).

The omission of shwa is more serious, and can only be attributed to a theoretical predilection: Swadesh was, as commented upon elsewhere (Chap. II, sec. 20.1), much concerned with the non-phonemic status of what Boas had called 'the pepet vowel.' It will be seen that shwa indeed has a special status in Twana, but this is far from agreeing with Swadesh's view that it has no status.[1]

As will be seen from the corpora for Twana in Chapters II and III, I have no certain cases of x, the front-velar spirant,[2] and can only surmise (since I do not have access to the Boas MSS referred to above) that the forms which Swadesh is using may well show the affricate on-glide to velars.[3]

I.3.3.2. Elmendorf's Inventory

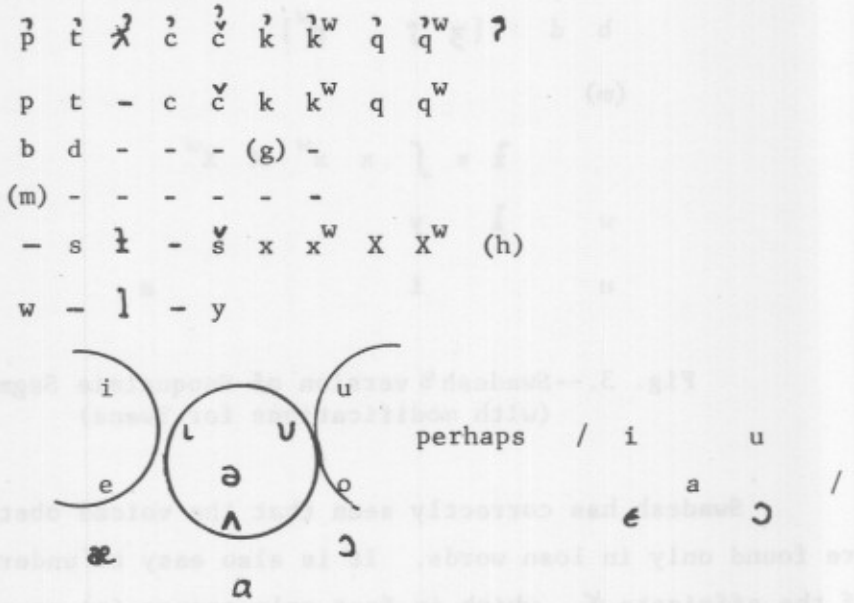

Fig. 4.--Elmendorf's Twana segments (1954). (Rearranged for comparison with Swadesh's chart)

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[1] See Chap. II, sec. 4, for shwa in stems, and Chap. IV, sec. 4.4. for shwa as Lax.

[2] See Chap. IV, sec. 3.5 for the sound-shift effectively removing x from the Twana inventory, and sec. 4.2 (p. 214, fn.3) for another explanation.

[3] Cf. Chap. I, sec. 3.3.2 in Elmendorf's inventory, and Chap. IV, sec. 4.2.

As will be seen from the above figure, based on Elmendorf's, χ° occurs, but not χ, although Elmendorf notes the allophonic (sic) status of the latter. The segments m and g are bracketed, with the comment 'phonemic status doubtful.' At this stage of his field-work, Elmendorf had collected comparatively few lexical items (approximately five hundred appear in the list referred to), and it seems his judgments are based on frequency of occurrence. The same hypothesis would explain the omission of n, as well as his bracketing of h at this time.[1] The inclusion of x, as commented on above (re Swadesh), seems again based on Elmendorf's interpretation of the on-glide to a velar, this time following the vowel e.[2]

So far as surface-contrast analysis is concerned, the suggested distribution of vowel allophones and their assignment to phonemes is largely confirmed by the analysis in this thesis, with the special exception of the treatment of shwa.[3] However, it is not possible to comment on the implications for Elmendorf's later analysis of Twana, on the basis of his remarks in 'The Structure of Twana Culture' (1960), since the inventory listed there is expressly intended to cover both Twana and the neighboring western Washington Indian languages.[4]

I.3.3.3. The Inventory of this Thesis

Figure 5 presents the contrasting (surface) segments of Twana[5] to be utilized in this thesis.

We tentatively adopt a feature-composition of segments,[6] more or

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[1] See Elmendorf (1961) where h is included without comment.

[2] Cf. his dəx^{w}hədéxq^{w}bəd, stexqéyu, with dəx^{w}hədéq^{w}bəd, steqéw of the present corpus. Note that the Augmented sqtéqaw establishes the representation *steqéw: see Chap. II, sec. 4, V̀~a. Cf. Chap. II, sec. 15.7 on Ch-metathesis; and Chap. IV, sec. 4.2 for another interpretation.

[3] See Chap. IV, sec. 4.4.

[4] Author's note, par. 10.

[5] For illustrative data, see Chap. IV, sec. 1.1. For shwa, see also Chap. IV, sec. 4.4.

[6] As explained above (Chap. I, sec. 3.2), the Twana vocalisms are not discussed in Chap. II. The introduction to Chap. III will give a tentative feature analysis for the vowels, to be modified as dictated by the shapes of the rules and the required phonetic output (see also Chap. IV, secs. 3.3 and 4.4).

p̓	t̓	c̓	č̓	k̓	k̓ʷ	q̓	q̓ʷ	ʔ	
p	t	c	č	-	k	kʷ	q	qʷ	
-	-	s	š	ɬ	[x][1]	xʷ	x̣	x̣ʷ	h
b	d	(ʒ)[1]	(ǰ)	-	(g)	(gʷ)			
m̓	-	-	y̓	l̓	-	w̓			
m	n	-	y	l	-	w			
			e[2]	ə		o			
			ɛ	a		ɔ			

Fig. 5.--The surface contrasts of Twana

[1]Bracketed segments are found only in loan words (see Chap. IV, secs. 7, 8). The segment [x] is in doubt (see Chap. IV, sec. 3.5).

[2]Elmendorf's choice of /i,u/ was obviously made on typological grounds: by far the most frequent allophones are [e,o]. See Chap. IV, sec. 3.3.2 for discussion.

less mechanically substituting the names of binary features for the articulatory terminology we employed above; the text will establish our motivation for any modifications we shall hereafter make.

The transcription of all forms in the figures and text of Chapters II and III (The Augment and The Attenuative) are in terms of the above (surface) contrasts, and utilize the symbols of this grid. Chapter IV (The Phonetic Output) and the Appendices, on the other hand, employ different transcriptions[1] for different purposes.[2]

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[1]See Chap. IV, sec. 3.3. and Appendix I, sec. 1.

[2]Main conventions used are:

* Underlying representation
** Incorrect form
// 'Phonemic' representation, only in Appendices
$ Utterance, initial or final
# Word, initial or final
& Morpheme boundary in rules
- Morpheme boundary elsewhere

	p	t	c	ƛ̌	č	k	k^w	q	q^w	b	d	(ʒ)	(j)	(ǧ)	g^w	(m)	(n)	l	w	y	s	š	ɬ	[x]	x^w	x̣	$x^w_{\cdot}$	h^l	$ʔ^l$
cons	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	+	+	+	+	+	+	+	+	+
voc	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-
obstr	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	+	+	+	+	+	+	+	+	+
nasal	-	-	-	-	-	-	-	-	-	(+)	(+)	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-
cont	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	-
grave	+	-	-	-	-	+	+	+	+	+	-	-	-	+	+	+	-	-	+	-	-	-	-	+	+	+	+	+	+
round	+	-	-	-	-	-	+	-	+	+	-	-	-	-	+	+	-	-	+	-	-	-	-	-	+	-	+	-	-
lateral	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	+	-	-	-	-	-	-
diffuse	+	+	+	+	-	-	-	-	-	+	+	+	-	-	-	+	+	+	+	-	+	-	+	-	-	-	-	-	-
strident	-	-	+	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
retracted	-	-	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+		
checked	±	±	±	+	±	±	±	±	±	-	-	-	-	-	-	±	-	±	±	±	-	-	-	-	-	-	-	-	+

Fig. 6.--Tentative distinctive-features (matrix) for Twana consonants

( ) Denotes segments attested only in loan words.
[ ] Denotes a putative segment, the distinctiveness of which is to be debated in the text (Chap. IV, sec. 3.5).
± Signifies a (surface) segment occurs for each value.

[1]The assignment of h/ʔ to [+Obstruent] makes it impossible to distinguish ʔ from q̇. We shall show that h/ʔ must be treated as semi-vowels (see Chap. II, sec. 18; cf. also Chap. IV, sec. 4.3).

CHAPTER II

THE AUGMENT

II.1. The Morpheme Strings Involved

Preparatory to the discussion of the phonology of noun and verb reduplication as exponents of 'Augment,' we briefly characterize the (minimal) strings of morphemes involved.

The majority of Twana verb roots are of the shape CVC. Since third person singular subject commonly has the phonological shape 'zero,' the intransitive verb stem with 'unmarked' aspect may appear in the shape of the bare root.

Examples:

ʔə́kʷ	makes a spot on	kʷóy	bends
ʔwáp	corrects	čéq	reddens
šóʔ	grinds	tə́kʷ	pierces
qʷál	paints	ɬób	heals, scars
yə́ʔqʷ	washes	lép	covers

The corresponding forms for 'continuative' aspect simply prefix be- to this stem; thus be-qʷéc 'he's dancing.' For the 'stative' aspect, in turn, the prefix ʔas- is prefixed instead; thus, ʔas-pə́kʷ 'spotted.'

It might be maintained that, apart from particles, all roots in Twana are verbal. This would imply that all Twana nouns are derived from verbs; we here give some examples of such derived nouns, taking for simplicity the least complex derivational process, viz. the Nominal in s-.

Examples:

Verb Root		Derived Noun	
tə́q	close	stə́q	log jam
ʔáxʷ	freeze	sʔáxʷ	ice
čéš	help	sčéš	power (spirit-given)
qʷéc	dance	sqʷéc	dance
ʔcóc	rain	sʔcóc	rain

q^{w}ác	vomit	sq^{w}ác	vomit
x^{w}ák^{w}k^{w}	breathe	sx^{w}ák^{w}k^{w}	breath
pə́c	defecate	spə́c	ordure
ʔéɬad	eat	sʔéɬad	food[1]
ʔélal	sing	sʔélal	song
ʔobát	name	sʔobát	name
ʔéwad	invite	sʔéwad	invitation

Despite the theoretical claim that all roots in Twana are basically verbal, there remains an unhappily large number of noun stems as yet unrelatable to any corresponding verbal root. Of these, some are found as citation-forms with s- nominal prefix, while others lack this prefix.

The presence or absence of the s-nominalizer does not seem predictable for stems not directly derivable from verb roots; the dictionary entries for such s- forms must accordingly contain s-. We give examples of non-derived nouns with root-shapes CVC and CVCVC, citing s- and non-s- forms.[2]

Examples:

	s- nominalizer		no s- nominalizer	
CVC				
	sxác	rib	čə́t	elder brother
			k^{w}óy	mother
	scə́k^{w}	angle-worm	čáp	aunt
	spéx^{w}	gull	xáč	stomache
	sx^{w}óp	bracelet		
CVCVC				
	stə́čəd	slave	čálaš	hand
	sčátas	stone	k^{w}opéc	master
	sqáboɬ	dug-out canoe	yədés	tooth
	steqéw	horse	báq^{w}ab	field
	syələ́b	year	wəqəb	box
	səbáded	mountain	ɬók^{w}aɬ	moon

---

[1] There are a few 'frozen' noun forms, derived from verbs but lacking initial ʔ. Such are sélbad 'half-brother' (cf. ʔeɬ-sə́q 'split,' sə́q 'split') and séɬad 'provisions'--although the glosses for séɬad and sʔéɬad were sometimes reversed by the informant.

[2] The lack of near-minimal pairs for the monosyllabic forms is attributed to the limitations and accidents of the corpus, rather than to any kind of complementary distribution.

CVCVC s-nominalizer		no s- nominalizer	
		ʔébəc	grandchild
		ʔásax^{w}	seal
		ʔádəč	species of duck

There is a clear distinction between forms with s- nominalizer and those in which s is part of the root. In the case of noun and verb roots in association with 'augment,' s-initial takes part in reduplication, while s-(nominalizer) and ʔas-(stative) do not.[1] This may be briefly illustrated by the following examples:

Examples:

Unaugmented	Augmented	Gloss
	s as root-initial	
sél	səlʔ -sél	cloth
sóq^{w}ay	q^{w}-sóq^{w}ay	elder sister[2]
s-sqáče(h)	s-q-sáqče(h)	finger
ʔas-sót-čəd	ʔəs- t-sót-čəd	I know[3]
	s- as nominalizer	
s-təčəd	s-tč-táčəd	slave
š-čótaɬ	š-čt-čótaɬ	halibut
s-teqéw	s-q-téqaw	horse
ʔas-ƛ'óc'	ʔəs-ƛ'c-ƛ'óc'	it's old[4]

---

[1] Only one form occurs in which the grammatical prefix apparently partakes of the reduplication. This is ʔasʔáx^{w}; təsx^{w}sx^{w}ʔáx^{w} 'old; elders'; from te- article, def; s- nominalizer; x^{w}- agentive (?); ʔáx^{w} root.

[2] The Corpus is unfortunately not so rich that we are always able to select data showing only the point under discussion. Morpheme-boundaries are therefore indicated (e.g. ʔəs-tč-táčəd) where this facilitates matters. In the present case, the obscuring factors are cluster-simplification (q^{w}-sóq^{w}ay), geminate simplification (ʔəs-t-sót-čəd), and s- assimilation (š-čt-čótaɬ).

[3] ʔas- ~ ʔəs- alternation. See Chap. II, sec. 3.2.

[4] Ibid.

II.2. Taxonomy

II.2.1. Plural Types

	Unaugmented	Augmented	Gloss
(a)	ʔtabéd	təqʷɬ-ʔtabéd	hair
	yəšəd	təqʷɬ-yəšəd	foot; my foot[1]
	wədáwʔ	hɔhɔ́ʔ tə-wədáwʔ ~ hɔhɔ́ʔ təqʷɬ-wədáwʔ	horn
		dos-x̌á?ləb	the Clallam
	spoʔyáɬapabš	čt-poʔyálap	Puyallup; the Puyallup (tribe)[2]
	skʷʔáxʷsəd	čo-skʷʔáxʷsəd	Sqaxon; the Squaxon
		qəx̣-obəš	big tribe
(b)	sxʷéx̌ay	sxʷex̌ay-óbəš	sheep
	bókʷ	bokʷ-óbəš	book
	čáɬ	təqʷɬ-čaɬ-óbəš	night
	stebʔát	hɔhɔ́ʔ stebʔat-óbəš	man
	qʷoqʷɔ́ʔ	sqʷoqʷɔ́ʔɔ bəš	creek; the Skokomish
		səhéwabəš	the Suwamish
		x̌x̌ɔ́x̌əx̣təd	parents
(c)	ččáʔyac	qéʔɛ qpaɬ	child
	ɬéqʷade(h)	šč̌əbáde(h)	cheek
	seséd	pésat	big
	dəcə́h	debáɬ	I, we
	dəʔwéh	təwəlʔwə́lap	you, ye
	beʔáhtəbəstč̌əd	bečxʷə́č̌əd	I'm killing him, lots
	ʔabótdəxʷ	ɬaqélʔətxʷɔ	sit down![3]
	ʔas·ə́tadbəč̌əd	ʔasčə́lap	I'm standing up; they're -

Fig. 7.--Types of Plural in Twana

[1] d- Possessive 1st singular. For d-loss, see Chap. II, sec. 19. Here, *təd-qʷɬ-yəšəd.

[2] spoʔyálapabš shows (irregular) vowel-retentions--probably a loan form.

[3] Probably *óh, with stress-retraction (see Chap. II, secs. 15.3, 21); thus *ɬaqélətxʷóh.

Before embarking on the main theme of this chapter, we shall briefly survey the total range of 'plural' in Twana. Since it is not the purpose of this thesis to examine Twana syntax as such, sufficient examples are given only to clarify co-occurrence possibilities and to avoid the cruder semantic ambiguities.

Certain 'plural allomorphs,' it will be suggested, are perhaps best reassigned the status of collectives, others that of quantifiers.

Examples Fig. 7(a) illustrate the use of six prefixes making plurals. $q^{w}ɬ$-[1] may be used alone, but is most frequently found in conjunction with tə-.[2] həhɔ́ʔ 'lots' is a free form, best considered a general quantifying adverb; it may be used together with tə-$q^{w}ɬ$. dos- occurs only once in the corpus for Twana.[3] On the other hand, čt- is a common collective prefix used with tribe names. The homonymy with the prefix čt- 'decade' as in čt-bósas 'forty' is almost certainly not accidental. čo- is occasionally used with tribe names. qəx̣-[4] occurs three times in the Corpora, in qə́x̣-obəš 'big tribe,' qx̣-táləh 'lots of money,' and qx̣-édəʔwət[5] 'wise: clearly an adverbial prefix of 'magnitude.'

Examples Fig. 7(b) illustrate the use of the suffix -óbəš. -*(V)mš is in widespread use within Salish, both in tribe names and as a generic pluralizer. In Twana its use seems to be even wider, for it is clear from texts that there is no 'generic' limitation.[6] The suffix -təd, on the other hand, is found only once, in 'parents.'[7]

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[1] Cf. Upper Chehalis (Boas [1934]) "collective" -q^{w}lʔ-š (a suffix!). Also Kincade (1964).

[2] Cp. Kincade ta-, as well as ta-q^{w}lʔš, ibid.

[3] I have presently no check, but the informant's Clallam background makes me suspect a direct loan from Clallam. Cp. nš-tn (below, this section).

[4] Cp. ta-qəx̣ɬ, and (qəx̣ɬ 'many'), in Upper Chehalis (Kincade, ibid.).

[5] táləh 'money,' European loan; édəʔwət undoubtedly related to yədəʔwás 'heart.' The s~t alternation is obscure.

[6] For example, bók^{w}obəš 'books' is used of a small number of quite specific books in an autobiographical text.

[7] Compare its use in 'instrumental' nominalizations of the type sə́ʔp-təd 'club,' from sə́ʔp 'to strike.' Also compare Upper Chehalis type nš-tn, used only with kinship terms.

Examples Fig. 7(c) are of suppletive plurals, a very limited class in Twana.[1] The verb forms (except 'killing lots') are probably verbs of group or collective activity.

We take now representative corpora of Twana forms showing that allomorph of 'plural' which consists of a pre-posed unstressed reduplication of all or part of the initial CVC- of the root. The definition of what exactly is pre-posed, it is noticed, is here left somewhat vague, for reasons that will become apparent as the argument progresses.[2]

The lexical items to which such an Augment is pre-posed correspond roughly[3] to English Noun and Adjective. Some preliminary examples are given below.

Examples:

Unaugmented	Gloss	Augmented	Gloss
š-čótax̣	halibut	š-čt-čótax̣	halibut (coll)
s-pə́čo	berry-basket	s-pč-pə́čo	berry-baskets
ʔas-pós	having a boil	ʔə s-ps-pós	having boils[4]
ʔaš-šéč	paid	ʔəš-šč-šéč	all paid
ʔaš-čél	lazy	ʔəš-čəlʔ-čél	all lazy
ʔas-xʷéʔl-čəd	I'm lost	ʔəs-xʷəlʔ-xʷéʔl-čəd	I've lost them

We notice immediately another respect in which the English glosses may be most misleading. Whereas for the Twana noun the addition of the augment corresponds fairly well with English plural agreement, the Twana verb

---

[1] 'Child' may contain -paɬ (cf. Reichard [1933] 390--'a plural prefix [sic] meaning 'boys''). But cf. also Kalispel -ul (collective); Twana -ʔəɬ, 3rd person plural, also wəɬ 'and'; also possible is a root *qəp plus Attentuative -aɬ (see Chap. III, sec. 7).

[2] Because of special problems associated with h and glottal stop as C_1 or C_2 of stems, we reserve these for separate treatment (Chap. II, sec. 17).

[3] English glosses can be very misleading. For example, 'fire' in Twana is ʔas-qʷə́t, clearly a stative form.

[4] Another dangerous gloss. In Twana, 'having x' is rendered bəs-, as in bəš-čəʔwáščəd, 'I've got a wife' (čəʔwáš, 'wife'). Here, better 'be-boiled'; 'all-be-boiled.'

augment may correspond to English glosses denoting multiple subject, multiple object, or even increased or totally achieved action.[1]

However, the 'augment' is by no means an obligatory agreement in Twana, even in the absence of any other agreement marker[2] in the same phrase, as the following examples will illustrate in simple fashion:

Examples:

q̓ʷə́č̓əbətəb	təd-<u>yəšə́d</u>		my <u>legs</u> frightened them.
xʷáʔqəkʷs	ʔas-<u>sót</u>-qə-təbs	ɬəs-xčád	<u>they</u> didn't understand what would happen.
t-qʷéc	ɬəc-ɬáwalbəš		the <u>people</u> were dancing.

[Compare yəš-ə́d; šeʔyə́šad 'foot; feet.'

ʔas-sót; ʔəs-st-sót 'know' : (ʔas-sót-qə-čəd 'I understand')

ɬáwalbəš; ɬoʔ-ɬáwalbəš 'Indian; Indians.']

II.2.2. Augment Types

Considering only the shape of the reduplicating syllable, surface forms of the following types are found in Figure 8.[3]

Type (a) = $C_1 C_2$[4] ; $C_1 ə C_2$; $C_1 ə C_2 ʔ$

(b) = C_1 o ; C_1 o ʔ ; C_1 e ʔ

(c) = C_2 ; $C_2 V_1$; $C_2 ə$; C_2 o ; C_2 e ʔ

Cross-cutting this taxonomy, however, are the following features.

(a) Vowel-loss in the stem - e.g. 'ear'
(b) Vowel-gain " " 'cockle'
(c) Vowel-gain " " - 'gather' (V ~ a)
'sunk' (V ~ á)
'sing' (V ~ ə)

---

[1] 'Increased action' is, for Twana, <u>not</u> synonymous with 'intensive,' for which another type of reduplication (stressed C_1V_1) is employed.

[2] It is probably best to consider the augment, so far as verbs are concerned, as including both number and aspect. It is really number, then, that may remain unmarked, in both noun and verb. (Compare p. 49, fn. 1.)

[3] Compare the taxonomic analyses in Kincade (1964), Hess (1966) for Upper Chehalis and Snohomish. I hope to show elsewhere the rule-governed relationship between the forms for these languages and those of Twana, are least as far as Augment and Attenuative are concerned.

[4] C_1, C_2 refer to stem consonants.

	Unaugmented	Augmented	Gloss
(a)	šóx̌	š-x̌ -šóx̌	grind
	š-čótax̣	š-čt-čótax̣	halibut
	s-x̣ʔáb	s-x̣ʔ-x̣áʔab	cockle
	ʔəs-pq̓ʷéqʷad	ʔəs-pq̓ʷ-páɬ̓ʷqʷəd	feather in hair
	bə́də(h)	bəd-bə́də(h)	child
	łób	łəb-łób	scar
	bále(h)	bəl-bále(h)	roe, bait
	yəlʔə́x̣	yəlʔ-yə́lax̣	gather
	q̓ʷəl.áde(h)	q̓ʷəlʔ-q̓ʷə́lde(h)	ear
	sélə(h)	səlʔ-sélə(h)	grandfather
	wədáwʔ	wədʔ-wə́daw	horn
	yədés	yədʔ-yə́das	tooth
(b)	də́ʔwat	do-də́ʔwat	wave, surf
	kʷóy	kʷeʔ-kʷóy	bend
	łáwalbəš	łoʔ-łáwalbəš	Indian
	ɬ̓áwʔ	ɬ̓oʔ-ɬ̓áw	mussel
	šáwʔ	šoʔ-šáwʔ	bone
(c)	ɬ̓káyas	k-ɬ̓ə́keʔəs	basket
	s-tə́q	s-q-tə́q	logjam
	ʔáx̣cəd	x̣aʔáx̣cəd	bed
	ʔélal	leʔélal ~ ləʔélal	sing
	bəqsə́d	qə-bə́qsəd	nose
	wəq̓ə́b	q̓ə-wə́q̓ab	box
	ʔas-hóbšəd	ʔəs-əbo-hóbšəd	red-foot
	wəq̓ʷə́təb	q̓ʷə-wəq̓ʷátəb	sunk
	qʷɔ́ʔ	qʷo-qʷɔ́ʔ	water; river
	yəšə́d	šeʔ-ə́šad ~ šəʔ-yə́šad ~ šeʔ-yə́šad	foot

Fig. 8.--Twana Augment Types

(d) Gain of ʔ in the stem - e.g. 'basket'

(e) Loss of ʔ " " - 'wave' (medially)

'horn' (finally)

(f) Stress-retraction " - 'ear'

The exuberance of such a typological survey must surely obscure rather than reveal the structure of a language, the more so since (quite

apart from questions of constituent structure), the features involved appear again and again in Twana morphophonology.

The remainder of this chapter will be devoted to a re-analysis of substantial sub-corpora of data such as that given above.[1]

II.3. Monosyllabic Stems

II.3.1. Voiceless Obstruent Stems

Unaugmented	Augmented	Gloss
	Nouns	
s-tə́čəd	s-tč-tə́čəd	slave
čə́t	čt-čə́t	elder brother
š-čótax̌	š-čt-čótax̌	halibut
š-čátas	š-čt-čátas	stone
kʷácaptəd	kʷc-kʷácaptəd	blanket
s-qʷółqabəc	s-qʷł-qʷółqabəc	blue-bill
s-q̓áx̌ad	s-q̓x̌-q̓áx̌ad	snail
q̓ʷópaptəd	q̓ʷp-q̓ʷópaptəd	cushion
	Verbs	
ʔas-p̓óc	ʔəs-p̓c-p̓óc	floating
ʔas-p̓ə́kʷ	ʔəs-p̓kʷ-p̓ə́kʷ	spotted
ʔas-t̓ə́čˇ	ʔəs-t̓čˇ- t̓ə́čˇ	put on
ʔas-t̓éčˇ	ʔəs-t̓čˇ- t̓éčˇ	pulled
ʔas-x̌̓óc̓	ʔəs-x̌̓c̓-x̌̓óc̓	knotted
ʔas-sót	ʔəs-st-sót	known
ʔaš-šóx̌̓	ʔəš-šx̌̓-šóx̌̓	ground up
ʔaš-šéc̓	ʔəš-šč̓-šéc̓	paid
ʔas-k̓ʷáp	ʔəs-k̓ʷp-k̓ʷáp	corrected
ʔas-q̓ʷóx̌̓	ʔəs-q̓ʷx̌̓-q̓ʷóx̌̓	hidden
ʔas-q̓áxʷ	ʔəs-q̓xʷ-q̓áxʷ	frozen

Fig. 9.--Monosyllabic Stems, Voiceless Obstruents[1]

[1] C_1 and C_2 are voiceless.

From a consideration of Figure 9 we might tentatively characterize the augment as a reduplication of shape C_1C_2, i.e., a copy of the first two consonants of the root.

---

[1] No apology need, I trust, be made for the somewhat pedagogical step-by-step nature of the treatment, which is adopted partly because the data will be unfamiliar to most readers, but also to ensure the vulnerability of the argument at all points.

Two other points of interest are the following: There is an alternation in the shape of the 'stative' morpheme, giving ʔas- ~ ʔəs- . For the moment, it is not clear whether this alternation is associated with unaugmented as against augmented forms, or whether the conditioning factor is purely phonological, e.g., remoteness from stress.[1] The morpheme s- (nominal) assimilates its point of articulation to a following initial š or č.[2]

II.3.2. Voiced-Obstruent and N Stems

Unaugmented	Augmented	Gloss
	Noun	
sə-báded	sə-bəd-báde(d)	mountain[1]
bə́də(h)	bəd-bə́də(h)	child[2]
s-q̓ʷóbayʔ	s-q̓ʷəb-q̓ʷóbayʔ	brain
kʷábələxʷ	kʷəb-kʷáblə xʷ	root (of tree)
təbéxʷ	təb-tə́baxʷ	land, earth
cədéɬ	cəd-cə́daɬ	he
bəqsə́d	qə-bə́qsəd	nose
	Verb	
ʔas-ɬób	ʔəs-ɬəb-ɬób	scarred
ʔas-x̣éb	ʔəs-x̣əb-x̣éb	wrinkled
ʔas-qəbə́c	ʔəs-qəb-qə́bac	shrunk
ʔas-xʷə́d	ʔəs-xʷəd-xʷə́d	tired
ʔas-kʷə́dad	ʔəs-kwəd-kʷə́dad	held
ʔas-x̣ədə́qʷ-čə(h)	ʔəs-x̣əd-x̣ə́daqʷ-čə(h)	sore hand[2]
ʔas-báx̣	ʔəs-x̣ə-báx̣	worn out
ʔas-mə́x̣ʔ	ʔəs-x̣̓ə-mə́x̣ʔ	proud

Fig. 10.--Voiced Obstruent and Nasal Stems[3]

[1] See Chap. II, sec. 8 for d-loss finally.

[2] See Chap. II, sec. 5.

[3] C_1 or C_2, or both, as voiced stop or nasal.

Comparing Figures 9 and 10, fresh problems emerge; but so also do tentative solutions to problems already encountered. First, we are so far

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[1] Which proves to be the case (see Chap. II, sec. 3.2).

[2] Except in slow (citation) speech, s-nominal is lost when it geminates with s, or with š (i.e., after assimilation).

unable to decide on the status of the -ə- segment for the form səbáded: səbədbáde(d) 'mountain.'

We note too that, regardless of the vowel in the first syllable of the root, a ə appears in the reduplicating syllable for all the forms of Figure 10. It is reasonable to associate this with the occurrence of voicing in either of the consonants involved in the reduplication. However, the content of the corpora so far cited does not allow us to decide whether this ə segment is best treated as a weakened grade retention for the cases concerned, or whether we must consider it as an insertion.[1] The latter solution, it is important to note, perhaps allows a simpler statement of the rules for reduplication; but this in itself would not be conclusive.

We note, in forms such as təbéx^{w} : təbtəbax^{w} 'earth,' and ʔəsqəbəc; ʔəsqəbqəbac 'wrinkled,' an alternation in stress between unaugmented and augmented forms. Tentatively, we may say that in the presence of the augment, the stress shifts to the first syllable of the root. This we shall later confirm from other cases, and shall discuss fully (see Chap. II, sec. 4).

We note, too, that for those forms with alternating stress just referred to, the stressed vowel of the unaugmented form is normally replaced by a in the augmented form; the exception in this corpus is bəqsəd : qəbəqsəd 'nose.' We shall return to this alternation in detail (Chap. II, sec. 4) below.

The form bəqsəd : qəbəqsəd[2] 'nose' itself, entered in Figure 10 as an exception to the vowel-replacement just discussed, is also, however, an example of another phenomenon to be treated in detail below; this is the problem of cluster-simplification,[3] which also involves the forms for 'worn out,' 'proud.'

One problem carried over from Figure 9 may, on the other hand, now be profitably mentioned again. The existence of unaugmented forms such as

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[1] For the shwa-insertion condition in this case, see the argument on p. 44 . Further discussion on the wider application of such a rule will be found at Chap. II, sec. 20 'shwa insertion.'

[2] The importance of forms of the type bəqsəd : qəbəqsəd 'nose' extends to their bearing on the problem (already mentioned) whether certain ə occurrences are best considered as retentions or insertions. It is crucial that in q-ə-bəqsəd, it can only be an insertion. The exceptionality of qəbəqsəd as regards the a-alternation is explained at Chap. II, end of sec. 5.

[3] Chap. II, sec. 7.

ʔəsx̣ədə́q^{w}x̌če(h) 'sore hand' shows clearly that the alternation ʔas-~ʔəs- in the stative prefix cannot be associated with the alternation 'unaugmented~augmented.' The alternation is now seen to be connected with the proximity of stress, or rather with its remoteness. The rule will be formulated more precisely when we have considered further evidence on vowel-reduction in general.

II.3.3. l,w,y Stems

	Unaugmented	Augmented	Gloss
		Noun	
(a)	sélə(h)	səlʔ-sélə(h)	grandfather
	sélqəd	səlʔ-sélqəd	shell
	q̓^{w}éle(h)	q̓^{w}əlʔ-q̓^{w}éle(h)	cedar tree
	sx̣áltəd	sx̣əlʔ-x̣áltəd	cradle-board
	čálaš	čəlʔ-čálaš	hand
	q̓^{w}əláde(h)	q̓^{w}əlʔ-q̓^{w}ə́lde(h)	ear
	yálʔšəd	yəlʔ-yálʔšəd	moccassin
	-wələp	təwəlʔ-wə́lap	you[1]
	bále(h)	bəl-bále(h)	fish roe
		Verb	
	ʔas-qáldəx^{w}	ʔəs-qəlʔ-qáldəx^{w}	don't want
	ʔas-qálabdəx^{w}	ʔəs-qəlʔ-qə́labdəx^{w}	prepared
	ʔaš-čél	ʔəš-čəlʔ-čél	lazy
	ʔas-x^{w}əl	ʔəs-x^{w}əlʔ-x^{w}ə́l	picked
	ʔəs-q̓^{w}ələ́b	ʔəs-q̓^{w}əlʔ-q̓^{w}ə́lab	sunk
	ʔas-x̣^{w}élʔ	ʔəs-x̣^{w}əlʔ-x̣^{w}élʔ	lost
	ʔas-x̣álʔ	ʔəs-x̣əlʔ-x̣álʔ	marked, written
(b)	łáwalbəš	łoʔ-łáwalbəš	person, Indian
	q̓əwəʔáče(h)	q̓oʔ-q̓áʔwəče(h)	cane, walking-stick
	wədáwʔ	wədʔ-wə́daw	horn, antler
	ʔəs-łəwáʔldəb	ʔəs-łoʔ-łáwaʔldəb	left behind
	ʔəsə-wəłə́k̓^{w}	ʔəs-łəʔ-wə́łak̓^{w}	crazy
	wəq̓əb	q̓ə-wə́q̓ab	box
	yədés	yədʔ-yédas	tooth
	yəšə́d	šeʔ-yə́šad	foot
	ʔas-yášədeł	ʔəš-šeʔ-yášədeł	carrying a baby on the back
	kə́yə(h)	keʔ-kə́yə(h)	grand-mother
	ʔas-k^{w}óy	ʔəs-k^{w}eʔ-k^{w}óy	bent
	k̓^{w}óy	k̓^{w}eʔ-k̓^{w}óy	mother
	s-čáʔyat	s-čeʔ-čáʔyat	salmon-gill

Fig. 11.--l, w, y Stems

[1] Unaugmented 'you' is unstressed; only used as enclitic.

We examine next the behavior of l,w,y in reduplication (Figure 11). For simplicity of exposition we have cited reduplications involving l separately from those involving w and y, since the latter introduce further complication owing to their simultaneous function as non-obstruents and semi-vowels.

We note that if there is an l, w or y[1] in the root, a glottal stop often appears in the reduplicated (i.e., the augmented) form. This at once distinguishes l, w and y from b, d,[2] roots with which never behave in this way, as may be seen from Figure 10. To formalize the distinction we have made, we reformulate our first observation as follows: 'if there is a non-obstruent, non-nasal segment in the (initial CVC of a) root, then . . . ' We tentatively characterize such a segment as a 'resonant.'[3]

Unless further complications disallow it, we shall tentatively treat the stem glottal stop in forms like yál$^{\text{ʔ}}$səd as a 'separate' segment. This does not necessarily imply a similar treatment for the added glottal stop in Augmented forms, a fuller justification of which must be sought.

In their function as 'resonants,' w and y clearly behave in similar fashion to l; that is, their occurrence in roots often gives rise to a glottal stop in the augmented form, as may be seen from Figure 11(b). However, a number of important observations must now be made concerning Figure 11(b) (as against Figure 11[a]).[4]

Certain forms (e.g., wəq̓áb ; q̓ə-wəq̓ab 'box') fail to show the expected glottal stop; some forms (e.g., k̓$^{\text{w}}$óy; k̓$^{\text{w}}$e$^{\text{ʔ}}$-k̓$^{\text{w}}$óy 'mother') show an alternation between y/e (as also w/o) in the augmented forms; one form (wədáw$^{\text{ʔ}}$; wəd$^{\text{ʔ}}$-wədaw 'horn, antler') shows loss of glottal stop in the augmented form; while for the last form of the corpus (s-č̓á$^{\text{ʔ}}$yat; s-č̓e$^{\text{ʔ}}$-č̓á$^{\text{ʔ}}$yat 'salmon gill') it will be

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[1] bále(h) 'fish-roe,' bóle(h) 'spring (water),' bol$^{\text{ʔ}}$óq$^{\text{w}}$ 'tangle' are forms that do not follow the rule; the importance of such forms will be shown later (Chap. II, sec. 9).

[2] The corpus contains no n-forms, and only one m-form, in augment.

[3] It is not implied that 'resonant' is considered a distinctive feature; it is merely a convenient cover-term.

[4] For the form q̓$^{\text{w}}$ə láde(h); q̓$^{\text{w}}$ə l$^{\text{ʔ}}$-q̓$^{\text{w}}$əlde(h), with the stressed vowel of the unaugmented form lost in the augmented form, see 'Tri-syllabic stems with second-syllable stress' (Chap. II, sec. 5).

seen that we must sometimes postulate an underlying representation of more abstract shape than that of the unaugmented form.

Now it is clear that these anomalies are all closely bound up with the behavior of the glottal stop found in the augmented forms, and that our earlier statement on the conditions for the appearance of glottal stop in those forms must be refined.

We have stated that this glottal stop is often produced in association with roots containing at least one 'resonant,' the glottal stop then occurring between the reduplicating syllable and the root. We note that it always occurs if a 'resonant' stands finally in the reduplicating syllable, regardless of the nature of the initial consonant.

From Figure 10 in particular, we further observe that no glottal stop arises in the augment where the reduplicating syllable (CVC) contains b or d as one consonant, and any other non-'resonant' consonant, regardless of which of the two stands syllable-final.

It is thus reasonable that we should associate the appearance of the glottal stop with the occurrence of l, w, y, but not with the occurrence of b, d. However, if this is so, then augmented forms such as wəd^{ʔ}-wə́daw 'horns,' and yəd^{ʔ}-yə́das 'teeth' present a puzzle. As we have just shown, the glottal stops in these forms are to be associated with the presence, not of the syllable-final d in the reduplication, but of the syllable-initial w and y. We are thus motivated to ask why the glottal stops in these forms are in fact heard after the end of the reduplicating syllables.

Consonant with the view[1] that the proper formulation of a rule handling an irregularity in a grammar must follow from the most plausible explanation of that irregularity, we offer the following tentative explanation of the apparent anomaly in the shapes of the above forms.

First, we assume that the glottal stop arising in augmented forms constitutes a separate segment--as, indeed, we have (although so far merely for typographical convenience) written it.

Second, we shall hold that this glottal stop derives from the lost vowel in the unstressed reduplicating syllable. However, the derivation

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[1] It will easily be seen from the following discussion that a 'morpheme-alternant' analysis would necessarily be extremely complicated, involving many quite ad hoc riders to account for the alternations found.

can hardly be a direct one; rather, we propose that the 'lost' vowel is first unvoiced, and that the loss of 'position' features which this entails results in a segment which we shall identify with 'h.' It is this 'h' which then dissimilates its continuousness (becoming glottal stop) if its abuts a voiced consonant, but is otherwise lost.[1]

Thus, we shall require two ordered rules to produce the augment glottal stop: (1) Reduplicating vowel becomes h

(2) h in the Augment becomes ʔ in certain environments.

It may be argued that the present formulation is to be less prized than one in which the lost vowel becomes glottal stop directly, since we have used two rules instead of one. But it is clear that the criterion of economy is here to be over-ridden by that of naturalness, a claim which we shall fully justify later[2] by showing that other instances of glottal stop must in turn be derived <u>directly</u> from h.[3]

If we adopt the two assumptions made above, then the following implications are to be reckoned with. If the glottal stop referred to derives from an 'original' vowel in the reduplicating syllable, then obviously the rule for reduplication must specify a <u>vowel</u> as well as the C_1C_2 already established. This vowel could logically be any Twana vowel whatever. It could in fact be shwa. However, there are many cases (some already cited) where a shwa appears in the reduplicating syllable of the augmented form, <u>in addition</u> to the glottal stop. This shwa (as in the forms q̀ʷə̲lʔ-q̀ʷéle(h) 'cedar trees' yə̲dʔ-yə́das 'teeth') cannot, of course, come from the 'original' vowel in the reduplicating syllable, even in a weakened grade, but must be the product of an epenthesis rule.

To allow this epenthesis rule as wide a power of application as possible, we now assume that <u>all</u> shwa vowels appearing in the unstressed syllables of augmented forms are attributable to it; this extension of the rule thus also provides a source for the shwa in forms such as kʷábələxʷ ; kʷə̲b-kʷábələxʷ 'root.'

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[1] See Chap. II, sec. 7 ('Augment clusters'), where the Y-metathesis rule forces us to modify this position somewhat. For a richer account of the derivation of glottalization, see Chap. IV, sec. 4.4.

[2] See Chap. II, sec. 15.4 'h - mutation.'

[3] Compare the discussion in Sapir (1938).

We cannot prove this with the data so far presented,[1] but we nevertheless find it most plausible to assume that the reduplication rule for the Augment specifies 'a copy of the first vowel of the root.' It is this vowel which yields the h from which the Augment glottal stop derives.[2] A shwa vowel is later inserted (again, in specifiable environments) in certain reduplicating syllables.[3]

We turn next to the shifted glottal stop in forms with roots of the shape 'resonant' -V-b/d, raised for the cases of wəd^{ʔ}-wə́daw 'horns,' and yəd^{ʔ}yə́das 'teeth' above. What has happened here is to be characterized as 'glottal metathesis,' the glottal stop having been attracted by the stress. The appropriate rule, tentatively formalized below,[4] may clearly be generalized to account for the shift of all glottal stops generated in augmented forms, to the end of the reduplicating syllable. Within this framework, wəd^{ʔ}-wə́daw and yəd^{ʔ}-yə́das are just as 'regular' as forms of the shape of (e.g.) q̓^{w}ə l^{ʔ}-q̓^{w}éle(h) 'cedar trees,' etc.

But what of forms such as wəq̓ə́b; q̓ə-wə́q̓ab 'box,' in which, despite the occurrence of an initial 'resonant,' no glottal stop appears in the augment? q̓ə-wə́q̓ab in fact demonstrates a most important constraint, viz., that when the final consonant in the reduplicating syllable is not voiced (i.e., is not b,d,m,n,l,w,y) no glottal stop appears in the augment. But we do not necessarily conclude that this is a constraint on the rules for generating glottal stops. From the evidence so far, we might just as plausibly assume that the glottal-stop is generated regularly, but that forms of the shape 'resonant'-V-unvoiced consonant fail to meet the conditions for glottal-attraction. That the glottal stop is thereafter absorbed and later lost is a hypothesis which we could so far fairly maintain.[5]

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[1] See Chap. II, sec. 17 for evidence that the root vowel itself is involved.

[2] Since many Salish languages (such as Snohomish) simply reduplicate CVC of the stem, without vowel-loss, it seems that Twana has added a rule here. The consequences of this rule are the subject of much of the rest of the present chapter.

[3] Chap. II, sec. 20.

[4] C_1 ʔ C_2 ⟶ 1 3 2 in env./ - & C_1V́ (with exceptions).
$_{1}{}^{1}\ {}_{2}\ {}_{3}{}^{2}$

[5] See the discussion, in a larger context in Chap. II, sec. 7 (Augment Clusters).

The forms typified by ʔəsəwəɬə́kʷ ; ʔəsɬəʔ-wə́ɬakʷ 'crazy,' and yəšəd; šeʔyə́šad 'foot' in turn demonstrate that the glottal attraction rule applies equally to roots of the shape 'resonant'-V-continuant, although here again there are complications[1] to be commented on further.

For the complications arising with augmented forms based on roots of the shape C-V-semi-vowel (y,w), typical cases are k̓ʷóy; k̓ʷeʔ-k̓ʷóy 'mother' and ɬáwalbəš; ɬoʔ-ɬáwalbəš 'Indian, person.' Assuming the hypothesis above, concerning the shape of reduplication, the augmented forms should be based on the shapes *k̓ʷoy-k̓ʷóy and *ɬaw-ɬáwalbəš. We derive k̓ʷʔy-k̓ʷóy, ɬʔw-ɬáwalbəš (by loss of unstressed vowel in reduplication); then k̓ʷyʔ-k̓ʷóy, ɬwʔ-ɬáwalbəš (by glottal metathesis).

Comparing these derived forms with the proper outputs above, we see that y and w have become e and o respectively, that is, 'semi-vowels vocalize when syllable-final in augment reduplication.' The environment 'between obstruents' is in fact sufficient for a formal rule, and is here obviously met. However, on the data so far presented, the environmental condition is met just as well before glottal metathesis (k̓ʷʔy-k̓ʷóy) as after it (k̓ʷyʔ-k̓ʷóy).[2] Thus

Semi-Vowel Rule

$$\text{Obstruent} \begin{Bmatrix} y \\ w \end{Bmatrix} \text{Obstruent} \longrightarrow 1 \begin{Bmatrix} e \\ o \end{Bmatrix} 3$$

1 2 3

The form sc̓áʔyat ; sc̓eʔ-c̓áʔyat 'salmon-gill,' in turn exemplifies the already explained vocalization of semi-vowels, but it also requires a base form not identical in shape with the unaugmented form. If we take *sc̓áʔyat as our base, we are forced to complicate what was a very simple formulation of the process of reduplication. Reduplicating CVC, we derive **s-c̓aʔ-c̓áʔyat,

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[1] In particular, the shwa in ɬəʔwə́ɬak̓ʷ arises through shwa-insertion while the e in šeʔ-yə́šad requires a special metathesis rule (Chap. II, sec. 7.4); both forms show cluster-simplification.

In q̓oʔ-q̓ə́-ʔwəčeʔ 'canes,' the ʔ-attraction has operated on both augment and stem (cf. q̓əwəʔ-áčeʔ; in addition the originally-stressed vowel is lost (see tri-syllabic stems, Chap. II, sec. 5); shwa is later inserted.

[2] We shall resolve this ordering problem, together with other problems of rule-ordering, when a suitable number of rules is available for the discussion (see Chap. II, sec. 9 end).

from which it is impossible to derive the correct augmented form without a completely ad hoc substitution of e for the reduplicating vowel a.

It is clearly preferable to assume that the base form is in fact *sc̓áyʔat, and that the glottal attraction rule has operated to give sc̓áʔyat: the augmented form is then perfectly regular, i.e., follows the rules we have so far discussed.

The following forms illustrate the same phenomenon, and are thus, similarly, supposed to derive from roots of the shapes indicated: s-cóʔb; s-cəb-cóʔb 'crab-apple' from *s-cóbʔ ; ʔəš-čə́ʔb ; ʔəš-čəb-čə́ʔb, 'jammed,' from *ʔəš-čə́bʔ; and dəxʷ-láʔw-bəd; dəxʷ-lóʔ-láʔw-bəd 'baking pan,' from *dxʷ-láwʔ-bd.

One further anomaly exemplified in Figure 11(b) must be referred to. The loss of final glottal stop in wədáwʔ ; wədʔ-wə́daw cannot be explained on the basis of processes so far discovered; a possible explanation will be offered later, after we have considered the proper underlying features of dictionary b,d (see Chap. II, sec. 15.4, 'h-mutation').

II.4. Disyllabic Stems, Oxytone

	Unaugmented	Augmented	Gloss
		Noun	
(a)	s-x̌p̓áb	s-x̌p̓-x̌ə́p̓ab	cockle
	yəšə́d	šeʔ-yə́šad	foot
	cədéɬ	cəd-cə́daɬ	he
	təbéxʷ	təb-tə́baxʷ	land, earth
	s-yələ́b	s-yəlʔ-yə́lab	year
	wələ́p	wəlʔ-wə́lap	you (bound, free)
	yədés	yədʔ-yə́das	tooth
	wəq̓ə́b	q̓ə-wə́q̓ab	box
		Verb	
	ʔəs-q̓ʷtə́xʷ	ʔəs-q̓ʷt-q̓ʷə́taxʷ	thin
	ʔəs-qəbə́c	ʔəs-qəb-qə́bac	shrunk
	ʔəs-q̓ʷələ́b	ʔəs-q̓ʷəlʔq̓ʷə́lab	sunk
	ʔəs-cəlʔə́s	ʔəs-cəlʔ-cə́ʔlas	rattled
	ʔəsə-wəɬə́k̓ʷ	ʔəs-ɬəʔ-wə́ɬak̓ʷ	crazy
		Noun	
(b)	š-č̓táy	š-č̓t-č̓ə́tay	pan
		~ š-č̓t-č̓táy	

Fig. 12.--Disyllabic Stems, Oxytone

Having treated a variety of stems from the point of view of the behavior of the different consonantisms in the reduplicating syllable, we turn now to the complications found in certain augmented forms, the underlying dictionary entries for which we shall hold are best considered to be di-syllabic roots of the shape CVCV́

Consider the data in Fig. 12(a), where we present forms grouped together as showing similar behavior in the environment of the augment. These examples are not, however, identical in shape in the unaugmented form. Some are di-syllabic (e.g. s-yələ́b 'year'), while others have the shape CCV́C (e.g., s-x̣p̣áb 'cockle'). We also note that the di-syllabic forms are stressed on the second syllable in the unaugmente form, but on the first in the augmented form (s-yələ́b, but s-yəl^{ʔ}-yə́lab).[1] What is more, whatever the stressed vowel in the unaugmented form, such shapes CVCV́C all exhibit the vowel a in the second (now unstressed) syllable when the augment is present[2] (s-yəl^{ʔ}-yə́lab).

Comparing now the unaugmented forms of shape CCVC, we note that they too have the shape CVCV, as well as the same vowel-alternation, when the augment is present. Thus (e.g.) ʔəs-q̓^{w}tə́x^{w}, but ʔəs-q̓^{w}t-q̓^{w}ə́tax^{w} 'thin.'

We now have the motivation for assuming that the types represented by s-x̣p̣áb and s-yələ́b are in fact of identical underlying shape, and shall represent both as disyllabic in their dictionary entries. Thus we avoid the need for special rules for the alternation CC ~ Cə́C between unaugmented and augmented forms: a single rule deletes unstressed shwa between voiceless obstruents.

The question must, however, be raised; are all lexical morphemes (minimally) CVC in shape? In particular, do the very few forms exemplified by 'pan' (sub-corpus [b]) not in fact witness the existence of stems of underlying shape CCVC ? Should this prove to be the case, then we must modify the Constituent Structure rule for Augmentative and explain the alternative s-c̓t-c̓ə́tay as an analogical remodelling on the basis of the statistically predominant CVC root shape,

However, other factors must also be taken into account, and it will be held that the anomalous Augmented form for 'pan' shows stress-alternation rather than deviant root shape.[3]

There remains the problem of specifying the V́~a alternation. Once stress-attraction[4] is assumed to have operated in these augmented forms there

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[1]Cf. Chap. II, sec. 3.2.

[2]Compare s-teqéw; s-q-téqaw 'horse,' bə-cqél; 'he's going up' but ʔas-cə́qal 'up,' etc.

[3]See Chap. II, sec. 21.1, 'Stress Alternations.' [4]Cf.Chap.II, sec.3.2.

is no way to distinguish disyllabic stems with original second-syllable stress, from similar stems with original first-syllable stress (e.g., yədés; *yəd$^{?}$yədes; səbáded; səbəd báded). Thus, from the unaugmented form alone there is no way of knowing to which forms the a-producing rule must apply. The a-rule might be applied before the stress-retraction rule, a recourse which would certainly ensure the correct forms; but in an important sense such a solution is to be regarded as an illegitimate device, for it runs counter to the intuition that the vowel alternation is a result of the shift in stress; we assume, that is, that an originally-stressed vowel does not retain the feature [-compact] when it ceases to carry primary stress.

We thus prefer the equally simple, but more satisfying assumption that the re-assignment of stress to the first syllable does not wipe out the original stress but merely reduces it to secondary stress.[1] The positive condition for the a-rule is thus 'in a syllable carrying secondary stress.'

The two processes just described may be illustrated from another part of Twana morphology. Consider the following examples of transitive verb forms, each form consisting of a stem plus first person singular -čəd.

Examples

Unaugmented	Augmented[2]	Gloss
ɬeč-é-čəd	ɬéč-a-čəd	I scatter
teq^{w}-éčəd	téq^{w}-a-čəd	I play with
čeɬ-é-čəd	čéɬ-a-čəd	I hang up
ƛ^{w}aš-á-čəd	ƛ^{w}áš-a-čəd	I cut
x^{w}ac-áčəd	x^{w}ác-a-čəd	I lift up
ṗač-á-čəd	ṗáč-a-čəd	I sew
q̓^{w}oƛ̓-ó-čəd	q̓^{w}óƛ̓-a-čəd	I hide
poƛ^{w}-ó-čəd	póƛ^{w}-a-čəd	I raise (bread)
ṫoq^{w}-ó-čəd	ṫóq^{w}-a-čəd	I find
ƛ^{w}š-ə́-čəd	ƛ^{w}ə́š-a-čəd	I count
ṫk^{w}-ə́-čəd	ṫə́k^{w}-a-čəd	I pierce
sq̓-ə́-čəd	sə́q̓-a-čəd	I split
ləq-ó-čəd	lə́q-a-čəd	I buy, get

It will be seen that each stem in the Corpus consists of a CVC root plus stem-formative vowel, and that the stem-formative is either identical with the root vowel or (for the last four forms) corresponds to a zero-vocalism in the root.

Now it is clear that the latter cases are in fact quite 'regular,' behaving

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[1] A weaker claim might be simply that stress-shift is accompanied by vowel-ablaut. But see Chap. II, sec. 21, for further justification of the position taken here.

[2] It is entirely possible that we have to do with aspect here, as well as (or, instead of?) plurality (compare p. 36, fn. 2).

in precisely the same way as the forms of Figure 12(a) (Chap. II, sec.4) of (unaugmented) shape CCVC, such as s-x̣p̀áb; s-x̣p̀-x̣ó̀pab 'cockle.' We thus reconstruct the underlying forms here as (e.g.) *k^{w}ə́š 'count,' *ɬə́k^{w} 'pierce,' *sə́q̀ 'split,' and *lə́q 'buy, get,' noting that the vocalism in lə̲q-ə́-čəd must be considered a full vowel, parallel to those in the first nine forms of the corpus, and not a glide-vowel in an incompatible cluster resulting from the loss of a stressless ə in a root (compare s-x̣p̀áb).[1]

The content of the unaugmented transitive-stem-formative vowel may thus be defined as a 'copy of the stem vowel.' The question now arises as to what is the proper status of the a-vowel which appears invariably in the second syllable of these augmented forms. We might choose to assert that the augment involves the addition of a vocalism (or even a consonantism), in conjunction with which the stem-formative vowel gives a. However, there seems no cogent reason for not assuming, quite simply, that 'augment' in a transitive Verb Phrase is to be understood as 'retract the stress to the root syllable': the replacement for the originally-stressed vowel has then the status of the parallel vowel in the disyllabic second-syllable-stressed Noun and Stative verb, i.e., it is an automatic result of the re-assignment of primary stress, and has for its environment 'vowel under secondary stress.'

Thus: Rule 1. Definition of Constituent Structure for Augment.
Rule 2. Stress assignment--stress initial syllable of stem, in Augment
Rule 3. Ablaut rule[2]--vowel under secondary stress ⟶ a.

II.5 Trisyllabic Stems, Paroxytone

We now illustrate the behavior of tri-syllabic stems stressed on the second syllable in the unuagmented form.

Once more, it is clear that the stress retracts to the first syllable in the environment of the augment. Consider (Fig. 13[a]) q̀^{w}ə́lade(h); q̀^{w}əl?q̀^{w}ə́lde(h) 'ear.' Secondly, as with di-syllabic stems (compare Fig. 12[a], Chap. II, sec.4) we must consider inital CC to derive from an underlying CəC, as in forms such as k^{w}tábac; k^{w}tk^{w}ə́təbəc 'husband,' for which we postulate an underlying *k^{w}ətábac.[3]

As distinct from the disyllabic forms of Figure 12, however, the trisyllabic forms now under discussion lose an originally-stressed vowel when this vowel ceases to bear primary stress in the environment of the augment. However,

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[1] Compare the argument on s-x̣p̀áb, in Chap. II, sec. 4, above.

[2] Cf. Kincade (1966), pp. 343-348 for vowel ablaut (involving shwa - a) in Upper Chehalis.

[3] And similarly, therefore, *s-ɬəq̀áx̣ad 'arm,' *ɬəkáyas 'basket,' and *čəx^{w}álas 'steam.'

despite the juxtaposition of voiced consonantisms resulting in some cases, no glide vowel appears: we get q̓ʷəlʔq̓ʷə́lde(h), not **q̓ʷəlʔq̓ʷə́lə̲de(h).

	Unaugmented	Augmented	Gloss
		Noun	
(a)	q̓ʷəláde(h)	q̓ʷəlʔ-q̓ʷə́lde(h)	ear
	kʷtábac	kʷt-kʷə́təbəc	husband[1]
	s-ɬq̓áx̣ad	s-q̓-ɬə́q̓x̣əd	arm
	s-sq̓áče(h)	s-q̓-sə́q̓če(h)	finger
	q̓əwəʔáče(h)	q̓oʔ-q̓ə́ʔwəče(h)	cane, walking-stick
	ŧkáyas	k-t̕ə́keʔəs	basket[2]
	s-ɬq̓ʷə́qs	s-q̓ʷ-ɬə́q̓ʷqs	nostril
		Verb	
	ʔəs-yəq̓ʷáče(h)	ʔəs-q̓ʷe-yə́q̓ʷče(h)	washed hand
	ʔəs-č̓xʷálas	ʔəs-xʷ-č̓ə́xʷəlʔəs	steamed
	ʔəsə-waq̓óčədəxʷ	ʔəs-q̓ə-wə́q̓čədəxʷ	open
	ʔəs-tq̓ócad	ʔəs-q-tə́q̓ədəxʷ	closed
	ʔəs-pq̓ʷéq̓ʷad	ʔəs-pq̓ʷ-pə́q̓ʷq̓ʷəd	feather in the hair
(b)	bəqsə́d	qə-bə́qsəd	nose
(c)	sq̓ʷəháp	s-q̓ʷ-sq̓ʷə́hap	tree-trunk

Fig. 13.--Trisyllabic Stems, Paroxytone

[1] kʷt-kʷə́t̲əbəc also occurs: but since no other example of such a C ~ Ċ alternation is found, we must tentatively consider the alternation to be governed by dictionary marking (optional).

[2] The form k-t̕ə́keʔəs 'baskets' shows a 'secondary,' post-tonic glottal stop within the stem. We reserve discussion of such occurrences of glottal stop for the treatment of the Attenuative. There, the stressing of the prefix, with consequent vowel-losses in the stem, ensures a usefully large mass of data with which to supplement the sporadic and unsystematic cases to be found in the corpus of augmented Noun stems.

On the other hand, a comparison of the augmented forms for 'husband,' 'arm,' and 'nostril' strongly suggests that the -vowels appearing in post-tonic syllables are to be considered as inserted glide-vowels, and not weakened forms of full vowels.[1]

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[1] Compare shwa-insertion in the reduplicating syllable (Chap. II, sec. 3.3).

The implication is clear: for tri-syllabic stems, we must consider both post-tonic vowels to have been lost in the augmented forms. But what of 'ear,' 'finger,' 'cane' and 'washed hand,' in the augment of which a final vocalism remains, apparently counter to the above formulation?

We first note that all these forms show the alternation 'final h ~ zero.' Since, as we shall show,[1] final h is optionally lost after an unstressed vowel, these forms must then possess final h underlyingly. The surviving vowels must then be attributed to a limitation on the vowel-loss rule;[2] that rule must be supplemented by 'but not a final vowel before h.'

The augmented 'ears' has the further interest for us that no glide-shwa is inserted (ɬ̓ʷəlʔ-ɬ̓ʷə́ldeh), our first hint that a distinction must be made between compatible and incompatible resonant clusters.[3]

We are now, incidentally (sub-corpus [b]), able to explain the apparent failure of the V̀→ a rule to operate for the case of bəqsə́d; qəbə́qsəd 'nose,'[4] where we expected the augment to give **qəbə́qsad. If we assume that 'nose' is underlyingly not disyllabic but trisyllabic (*bəqəsə́d), then stress-retraction gives bəq- bə́qəsəd, and the V̀→ a rule gives bəq-bə́qəsàd quite regularly; but, of course, both post-tonic vowels will be lost (bq-bə́qsd), the initial cluster will be simplified (q-bə́qsd), and the output will gain shwas by later insertion--thus qəbə́qsəd.

But there is an apparent contradiction to the above formulation: if bəqsə́d is from *bəqəsə́d, then sɬɬ̓ʷə́qs 'nostril' must be from *s-ɬəɬ̓ʷəqəs. But in that case, why is the final vowel lost in the output form sɬɬ̓ʷə́qs ? Although the corpus for this phenomenon is slender, it will be suggested[5]

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[1] See Chap. II, sec. 15. The rule of course applies to all the forms of the corpora showing final (h).

[2] Note that it is not feasible to re-interpret these final e vowels (e.g.) as derived from underlying semi-vowels (y); a form such as (augmented) s-ɬ̓-sə́ɬ̓ačyh would then irregularly retain its middle vowel, giving **ɬ̓-sə́ɬ̓ačyh, thence **ɬ̓sə́ɬ̓ačeh.

[3] A distinction that will, of course, be reflected in the rule for shwa-insertion (see Chap. II, sec. 20).

[4] Cf. Chap. II, sec. 3.2.

[5] The evidence for this analysis must come from the Attenuative (see Chap. III).

that a final shwa in paroxytone disyllabics is lost between voiceless consonants.

The augmented form for 'tree-trunk' again raises the question of CC-stems, referred to above (Chap. II, sec. 4, disyllabic stems). Again (Chap. II, sec. 2.1, Irregular stress) the discussion must be postponed.

II.6. Rule Summary 1

For convenience, we shall here briefly and informally summarize the rules we have stated or implied so far, with an indication of their ordering insofar as this is as yet clarified in the text. For the moment, we constrain all these rules to 'augmented' forms.

1. 'Augment' (for non h/ʔ-initial stems) consists of $C_1V_1C_2$ reduplication, unstressed.

Before 3

2. In the environment of the augment, stress retracts to the stem-initial syllable. Stress on an originally-stressed non-initial syllable in the stem falls to secondary stress.

After 2

3. A vowel under secondary stress changes to a.

Before 5

4. An unstressed vowel in a reduplicating syllable gives h which is replaced by glottal-stop if either of the consonants of that syllable is a resonant.

After 4, before 9

5. An unstressed vowel (but not a semi-vowel) is lost in the following conditions:
   (i) in the reduplicating syllable.
   (ii) a shwa in the <u>first</u> syllable of the stem.
   (iii) post-tonic vowels in closed syllables, in tri-syllabic stems.

After 4, before 7

6. Glottal stop is attracted to the stress across a consonant which is voiced or continuant.

After 4, before 9

7. A semi-vowel vocalizes between consonants.

8. A glottal stop is absorbed by an adjacent resonant.

After 6-8, before 10

9. Some tri-consonantal clusters arising in reduplication lose the first element.

10. Shwa-insertion; except for certain morpheme-internal 'compatible' clusters.

II.7. Augment Clusters

II.7.1. General

So far, the augment reduplication[1] has been characterized as consisting of a $C_1V_1C_2$ copy of the stem-initial syllable. However, Figure 14 consists

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[1] For stems with other than <u>h</u>- or glottal stop as C_1 or C_2.

	Unaugmented	Augmented	Gloss
		Noun	
(a)	s-tə́q	s-q-tə́q	log jam
	čə́ḍpe(h)	ḍ-čə́ḍpe(h)	fir tree
	s-łḍ^{w}ə́qs	s-ḍ^{w}-łə́ḍ^{w}qs	nostril
	s-ckábšəd	s-k-cə́kabšəd	shin
	tx̌^{w}ápšəd	x̌^{w}-tə́x̌^{w}apšəd	shoe
	sə́x^{w}təd	x^{w}-sə́x^{w}təd	grease, fat
		Verb	
	ʔas- čéq	ʔəs-q-čéq	red
	ʔaš-šáq^{w}	ʔəs-q^{w}-šáq^{w}	smeared
	ʔas-łə́ḍ^{w}	ʔəs-ḍ^{w}-łə́ḍ^{w}	extinguished
	ʔas-tə́k^{w}	ʔəs-k^{w}-tə́k^{w}	pierced
	ʔas-céx̣^{w}	ʔəs-x^{w}-céx̣^{w}	boiled
		Noun	
(b)	čáp	p-čáp	aunt
	sə́ṗtəd	ṗ-sə́ṗtəd	stick
		Verb	
	ʔas-čə́ṗ	ʔəs-ṗ-čə́ṗ	flooded
	ʔas-łə́ṗ	ʔəs-ṗ-łə́ṗ	hung over and down
(c)	s-pə́ḍ^{w}	s-pḍ^{w}-pə́ḍ^{w}	feather
	k^{w}ábəlax^{w}	k^{w}əb-k^{w}ábəlax^{w} ~ k^{w}p-k^{w}ábəlax^{w}	root
	ʔas-pə́q	ʔəs-pq-pə́q	white
	ʔas-x̌^{w}áp	ʔəs-x̌^{w}p-x̌^{w}áp	correct, straight
	təbéx^{w}	təb-tə́bax^{w}	land, earth
	ʔas-łə́b	ʔəs-łəb-łə́b	scarred
	bəqsə́d	qə-bə́qsəd	nose
(d)	bəqsə́d	qə-bə́qsəd	nose
	ʔas-bə́ɬ	ʔəs-ɬə-bə́ɬ	suckled
	ʔas-mə́ɬ̓	ʔəs-ɬ̓ə-mə́ɬ̓	proud
	ʔasə-déč̓	ʔəš̓-č̓ə-déč̓	grazed, scratched

	Unaugmented	Augmented	Gloss
	ʔəsə-wəɬáƛ̓^{w}	ʔəs-ɬɔʔ-wáɬaƛ̓^{w}	crazy
	ʔas-ləx̣́	ʔəs-x̣əlʔəx̣́	lit, bright
(e)	yášqš̌če	šeʔyášqš̌če	long finger
	yəšə́d	šeʔyəšad	foot
	ʔas-yəx́^{w}	ʔəs-x^{w}eʔ-yəx́^{w}	disappeared
	ʔas-yəx̣́	ʔəs-x̣eʔ-yəx̣́	sorted
	ʔas-yəq̓́	ʔəs-q̓e-yəq̓́	filed
(f)	ʔas-x^{w}ót	ʔəs-t-x^{w}ót	soaked
	ʔəs-x^{w}ecós	ʔəs-c-x^{w}écas	fighting
	ʔas-x^{w}ác	ʔəs-c-x^{w}ác	lifted up
	ʔas-x̣ə́č	ʔəs-č-x̣ə́č	measured
	ʔas-x̣ə́ƛ̓	ʔəs-ƛ̓-x̣ə́ƛ̓	flicked
	ʔas-x̣ə́q̓	ʔəs-q̓-x̣ə́q̓	landed
(g)	č̓ə́š̌	š̌-č̓əš̌	elder sister
	š̌č̓ə́ʔesəd	š̌č̓ə́-čaʔesəd	eyebrow[1]
	ʔasq̓ə́cx̣əd	ʔəsq̓-q̓ə́cx̣əd	short arm[2]
	k^{w}opéc	k^{w}-k^{w}ópac	master
	sq^{w}ópč̓əlʔəš̌	sq^{w}ó-q^{w}apč̓əlʔəš̌ ~ sq^{w}o-q^{w}ápč̓əlʔəš̌	cane, stick[3]

Fig. 14.--Augment Clusters

[1] č̓ə́č 'be across' ; -áyas pronominal eye ; -Vd derived Nom.

[2] q̓ə́c 'short' ; -áx̣ad pronominal 'arm.'

[3] s- Nominal ; q^{w}óp 'root'; č̓VlVs ; connected with čálaš̌ 'hand' ? For anomalous stressing in Augment, see Chap. II, sec. 21.

of forms which, at first sight, appear to contradict that formulation. Beside č̓ə́t; čt-č̓ət 'elder brother,' ʔas-ƛ̓^{w}áp; ʔəs-ƛ̓^{w}p-ƛ̓^{w}áp 'corrected' (as in Fig. 9), there are also s-tə́q; s-q-tə́q 'log jam,' yəšə́d; šeʔ-yəšad 'foot,' etc.

One simple way to handle the difference between the forms of Figures 9 and (present) 14 might be to assert that, quite simply, another type of re-

duplication is here involved, a type then characterized as follows:[1] 'the augment may consist of initial repetition of the terminal consonant of the stem syllable.'[2] We might then conceive of the relevant dictionary-entries as including the rule-feature[3] [reduplication type 2] (or some other similar notation), in conjunction with a minor rule[4] in the grammar.

On the other hand, it would clearly be preferable to treat these forms, not as subject to another ('minor') reduplication rule, still less as individual exceptions to the $C_1V_1C_2$ rule, but rather as behaving differently because of their phonological shape. It will be shown that the reduplicating syllable of these forms simply loses its initial consonant, and that this loss results quite straightforwardly from the constraints on clusters. The clusters in question arise regularly through the loss of the vowel in an unstressed reduplicating syllable, for the root-consonant pairings to be defined below.

II.7.2. Clusters with Velar as C_2

We now consider the forms of Figure 14, on which we shall base our account of the constraints on augment clusters, referring also to forms of earlier corpora in an attempt to distinguish between non-permissible clusters and those merely non-occurring.

In forms Figure 14(a), note that if the second element of the cluster is a velar[5] stop or spirant (whether or not labialized and/or glottalized), then the first element is lost. Forms (b) suggest that it is [-grave] first

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[1] Thus Edel (1939), par. 23. Cf. Haeberlin (1917), passim.

[2] Better, for our purposes, 'stem-initial syllable.'

[3] See Lakoff (1965) for the question of linguistic irregularity in general, and the use of 'rule-features' in particular.

[4] The distinction between 'major' and 'minor' rule, important in Lakoff's formulation, is still fraught with difficulties, especially insofar as (as in the present case) it is based on essentially statistical considerations.

[5] The corpus is deficient in forms containing k, but there is no evidence to suggest the need to distinguish between [+Retracted] (i.e., q-type) and [-Retracted] (i.e., k-type) velars, from the point of view of the present rule. The absence of k-forms is here to be considered 'accidental.'

elements that are lost before [+grave] second elements, and that the 'environment' must <u>not</u> be confined to $\left[\begin{smallmatrix}+\text{grave}\\-\text{diffuse}\end{smallmatrix}\right]$ consonants (viz., velars).

Forms (c) confirm that the left-hand side of the cluster-simplification rule <u>must</u> specify [-grave] consonants.

The rule now takes the following tentative shape:

Rule I: $\left[\begin{smallmatrix}+\text{cons}\\-\text{grave}\end{smallmatrix}\right] \longrightarrow \phi$ in env. $/-\left[\begin{smallmatrix}+\text{cons}\\+\text{grave}\end{smallmatrix}\right]$) $\overset{\&}{\text{Aug.redup.}}$

This formalizes the generalization that in the unique cluster-type C_1C_2 & C_1- found in augmented forms, the sequence [-grave] [+grave] [-grave] constitutes an incompatible cluster,[1] to be resolved by deletion of the first member.

A further constraint is dictated by forms (c) of the type təbéx^w; təb-tə́bax^w 'land,' and ʔas-ɬób ; ʔəs-ɬəb-ɬób 'scarred.' Comparing such forms with ʔas-ɬə́ṗ ; ʔəs-ṗəɬə́ṗ 'hung over & down' of forms (b), note that a [-grave] segment is lost before <u>ṗ</u>,[2] but not before <u>b</u>, although both <u>ṗ</u> and <u>b</u> are both [+grave] segments. For the moment we formalize this distinction in simple and obvious fashion by adding [-voice] to the specification of the 'environment' of Rule I above. For convenience, we now re-write Rule I, as follows:

$$\left[\begin{smallmatrix}+\text{cons}\\-\text{grave}\end{smallmatrix}\right] \longrightarrow \phi \quad \text{in env. } / \quad - \begin{bmatrix}+\text{ cons}\\+\text{ grave}\\-\text{ voice}\end{bmatrix} \text{)Aug.redup.}$$

In the same sub-corpus, on the other hand, note that while initial <u>p</u> is retained in s-pq̓^{w}-pə́q̓^{w} 'feathers,' initial <u>b</u> is lost in qə-bə́qsəd 'noses.'

For qə-bə́qsəd, etc., however, it is not feasible to amend Rule I to make it operate at all, for we have already been forced to specify the left-hand part as referring to segments [-grave]. We must apparently add a sub-rule to Rule I to deal with the anomaly.[3]

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[1] The rules for cluster-simplification in augment could, perhaps more powerfully, be framed in terms of tri-segmental strings, but it is for the moment not certain that identical strings could not arise elsewhere in Twana than in augment reduplication. We have thus chosen, at least temporarily, to limit the rule to Augment.

[2] The distinction is a priori <u>im</u>plausibly assignable to the glottalization of <u>ṗ</u> in ɬə́ṗ 'hang down.' This is confirmed by the existence of forms such as čáp; p-čáp 'aunt.'

[3] We might add to the left-hand side of Rule I the following: $\begin{bmatrix}+\text{cons}\\+\text{grave}\\+\text{voice}\end{bmatrix}$, to allow b-loss (bəqsə́d; qə-bə́qsəd) but not p-loss (pq̓^{w}-pə́q̓^{w}).

II.7.3. Clusters with Voiced Consonant as C_1

However, consider the forms of sub-corpus (d). bóƛ' ; tə́-bóƛ' 'suckled' (etc.) is a member of a class in which the initial consonants are [+voice] and the following ones are [-voice]; the constraint then, is really on the total sequence [+voice] [-voice] & [+voice][1] in augment, and the first element is lost. This being the case, the addition of a sub-rule to Rule I, in order to allow it to handle qə-bə́qsəd as part of the natural class of clusters having a [+grave] second element, would not only be superfluous but would also lack the explanatory power of the analysis now proposed.[2]

Rule II thus reads:

$$\begin{bmatrix}+\text{cons}\\+\text{voice}\end{bmatrix} \longrightarrow \phi \text{ in env. } / - \begin{bmatrix}+\text{cons}\\-\text{voice}\end{bmatrix} \text{)Aug. redup.}$$

II.7.4. Clusters with Y Plus Voiceless Consonant

Figure 14(e) presents another kind of problem. If we assume that these forms follow Rule II above, we apparently explain why the initial y disappears. Let us reconstruct this stage, for the augmented *yəš-yə́šəd 'feet,' and compare the identical stage for the parallel form *wəɬ-wə́ɬakʷ 'crazy.'

Both forms are of the shape Resonant-V-Continuant, so we expect:

yʔš-yə́šəd , yšʔ-yə́šəd , šʔ-yə́šəd , šəʔ-yə́šəd

wʔɬ-wə́ɬakʷ, wɬʔ-wə́ɬakʷ, ɬʔ-wə́ɬakʷ, ɬəʔ-wə́ɬakʷ [3]

operating the rules for V ⟶ h, h ⟶ ʔ, glottal-metathesis, cluster-simplification, and shwa-insertion.

However, whereas ɬəʔ-wə́ɬakʷ is the correct (and only) augmented form of wəɬə́kʷ, šəʔ-yə́šəd is one of three alternative outputs for the augmented form of yəšə́d. How do the other two augmented forms of yəšə́d arise? We take first the alternative šeʔ-yə́šəd, then šeʔ-ə́šəd.

Recall forms such as kʷóy ; kʷeʔ-kʷóy 'bend' (Fig. 11[b] , Chap. II, sec. 3.3). We note that the e-vocalism in šeʔ-yə́šəd is in the proper environ-

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[1] Compare (Fig. 10, Chap. III, sec. 3.2) sə-bəd-bə́ded 'mountains,' yədʔ-yə́das 'teeth,' for the underlying sequence [+voice] [+voice] & [+voice].)Aug. redup.

[2] For the same reason, these rules must be ordered so that present Rule II precedes original Rule I.

[3] Note the shwa-insertion in env./#C-ʔ. Cf. Chap. II, sec. 17.2.

ment (viz., C-C) for the vocalization of a semi-vowel, in the present case y. Supposing this as a possibility, what is the source of the y in the (reconstructed) form *šy?-yə́šad ? The most plausible explanation we can offer is that metathesis of original yš has occurred. A Y-metathesis rule,[1] operating after glottal-metathesis, will permute the segments Y + voiceless consonant, the derivation being as follows:

yəš-yəšə́d	by Constituent Structure
yəš-yə́šə̀d	by stress-assignment
yəš-yə́šad	by V ~ a mutation
yhš-yə́šad	by V → h (loss of voice and position)
y?š-yə́šad	by h → ?
yš?-yə́šad	by ? - metathesis
šy?-yə́šad	by Y - metathesis (optional) (Compare yš?-yə́šad above)
še?-yə́šad	by vocalization of semi-vowels

What then of the alternatives of the shape še?-ə́šad ? To understand these forms it is necessary to revert to the ?-metathesis rule. As tentatively formulated (see Chap. II, sec. 3.3), it permutes the ? with the next segment towards the stress. The present cases seem to constitute evidence that the metathesis may occur across more than a single segment, as far as the stressed vocalism.[2] The derivation of the output forms, taken from the stage at which a two-segment ?-metathesis can occur, is as follows:

y?š-yə́šad	
yš-y?ə́šad	by ?-metathesis (2-segment option)
šy-y?ə́šad	by Y-metathesis : non-application gives yš-y?ə́šad
še-y?ə́šad	by vocalization of semi-vowels. Also yš-e?ə́šad
remains	by cluster-resolution. Also š-e?ə́šad

Note that there are theoretically four, not three possible outputs for the rules given above, since we must allow for both one and two-segment metathesis of ?, and also the application or non-application of the Y-metathesis rule. In the case of the two-segment ?-metathesis, application and

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[1] Not 'semi-vowel metathesis,' for the output łə?-wə́laǩ^{w} requires no previous stage **łw?-wə́łaǩ^{w} , and thus no w-ł metathesis. For the appropriate features for y in this rule, see Chap. II, sec. 7.5, end.

[2] There are even one or two cases of metathesis across the stressed vocalism itself: but I do not have sufficient structured material to do more than note this for further study.

non-application of Y-metathesis are seen to give identical phonetic outputs, for there is no perceptual distinction between šey?- and še?- .

Most of the forms of Figure 14(e) may be explained by the same rules. However, forms such as ?as-yə́ḍ; ?ə́s-ḍe-yə́ḍ, which present no glottal stop in the augmented form, may not be thus explained. Reconstructing, we assume that the underlying form for the augment is *?as-yəḍ-yə́ḍ. This should give ** as-y?ḍ-yə́ḍ. The glottal-attraction rule here failing to operate, it is obvious that y?-ḍ cannot metathesise unless we introduce a further rule to delete the ? segment.

Consider the alternatives. The addition of a further rule to delete the unwanted glottal stop would guarantee the correct output; but the lack of any further need for such a rule at least warns us to seek another solution. Suppose, instead, we constrain the generation of the glottal stop.[1] This may be done at either of the two stages V to h, or h to ?. We may assert that the unstressed V gives zero (i.e., no h) if a voiceless stop follows; or, that h is produced but is lost before (or instead of) becoming glottal stop.

Since, as will be shown,[2] Twana h is lost in environments which include that of the present case, it is clearly preferable to adopt the latter solution.[3] The rules involved are thus:

1. V to h in unstressed syll of Augment.
2. h --> Ø with following voiceless stop.
3. h to glottal stop, abutting a voiced consonant.
4. Glottal metathesis

II.7.5. Clusters with Velar Spirant Plus Oral Consonant

The remaining sub-corpus, Figure 14(f), makes it clear that in constraining the specification of the left hand side of Rule I to [-grave], we robbed that rule of the power to handle cluster-simplifications of the types

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[1] Cf. p. 45. Although forms such as wəḍə́b ; ḍə-wə́ḍab could in fact be subsumed under a glottal-absorption rule (see p. 45), it simplifies the glottal-stop generating rules to allow the constraint to apply there too.

[2] See Chap. II, sec. 15.

[3] The important generalizations thereby preserved are (1) that unstressed vowels are always unvoiced and give h in Twana, and (2) that h gives glottal stop, adjacent to a voiced consonant.

bəqsə́d ; qə-bə́qsəd 'nose' (cp. pɬ^{w}-pə́ɬ^{w} 'spotted'),
x^{w}ó́t ; t-x^{w}ó́t 'soaked' (cp. x^{w}əd-x^{w}ə́d 'tired'), and
ẋə́q̇ ; q̇-ẋə́q̇ 'landed' (cp. ẋṗ-ẋə́ṗab 'cockles').

It was shown above (Chap. II, sec. 7.3) that the type qə-bə́qsəd 'noses' falls under the domain of the constraint on sequences [+voice] [-voice] & [+voice]. What is the relevant constraint in the remaining types (e.g., x^{w}ó́t, ẋə́q̇) ?

The element deleted is clearly [+grave, +continuant].[1] The environment, however, constitutes a disjunctive set of features. For ẋə́q̇ ; q̇-ẋə́q̇ 'raked,' we require the environment to be [+grave] (q), yet <u>non-diffuse</u>[2] (since ẋṗ-ẋə́ṗab 'cockles,' does not lose its ẋ in reduplication). On the other hand, the remaining cases are all subsumed most easily under the features <u>minus</u> grave, and [-voice]: the feature [-voice] is required, to exclude x^{w}əd-x^{w}ə́d 'tired,' etc. (i.e., second elements b,d,l,w,y, before which x^{w} is <u>not</u> lost). We thus formulate the following rule:

Rule III:

$$\begin{bmatrix}+\text{cons}\\+\text{grave}\\+\text{cont}\end{bmatrix} \longrightarrow \emptyset \quad \text{in env} \quad / \quad - \left\{ \begin{matrix} \begin{bmatrix}+\text{cons}\\+\text{grave}\\-\text{diff}\end{bmatrix} \\ \begin{bmatrix}+\text{cons}\\-\text{grave}\\-\text{voice}\end{bmatrix} \end{matrix} \right\}$$

(for type ẋə́q̇)
(for type x^{w}ó́t)
)Aug. redup.

Throughout the present chapter, we have been concerned to show, whether explicitly or by implication, the explanatory power inherent in the use of distinctive features. However, far from exemplifying this, the above rule is in a sense far less revealing than the simple statement 'A velar spirant is lost before any voiceless consonant <u>except p</u>.' This simple environmental condition cannot be expressed in the features we have been using, for the feature of <u>gravity</u> required would also exclude loss of ẋ before (e.g) -q̇, as in ẋə́q̇ ; q̇-ẋə́q̇ 'raked,' giving **ẋq̇-ẋə́q̇.

On the other hand, the statement 'except p' merely gives us the bald

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[1] A Twana segment marked [+grave] and [+cont] cannot also be [+glottal].

[2] [-voice] is not required for such cases, for no [-diffuse] segment can also be [+voice].

fact of the exclusion, as if this were a quite arbitrary exception[1] in the language, a conclusion we are loath to accept without further examination. We should prefer some positive manner of expressing the exclusion, while at the same time implicitly suggesting a reason for it.

What is wrong, from our point of view, is that there is no one feature which sets p apart from all other obstruents. This we propose to remedy by assuming the existence of just such a feature. Since all other obstruents are articulated within the oral cavity, let us call this feature 'intra-oral,' or more simply 'oral.'[2] The segment p is now uniquely specified as [+cons, -oral, -voice].

Rule III thus reads:

$$\begin{bmatrix}+\text{cons}\\+\text{grave}\\+\text{cont}\end{bmatrix} \longrightarrow \emptyset \quad \text{in env.} \quad / \quad - \quad \begin{bmatrix}+\text{cons}\\+\text{oral}\\-\text{voice}\end{bmatrix}$$

)Aug. redup

The theoretical status of the arguments in favor of the employment of a new feature, 'oral,' in the above rule, may reasonably be said to outweigh the fact that there may be no other use for this feature in the description of Twana.[3]

The cluster-resolution rule thus reads:[4]

$$[+\text{cons}]_{[1]} \quad \begin{bmatrix}+\text{cons}\\-\text{voice}\end{bmatrix}_{[2]} \longrightarrow [\emptyset] \quad [2]$$

Conditions: $\left\{ \begin{array}{l} [1] \text{ is } [+\text{voice}] \\ [1] \text{ is } [-\text{grave}],\ [2] \text{ is } [+\text{grave}] \\ [1] \text{ is } \begin{bmatrix}+\text{grave}\\+\text{cont}\end{bmatrix},\ [2] \text{ is } [-\text{labial}] \end{array} \right\}$

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[1] Cf. the argument on d (but not t) loss, Chap. II, sec 8.

[2] Better, perhaps, 'labial'--which I use in the rule.

[3] That only Y is metathesized (and not w too) is perhaps made more plausible if we hold that only the [+oral] (or [-labial]) semi-vowel is involved (Chap. II, sec. 7.4). Cf. also n-loss (Chap II, sec. 19, esp. end).

It is not without interest to note that the loss of the component of labiality from all obstruents in Tillamook (Edel 1939) may perhaps be understood as simply an exclusion of the same feature. This suggests the borrowing of a single rule from Lower Chinook, the neighboring language, also lacking the feature. On the other hand, Thompson (1966) states that Garibaldi Tillamook does possess labio-velars, although utilizing a special kind of rounding. See Chap. IV, sec. 6. See also Hamp (1967).

[4] The extraction of 'conditions on rules' here allows the clearest formulation; in particular, the constraint in segment [2] on voicing.

II.7.6. Residual Forms, and s- Assimilation

Figure 14(g) contains five forms which, it seems, must be marked in the dictionary for anomalous cluster-simplification.

'Elder sister,' 'eyebrow': there are too few forms with clusters of this shape for us to be clear, but it is possible that there is a regular constraint, viz., against sequences of affricates.

Whereas 'master' must be assumed to have lost its reduplicating vowel regularly, 'cane' suggests the operation of a 'minor' deletion rule for C_2 of the reduplication when anomalously stressed.

It remains to note that Figure 14 presents several examples of the assimilation of s- (of prefix ʔas-) to a following š/č. Of especial interest are those forms, such as ʔasədéč̌ ; ʔəšč̌ədéč̌, 'grazed,' showing the assimilation only after the simplification of a cluster, and thus, of course, partly ordering the required rule for s-assimilation.[1]

II.8. Representation of b,d

Before attempting to specify the underlying representations required to handle the limitations on glottalization in the augment, we survey the classes of consonants involved.

For cluster-resolution, it is recalled, we employed the feature of [voice] to distinguish l,w,y,b,d,ʒ,ǰ,g,g^w,m, and n from the rest of the Twana consonants. Here, on the other hand, we must distinguish l,w,y, from the rest of this set. The simplest distinction to be made is to characterize l,w,y as [-obstruent], leaving b,d,ʒ,ǰ,g, and g^w as [+obstruent, +voice], and m,n as [+nasal].

But the distinction we have newly made between voiced obstruents (b,d) and nasals (m,n) requires a more searching examination. Consider the corpora of Chapter IV, sec. 3.7,[2] from which we draw the following observations.

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[1] Since forms like *ʔas-sótčəd, 'I know it,' and *ʔas-šéč̌, 'paid' are commonly reduced to [ʔasótčəd, ʔašéč̌], s-assimilation precedes (optional) geminate resolution. For the moment, we place both these rules after cluster-simplification (see Chap. II, sec. 9). See Chap. IV, secs. 3.2 and 3.4 for the shape of the rule for s-assimilation.

[2] Loan words and allophony are both discussed in full in Chap. IV, where full corpora will be found.

From the notes to Figures 57 and 58 we see that m,n occur in Twana probably only in loan words, whether from European, Puget Sound or other Salish languages; but in all word-positions (Fig. 59). While Twana is one of the few languages of the world apparently possessing 'no nasals,' it is clear that Twana b,d in all cases go back to Salish nasals m,n (Fig. 60). On the other hand (as Fig. 61 illustrates), utterance initially, b,d freely alternate with ^{m}b, ^{n}d (Fig. 61[a]); an occasional occurrence is also found intervocalically, although almost only in texts.[1] Figure 61(b) illustrates that (only in texts) b,d occasionally appear as m,n before a morpheme-boundary before a dissimilar stop d,b. Lastly (Fig. 61[c]), we note that d is often lost[2] morpheme-finally before morpheme-initial voiceless stops, while t is not.

From the above summary, we conclude that we might simply utilize [nasality] to distinguish b,d from l,w,y. On the other hand, the occurrence of m and n in words not clearly borrowed requires us to distinguish between b and m, and between d and n.

Suppose we have defined b,d as including [+nasal], as well as [+voice] in the corresponding segments of the relevant dictionary entries. If, then, the proper environment for glottalization in augment reduplication is defined as $[^{+voice}_{-nasal}]$, b and d segments are excepted by virtue of their being specified as [+nasal]. But this is counter-intuitive, for it hardly seems plausible that it is nasality that inhibits glottalization--we should expect the opposite! What is more, we have not distinguished b,d from 'true' m,n in the dictionary.

So far as occurrences of 'true' m,n are concerned, it is open to us to suggest that, since certain morphemes contain segments which always[3] have phonetic m,n as their output, we may simply label these morphemes [-native]. This would allow them to pass through the grammar unaffected by

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[1] For both positions of occurrence, it is curious that the dental is involved very rarely, in comparison with the labial. Compare the inverse relation for Quileute initial-position, Andrade (1929), p. 156. Quileute, of course, has b,d, and g.

[2] See n-loss, Chap. II, sec. 19.

[3] The informant would accept the pronunciation, on my part, of b/d in such words without comment, but never herself replaced m/n by b/d except as delimited above.

any rules marked as applying to [+native] morphemes; thus we require merely to mark rules applying to b,d as [+native].

The question now arises, whether it might not be preferable to mark only the segments involved, and not the entire morphemes. If we do this, however, we are implying that there may, within the same morpheme, be segments to be marked as [+native] and other segments to be marked as [-native], a situation that seems not to occur in languages generally. With this in mind, we seek an explanation of the following apparently 'mixed' forms in Twana:

Examples:

xʷəq̓ənbəd (~ xʷəq̓ədbəd)	landing-place
səʔwésamdəxʷ (~ səʔwésabdəxʷ)	it flooded
ƛamóləčəd	barrel
ƛamʔəɬəd	rope

The first two cases are tri-morphemic, and represent dissimilations at morpheme-boundaries (in fast speech) mentioned above.[1] For the other cases too, however, all our understanding of Twana leads us to be almost certain that these are not single morphemes.[2] We are thus enabled to assign [native] to the relevant morphemes as a morpheme-feature.[3]

We return now to the question, how are we to avoid the completely arbitrary implication that segments marked as nasal are nevertheless not liable to the glottalization rule? One simple way of accomplishing this would be to assume that the sound change producing b,d from Proto-Salish m,n was a change involving not primarily a loss of nasality (the allophony and dissimilation phenomena mentioned above would militate against that in any case), but rather a change of obstruency for [+nasal] segments in [+native] morphemes.[4] If we assume that the sound-change was of the type characterized as 'unconditioned,' it is implicit in a generative formulation that there has been a re-structuring of the phonological specification of segments of dictionary entries.

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[1] For re-interpretation, see Chap. IV, sec. 7.

[2] We shall rehearse the evidence bearing on the possible etyma in another place.

[3] By a convention we shall, however, mark only [-native] morphemes.

[4] For further discussion, see Chap. IV, sec. 3.7.1.

Such an assumption would lead us to define b,d as [+nasal, +obstruent] in dictionary entries. 'True' m,n may then be distinguished as [+nasal, -obstruent], a distinction whose rare employment we are forced to explain as resulting from their [-Native] (i.e., loan) status,[1] although we observe that no such morpheme-feature is in fact required in the dictionary in the present formulation.

Suppose now, alternatively, we wish to infer, from the allophony and dissimilation phenomena mentioned, that the change of obstruency by which the glottalization rule may be prevented from operating on b,d in fact represents a conditioned sound change, and that it operates only optionally for these allophony and dissimilation environments, and not at all for m/n segments in morphemes containing 'true' m,n.

In this case, we should require to leave all the m,n,b,d segments as underlying non-obstruent nasals in the dictionary. At some point prior to the glottal-stop rule, we should then insert a rule [say, rule X], optional for the relevant (e.g., assimilation) environments, changing the obstruency of m,n to plus. To convey our assumption that 'true' m,n are exceptions to the rule, we must then mark all forms containing them as [not rule X].[2]

In the present analysis, the glottal-stop rules are formulated in exactly the same way as before; either formulation will still leave the need for a later rule to (optionally) delete the nasal quality of nasal voiced obstruents. What has changed is our interpretation of the historical facts: instead of assuming an unconditioned sound change, with immediate restructuring of dictionary segments,[3] we have here assumed the addition of a rule to the phonology.[4]

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[1] The use of [-Native] as a cover-term for 'behaving differently' is potentially misleading. See fn. 2 below.

[2] This corresponds to our ignorance of the conditions on the exception. If we knew these, we should of course incorporate them into the rule for the change of obstruence. We prefer to avoid the term 'Native,' which hides our ignorance.

[3] Perhaps more correctly, 'restructuring of dictionary segments as a result of a change in morpheme-structure conditions.'

[4] From the point of view of external reconstruction, we imply that Twana differs, not in its dictionary entries, but by the addition of this particular rule. Although the shapes of dictionary entries do not change, the m,n forms are affected to the extent that a rule feature has been added to them.

II.9. Glottal Absorption

Unaugmented	Augmented	Gloss
bále	bəl-bále	fish-egg; bait
bóle	bəl-bóle	spring (of water)
bol^{ʔ}óq^{w}	bəl-bó^{ʔ}laq^{w}	tangle up.
bə́yac ~ bə́y^{ʔ}ac		meat
sə-də́^{ʔ}wat	sə-do-də́^{ʔ}wat	wave (in the sea)

Fig. 15.--Glottal Absorption

The motive for attempting to distinguish b,d as a natural class from l,w,y, was that the output strings for augment showed a glottal stop derived with the latter but not with the former. However, Figure 15 shows that there are forms where an expected glottal stop is in fact not present in the output. The underlying forms for the augment are, respectively: *bəl-bále 'bait,' *bol-bóle 'spring,' *bol- bol^{ʔ}óq^{w} 'tangle,' *s-dəw-də́w^{ʔ}at 'wave.'[1]

But to derive the correct outputs we must still make one of two alternative assumptions. We could, first, assume that these forms are 'exceptions' to the rule for glottal stop in augment, marking the relevant dictionary entries appropriately.[2] However, in the light of the distinction we have just discussed concerning the underlying nature of b,d, another alternative is now open. Suppose we assume that underlying segments specified as $\left[\begin{smallmatrix}-\text{voc}\\+\text{voice}\end{smallmatrix}\right]$ are all relevant environments for the glottal stop rule, so that underlying m,n are affected as well as l,w,y.[3] For clarity at this point,

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[1] In accordance with the analysis of s-cób^{ʔ} 'crab-apple,' etc. See p.47.

[2] That is, although they meet the structural description of the rule, they are not to follow it. See Lakoff (1965) for the notion of 'structural description' and 'rule' features, within a general theory of the nature of linguistic exceptions.

[3] We allow 'true' m,n to produce glottal stops in the same way. This allows our rules the greatest power we may give them, bearing in mind however, that the evidence for the behavior of 'true' m,n is so scanty as to be quite inconclusive.

we re-write these forms with m,n for b,d, recalling that they are specified as $\begin{bmatrix} -\text{obstr} \\ +\text{nasal} \\ +\text{voice} \end{bmatrix}$.

Thus: mal- mále, mol- móle, mol-mol$^{\text{ʔ}}$óq$^{\text{w}}$, s-nəw-nə́w$^{\text{ʔ}}$at.

With the above assumption on the domain of the glottal-stop rule, and applying the other rules we have developed in their original order, we now derive:

m$^{\text{ʔ}}$l-mále, m$^{\text{ʔ}}$l-móle, m$^{\text{ʔ}}$l-mól$^{\text{ʔ}}$aq$^{\text{w}}$, s-n$^{\text{ʔ}}$w-nə́w$^{\text{ʔ}}$at (stress-retraction and development of ʔ).

ml$^{\text{ʔ}}$-mále, ml$^{\text{ʔ}}$-móle, ml$^{\text{ʔ}}$-mó$^{\text{ʔ}}$laq$^{\text{w}}$, s-nw$^{\text{ʔ}}$-nə́$^{\text{ʔ}}$wat (ʔ-metathesis).

" " " s-no$^{\text{ʔ}}$-nə́$^{\text{ʔ}}$wat (semi-vowel rule).

The glottal-absorption rule as originally conceived[1] did not require us to specify how a choice would be made in the case (as at present) of a glottal stop falling <u>between</u> equally applicable segments. Since we shall hold that the loss of glottal stop for the above forms rests on the incompatibility of glottalization and voiced obstruence in the <u>same</u> segment,[2] it is crucial that the absorption should be by the segment <u>towards</u> the stress.[3] We must not derive **m<u>l</u>-móle, for this would (implausibly) make that form an 'exception' again.

The above account might be summarized informally as follows: 'after attraction across any consonant, towards the stress, a glottal stop is absorbed by an adjacent voiced consonant.[4] Nasalized voiced non-obstruent consonants (except in certain morphemes[5] so marked in the dictionary) are then made obstruent. Such obstruents then lose the glottal component.'

However, there are certain forms in the corpus, in which a glottal stop <u>does</u> appear adjacent to a voiced (nasal) obstruent, which apparently contradicts the above account. Thus it seems that either the glottal-

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[1] See p. 45.

[2] The matter is argued in Chap. IV, sec. 3.7.1.

[3] We assume that təb-tə́bax$^{\text{w}}$ 'lands,' yəd$^{\text{ʔ}}$yə́das 'teeth,' etc., are derived in parallel fashion; the rule must thus allow absorption to a voiced segment towards the stress, <u>or</u> to an adjacent preceding voiced segment, in that order.

[4] Compare the penetrating account in Sapir (1938).

[5] The 'true' m/n forms. Cf. Chap. II, sec. 8, end.

absorption <u>or</u> the glottal-loss rule must be constrained so as to operate only in the environment 'Augment'; the 'anomalous' forms are <u>not</u> augmented forms, and would thus be distinct from the latter.

Although the constraint of rules to particular morphologically-defined environments is by no means uncommon, we should still prefer[1] a more powerful formulation if possible. We shall therefore examine some typical environments in which glottal stop is retained next to b/d.

héʔd	~	hédʔ	a long time
s-cóʔb	~	s-cóbʔ	crab-apple
dəčáʔd	~	dəčádʔ	where
bəščə́ʔd	~	bəščádʔ	louse
č̓ałáʔd	~	č̓ałádʔ	coal
s-łóʔb	~	s-łóbʔ	soup
ʔəs-sóʔb-dəx^{w}		sobʔód-as	smelled; smell it
q̓^{w}éx̣		dəx^{w}-q̓^{w}éx̣-əbəd	fry; frying pan[1]
s-téq^{w}ab		dəx^{w}-téq^{w}əb-ʔəd	toy; game
t̓abéd		t̓abéʔdabəc	hair; body-hair

Fig. 16.--Glottal Stop Abutting Voiced Stop

[1] <u>dx^{w}</u>-stem-<u>bd</u> is a common instrumental nominalization. Cf. be-téq^{w}-<u>ab</u> : -ab is a verb-deriving suffix; be- is an aspect prefix.

Leaving aside details not germane to the present discussion, we note the following points of interest in Figure 16. First, there is clearly an optionality in the glottal-attraction rule, at least for the environment 'in pause.' Since there is a priori no reason to suppose that 'pause' attracts a glottal-stop, whereas stress clearly does so, we must assume that the forms concerned (héʔd ~ hédʔ etc.) are underlyingly of the shape -CV́C<u>ʔ</u> , i.e., contain a final glottal stop in their dictionary entries.

Forms of the shape of <u>ʔasóʔbdəx^{w}</u> may reasonably be assumed to be

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[1] If only because of the historical implications of the general account of the sources of glottal stop in Twana.

*sób? , parallel to s-cób? , which we have already discussed (see p.47).

The nominalizations of type dx^{w}- stem -bd contain glottal stop if the stem-final consonant is also -b; clearly, there must be a geminate-resolution rule, one of whose sub-parts derives ʔ-b from *b-b. As has already been shown, such a rule must follow s-assimilation (cf. Chap. II, sec. 7.6). The same geminate-resolution rule will also handle the case of ƛabéʔdəbəc, which is clearly derived from *ƛabéd-dabac, applying the rules for vowel-loss beyond the stress (ƛabéd-dbc), then geminate resolution (ƛabéʔdbc), then shwa-insertion (ƛabéʔdəbəc).[1]

Thus, for the stage characterizable as 'immediately after the glottal-attraction rule,'[2] the forms of Figure 16 have the following shapes--taking only the segments immediately adjacent to the glottal stop:

i) for hé?d ~ héd?, etc. #CV́?C# ~ #CV́C?#

By contrast, now, the relevant augmented forms are given, at the same stage of derivation:

i) for wə-ʔ-wódaw
ii) for bl-ʔ-bóle
iii) for tb-ʔtábax^{w}

} -C ʔCV́C-

It seems that the environments are sufficient to distinguish the products of an absorption rule formulated in the following terms:

Glottal-absorption:[3]

$$\left\{ \begin{array}{l} [\text{ʔ}]\ [^{+\text{voice}}_{+\text{cons}}] \\ [^{+\text{voice}}_{+\text{cons}}]\ [\text{ʔ}] \end{array} \right\}_{2}^{1} \longrightarrow \left[\begin{array}{l} +\text{cons} \\ +\text{voice} \\ +\text{checked} \end{array} \right] \text{ in env. } / - \left\{ \begin{array}{l} [\emptyset] \\ [+\text{cons}] \end{array} \right\}_{2}^{1} \left[\begin{array}{l} -\text{cons} \\ +\text{voc} \\ +\text{stres} \end{array} \right.$$

Obstruency Rule:

$$[^{+\text{voice}}_{+\text{nasal}}] \longrightarrow [+\text{obstruent}]$$

Glottal Loss Rule:

$$[^{+\text{obstruent}}_{+\text{voice}}] \longrightarrow [-\text{checked}]$$

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[1] The final ordering of these rules will not invalidate the argument here, though of course many more rules are intercalated.

[2] And thus, of course, excluding the forms with glottal-stop not yet generated at this point in the rules.

[3] Glottal stop is to be defined later (Chap. II, sec. 18). This rule is modified later (Chap. II, sec. 13). N.B. The bracket numerals order the sub-parts of the rule.

As already mentioned,[1] 'true' m,n will be exempted from the Obstruency Rule by virtue of the morpheme-feature [not Obstruency Rule] associated with the relevant dictionary entries. The Glottal-Loss Rule, in turn, requires no 'environment,' since the Glottal Absorption Rule unambiguously creates glottalized, voiced obstruents only in environments where we suppose the Glottal-Loss Rule to operate.

In the light of the foregoing discussion, the ordering of the rules for ʔ(and Y) *metathesis*, glottal absorption, and vocalization of semi-vowels[2] may be clarified.

For yəšə́d; šeʔyə́šad 'foot,' the order is not crucial.

Thus, yəš-yə́šad, yʔš-yə́šad (V-loss), šyʔ-yə́šad (ʔ,Y-metath).

Now, (i) glott-absorp šy-ẏə́šad : (ii) S/V še-ẏə́šad

or (i) S/V še^{ʔ}-yə́šad: (ii) glott-absorp. še-ẏə́šad

On the other hand, taking ƛ^{w}óy; ƛ^{w}e^{ʔ}-ƛ^{w}óy 'mother,' the order proves to be crucial. Thus:

ƛ^{w}oy-ƛ^{w}óy, ƛ^{w}^{ʔ}y-ƛ^{w}óy (V-loss), ƛ^{w}yʔ-ƛ^{w}óy (ʔ-metath)

Now, (i) glott-absorp ƛ^{w}ẏ-ƛ^{w}óy --this leaves no way of deriving ƛ^{w}e^{ʔ}-ƛ^{w}óy which is not ad hoc, whereas

(ii) S/V ƛ^{w}e^{ʔ}-ƛ^{w}óy is correct, and glottal-absorption does not apply.

It is thus clear that the order of these rules is:

1. ʔ, Y - metathesis.
2. Vocalization of semi-vowels.
3. Glottal absorption.

II.10. Rule Summary 2

(Ordered, but still tentatively confined to Augment, except where otherwise specified.)

1. Reduplication Constituent Structure = $C_1V_1C_2$, unstressed (for non-laryngeal stems).
2. Stress assignment--to first syllable of stem (and original stress is diminished).
3. Mutation of vowel under secondary stress.

*4. V → h in unstressed syll of Augment.
h → Ø in / - voiceless stop.
h → ʔ in / abutting a voiced consonant.
V → Ø. Conditions: shwa pretonic; post-tonic, except before final h.

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[1] See p. 66. [2] Cf. Chap. II, sec. 3.3.

*5. ʔ methathesis, across any segment, towards the stress.

**6. Y-metathesis.

7. Semi-vowel vocalizes, between consonants.

*8. ʔ -absorption by voiced consonant a) towards the stress b) otherwise } Constrained by Structural Description

**9. Nasals become Obstruents. Not limited to Augment.

**10. ʔ -loss on voiced obstruents. Limited by S.D. of Rule 8.

*11. Cluster-simplification.

**12. s-assimilation (ʔas- prefix).

*13. Geminate resolution.

*14. Shwa insertion, conditions partly established. Not limited to Augment.

**15. Nasal obstruents (optionally) lose obstruency before dissimilar nasal obstruents at morpheme boundary. Not limited to Augmented.

**16. Voiced obstruents lose nasality (optionally) after pause. Not limited to Augment.[1]

II.11. Summary of Stress and Vowel-Loss Phenomena

The above discussion completes our basic account of the development of glottal stop, so far as its appearance seems to depend upon the morphology of 'Augmentative.' This is a suitable point at which to sum up the conditions under which post-tonic stem vowels are lost, using the same basic Corpora as our data.

For di-syllabic stems with primary stress on the first syllable (type šˇ-čˇótaxˇ ; šˇ-čˇt-čˇótaxˇ 'halibut'), the stress-retraction rule operates vacuously on the augmented form; this leaves the correct stress as šˇ-čˇt-čˇótaxˇ, no vowel-loss occurring.

For di-syllabic stems with primary stress on the second syllable (type tɘbéx^{w} ; tɘb-tɘ́bax^{w} 'land'), the stress is retracted in the augment; the second syllable, now carrying secondary stress, has the vowel a, regardless of the quality of the original vowel. If the first vowel of the stem is shwa, this vowel is lost in the unmarked form;[2] but the augmented form never loses a stem vowel.

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[1] *signifies a modification to a rule, as compared with Rule Summary 1, Chap. II, sec. 6. **signifies the insertion of a new rule, of course with renumbering.

[2] We take up the question of the loss of unstressed shwa in the unaugmented form of di-syllabic stems, immediately following this summary.

For tri-syllabic stems (type s-ɬq̓áx̣ad ; s-q̓-ɬə́q̓x̣əd 'arm'), however, both post-tonic vowels must be considered to be lost in the augmented forms, with the exception of a vowel before final h.

It is crucial to bear in mind that for many stems encountered, it was necessary to reconstruct underlying forms of slightly different shape than that of the unaugmented form. Such reconstructions have so far taken two different forms: for some, a shwa had to be assumed to be present in the first syllable (.e.g., s-x̣p̓áb; s-x̣p̓-x̣ə́p̓ab 'cockle,' reconstructed *s-x̣əp̓áb),[1] while in others a glottal stop had to be assumed to have been attracted towards the stress in the unmarked form (s-čá?yat ; s-če?-čá?yat 'fish gill' reconstructed *s-čáy?at).[2]

With these provisos, the following formulae represent a summary of our conclusions concerning stress position and vowel-loss so far.[3] For clarity of presentation, the formulae refer to stem-vowel segments only.

Di-syllabic Stem			Tri-syllabic Stem		
Unaugmented		Augmented	Unaugmented		Augmented
* - V́ V	→	-V́ V	*-V́ V V C	→	-V́ ∅ ∅ C
* - V V́		-V́ a	*-V V́ V C		-V́ ∅ ∅ C
			*-V́ V Vh#		-V́ ∅ Vh#
			*-V V́ Vh#		-V́ ∅ Vh#

---

[1] See Chap. II, sec. 4.

[2] See Chap. II, end of sec. 3.

[3] The corpus so far discussed contains so few stems in which more than two vowels follow the stress, that we are obliged to postpone discussion of vowel-loss for such stems until we treat Attenuative: there, owing to retraction of the stress to the Attenuative prefix itself, we may see clearly the loss of vowels over the longer spans we seek (see Chap. III, sec. 3).

Pretonically, stem vowels stand except shwa (lost between voiceless consonants). The vowel in the stative prefix ?as- is lost when it stands more than one syllable from the stress.

II.12. Glottal Stop in Unaugmented Stems

II.12.1 Clear Cases

	Augmented	Unaugmented	Gloss
(a)	čo?-čáwaš	čo?áš ~ čə?wáš	wife
	šo?-šáwał	šo?áł ~ šə?wáł	road
	s-yo?-yáwas	s-yo?és ~ s-e?wés ~ s-yə?wés	wood
	s-x̣ʷe?-x̣ʷáyač-šəd	s-x̣ʷe?áč-šəd	ankle
	yəl?-yálax̣	yəl?áx̣	gather
	ṗəl?-ṗálaqʷ	ṗəl?áqʷ	gravel-cooking
	q̓ʷəl?-q̓ʷálab	q̓ʷəl?álab ~ q̓ʷəl·áb	sinking[1]
(b)	s-yəl?-yálab	s-yəl·áb ~ s-yəláb	year
	q̓ʷəl?-q̓ʷálde	q̓ʷál·áde ~ q̓ʷəláde	ear
		šəl·ás ~ šəlás	fish
		qəl·áb ~ qəláb	bad[2]
		ščəl·áb ~ ščəláb	liver
		ʔəs-həl·áb ~ ʔəs-həláb	hot
	ʔəs-lə-hále-ł	həl·é	alive[3]
	('we are alive')	qəb·ád ~ qəbád	axe[4]
		sx̣ʷéš·əd	deer[5]
		sq̓ʷáš·əb	fog[6]

(c)	Stem		Gloss
	šeʔáb	šəyéʔb-ał	crab
	x̣ʷeʔáčšəd	x̣ʷeʔ-x̣ʷáyačšəd	ankle
	x̣ʷeʔáčče(h)		wrist
	x̣ʷeʔáxad		cut-off arm
	x̣ʷeʔáp		bob-tail
	dəʔwéh ~ dəʔwéʔ ~ dəʔwé		thou
	čəʔwá(h)t		fine
	ṗəlʔád		bark

(c) (cont.)	Stem	Gloss
	x^{w}əlʔápəle(h)	cottonwood tree
	qəlʔéčay	willow tree
	q̓^{w}eʔwác	ash

Fig. 17.--Glottal Stop in Stems

[1] q̓^{w}ə́l, + $\acute{V}_1C_2$ post-reduplication for Inceptive, +-(a)b derived Intransitivizer. Vowel-loss in the first syllable then gives glotttal-stop, which is attracted by the stress to give q̓^{w}əlʔ-ə́l-ab.

[2] Compare qé^{ʔ}ɛqələb (Attenuative, Chap. III, sec. 3).

[3] For the Augmented form, see 'ʔ/h-initial stems' (Chap. II, sec. 17). For h-loss finally, see Chap. II, sec 15.3.

[4] Compare qəbé^{ʔ}d-aɬ (Attenuative, Chap. III, sec. 7.1).

[5] We note that geminates are not always simplified. Compare s-ɬáday; s-ɬ·áday (Augment) (see d-loss, Chap. II, sec. 19). Elmendorf sx^{w}ə́yʔšəd.

[6] Elmendorf sq^{w}ə́šəb.

Having discussed the development of glottal stop in the augment, together with the vowel-losses consequent upon stress shift, we turn now to a converse but parallel topic, namely, the development of glottal stop in the unaugmented forms themselves. We shall suggest that the development of glottal stop must be considered a phenomenon not at all confined to the augment, but one very closely bound up with all vowel-loss in conjunction with remoteness from stress. The conditions for glottal absorption will require revision.

The forms of Figure 17(a) show the alternation ʔ ~ ∅ not only at the morpheme-boundary between the stem and the reduplicating syllable, which has been our interest so far: they also show that glottal stop found within unaugmented stems is sometimes in alternation with ∅ in the corresponding augmented forms. The existence of forms such as the following, shows that the alternation is not one characterizable as 'automatic'; that is, it is not the case that such glottal stops found in the augmented forms are never present in the unaugmented forms.

Examples:

ʔas-x̣ə́l̲ʔ	;	ʔəs-x̣əlʔ-x̣ə́lʔ	marked
s-ɬáʔwaltx^{w}	;	s-ɬoʔ-ɬáʔ̲waltx^{w}	roofing
ʔas-láw̲ʔ	;	ʔəs-loʔ-láw̲ʔ	baked
s-q̓^{w}óbay̲ʔ	;	s-q̓^{w}əb-q̓^{w}óbay̲ʔ	brain
s-c̓áʔ̲yat	;	s-c̓eʔ-c̓áʔ̲yat	salmon-gill

If the alternation is not automatic in the sense defined, then what controls it? We notice immediately that the glottal stops with which we are concerned, such as that in the unmarked čoʔáš̌ ~ čəʔwáš̌ 'wife,' are again always found adjacent to a 'resonant' in disyllabic stems with unstressed first syllable. Second, we recall that we found it simplified the rules to assume that unstressed shwa in oxytone stems such as *x̣əp̓áb 'cockle' is lost 'between voiceless obstruents.' We then suggested that, since a shwa-insertion rule would in any case operate if either of the consonants of the reduplicating syllable were voiced, we might well assume that a shwa vowel in the reduplicating syllable is always lost.

A similar interpretation may be placed on the development of the glottal stops now under discussion. If we take as the underlying forms shapes such as (e.g.) *yələ́x 'gather,' *šəyə́b 'crab' we may suggest that the loss of an unstressed vowel separated from the stress by at least a 'resonant,' results in the generation of a glottal stop.[1] Note that we frame the hypothesis in the most powerful form possible.

The respective outputs of these underlying forms are the expected yəlʔə́x , šeʔə́b (with glottal attraction, and subsequent vocalization of y̲). However, as will be seen from Figure 17(b) above, there are cases where shwa must again be supplied to the underlying form, although with a different outcome in the unmarked form. As an example, take the augmented form q̓^{w}əlʔ-q̓^{w}ə́lab 'all sunk.' Assuming an underlying stem *q̓^{w}ələ́b, we expect **q̓^{w}əlʔə́b for the unmarked form; but the correct output is q̓^{w}əl-ə́b.

We do not possess enough evidence to be clear as to the proper explanation of this alternation,[2] although a possible source for at least some

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[1]The intermediate h is, of course, assumed, but omitted as not relevant to the present discussion.

[2]Data from Nisqually (a neighboring Puget Sound language of the Salish family) shows that a stress-shift has occurred, probably in Twana

of these stem glottal stops may be the existence of geminates in the underlying forms.[1]

What now is the appropriate explanation of such an alternation as Figure 17(a) exemplifies in freely-varying pairs like čo?áš ~ čə?wáš ?

The following examples show the same phenomenon:

Examples:

s-cób?	~	s-có?b	crab-apple
čałád?	~	čałá?d	coal
ho?ól?	~	ho?ó?l	really
s-q^{w}əbáy?	~	s-q^{w}əbá?e	dog
dəx^{w}-láw?-bəd	~	dəx^{w}-lá?o-bəd	strainer
pál?el	~	pá?lel	resurrect

Clearly, the alternations rest on an option in the glottal-attraction rule.[2]

II.12.2 Probable Cases

Figure 17(c) shows a sample of further di- and tri-syllabic stems for which, again, we might suggest the glottal stop in an unmarked form has originated by loss of shwa in an unstressed syllable before the stress. The first three forms are given as a parallel, for we can show the alternation for these cases.

(cf. Tw. yədés , Nis. ǰə́dəs 'tooth,' Tw. yəl·ə́b , Nis. ʒáləd<u>ə</u>b 'year.') Considering the forms for 'year,' it is clear that Twana has lost a d ; this is a result either of the resolution of the cluster *yld , or a loss of d before a consonantal affix b, after vowel loss due to stress-shift (yálVdVb — ylV<u>d</u>b). The alternative explanations correspond to stress-shift of 2 and 1 syllable, respectively. For the d-loss rule, see Chap. II, sec. 19.

There is some reason to hope that situations of this kind may prove recoverable within Twana. The matter will be discussed in detail elsewhere but can have no further place here.

[1] For the resolution of geminates at certain morpheme-boundaries by generation of glottal stop, see Chap. II, sec. 9, esp. p. 70.

[2] The option seems never to be taken in the case of glottal-stops generated in the reduplicating syllable of the augment. If we assume this is an absolute constraint, then we may incorporate it into the rule: if not, then there seems no way of formalizing whatever statistical knowledge we may have on the application of the option. The alternants wədə́?boy ~ wədə́bə?we 'blackberry' of Figure 18 are due to the same option.

For the forms dəʔwə́h 'thou' and čəʔwá(h)t 'fine,' the question must remain undecidable inside Twana;[1] whereas for the rest of these forms, we should require to know the augmented forms to be certain that the glottal stop is not 'original.' To clarify this point, let us derive the alternative plurals for p̓əlʔád. If it proved to be **p̓əlʔp̓ə́ʔlad (with glottal attraction), the glottal stop is clearly 'original'; but if it were **p̓əlʔ-p̓ə́lad, then the glottal stop must be 'secondary,' produced in the manner suggested above.

II.12.3. A Select Twana Herbarium

	Fruit	Plant	Gloss
(a)	bəcə́kʷ	bəcə́kʷay	black-cap
	q̓ap̓óxʷ	q̓ap̓óxʷay	hazel
	ƛ̓əbʔáxʷ	ƛ̓əbʔə́xʷay	gooseberry
		q̓éʔčay	moss
		həbébay	cascara
		dáčay	rye grass
	čeqʷéqʷ	čeqʷéqʷay	blue elderberry
(b)	téleqʷ	ƛ̓élʔqʷe	wild strawberry
	wədəbaxʷ	wədəʔboy ~ wədəboʔe	blackberry
	yətáwad	yətáʔode	salmon-berry[1]
	sɬə́ɬaq	sɬə́ɬqe	thimble-berry
	šč̓əʔwélas	šč̓əʔwélʔse	red huckleberry
	coʔyóxʷeɬəs	coʔyóxʷaʔese ~ coʔyóxʷaʔeseʔ	Oregon grape
Compare	ʔəsále(h) :	ʔəsáʔl-aɬ-čəʔwəš	two, doubly-wived[2]

Fig. 18.--Twana Plant Names

[1]Cp. Unaugmented yətə́wəh (Elmendorf) and see Chap. II, sec. 8 for loss of d#.

[2]-aɬ- makes adverbial phrases.

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[1]Since the plural of dəʔwə́h is suppletive; thus tə-walʔ-wə́lap. No plural is attested for čəʔwá(h)t. The external comparison, on the other hand, shows gʷ in (e.g.) Nisqually. For Twana čəʔwáš 'wife,' cf. Nisqually čə́gʷəš; and for Twana dəʔwə́h, 'you,' cf. Nisqually də́gʷeʔ.

One further set of forms, those of Figure 18, will be used to illustrate the development of glottal stop within stems. In the cases now to be discussed, however, we have to do with glottal stop after the stress. The alternation is produced by the addition of a stem-formative suffix,[1] -ay[2] 'growing thing'; this results in vowel-loss in certain cases, according to the conditions summarized above (Chap. II, sec. 11) for di- and tri-syllabic stems.

Sub-corpus (a) shows the simplest condition, parallel to the case of unmarked di-syllabics such as s-čótax 'halibut,' where no vowel-loss occurs. Thus, ḳaṗóx^{w} ; ḳaṗóx^{w}-ay 'hazel-nut,' where the single vowel after the stress is retained.

In sub-corpus (b) however, an original di-syllabic (such as s-ɬə́ɬaq 'thimble-berry') now becomes a tri-syllabic (viz., *s-ɬə́ɬaq-ay); the result is that both the vowels following the stress are lost. Deriving this form in stages, we notice a fresh condition for vocalization of a semi-vowel. We have *s-ɬə́ɬaq-ay, then s-ɬə́ɬq-y (by vowel-loss). But the output is in fact s-ɬə́ɬq-e. It seems that -y vocalizes finally as well as in the environment C-C (as in *k^{w}oy-k^{w}óy, k^{w}ʔy-k^{w}óy, k^{w}yʔ-k^{w}óy, k^{w}eʔ-k^{w}óy 'bent').[3]

The remaining forms of the sub-corpus show, in addition to the vocalization just discussed, the development of a glottal stop from the loss of an unstressed vowel adjacent to a stressed one, with intervening 'resonant.' Thus t̓éleq^{w}, but t̓élʔq^{w}-e 'wild straw-berry.' Although no plural is attested, we may surmise that the form š-c̓əʔwélas ; š-c̓əʔwélʔs-e in fact also exhibits a derived glottal stop in its first syllable, in the manner demonstrated for such forms as čəʔwáš ~ čoʔáš ; čoʔ-čáwaš above p. 74.

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[1] Here we see, in effect, that a derived stem (whether by stem-formative suffix or prefix (the augment) behaves in the same way as the unmarked stem. We shall later contrast this with the different behavior of the complex stem plus (e.g.) 'possessive.' For the implications for constituent structure, and thus for the cyclical application of the rules, see Chap. II, sec. 15.2.

[2] Shown (p. 79, fn. 3) to be *ayh.

[3] On the other hand, the alternant c̓oʔyóx^{w}aʔese_ʔ 'Oregon Grape plant' shows a final glottal stop which, as will be seen (see Chap. II, sec. 15.4), can only derive from h in cluster with y, w, l. We thus conclude that the suffix 'plant' is *-ayh. The vocalization of this y (when the truncation rule deletes the vowel) is thus quite according to the original formulation, using environment 'Consonant - Consonant.'

The last two forms of the sub-corpus suggest that, perhaps only under limited conditions not yet fully understood, immediate adjacency to the stress is not a necessary condition for the generation of a glottal stop from the loss of a vowel, although the presence of a 'resonant' adjacent and towards the stress is necessary.

Let us see whether, using only the rules we have, we can reconstruct a suitable underlying form for c̓o7yóx^{w}e7əs 'Oregon grape.' If the rules suggested above are correct, then within a stem, the two vowels following the stress should be lost. Then assuming that the underlying form has the shape -V́ V VC, either the e in c̓o7yóx^{w}e7əs is anomalous, or the rule is wrong. The final ə is irrelevant, since it may be a shwa-insertion replacement of a lost original vowel.

However, the derived stem c̓o7yóx^{w}a7ese 'Oregon grape plant' shows that the underlying form must have the shape (at least) *c̓o7yóx^{w}a- . Recalling that the glottal stop may perhaps not now be in the same position as in the underlying form (i.e., it may have been attracted by the stress), we tentatively suggest that the puzzling e vocalism is derived from an underlying y. If this were so, we should have the right to reconstruct *c̓o7yóx^{w}ay- . Let us, further, now assume that the glottal stop in c̓o7yóx^{w}a7- is in fact derived from a vowel after the y which we have newly restored. We now reconstruct *c̓o7yóx^{w}ayVs.[1]

The form *c̓o7yóx^{w}ayVs would produce the correct output, giving c̓o7yóx^{w}y7s by vowel-loss and glottal stop production, then c̓o7yóx^{w}e7s by the semi-vowel rule, then c̓o7yóx^{w}ə7əs by the shwa-insertion rule. To justify the suggested reconstruction, we cite also the form t̓káyas ; k-t̓áke7əs, where an underlying *t̓əkáyas must obviously be supplied. The derivation here is clearly the same as for the reconstructed *c̓o7yóx^{w}ayVs above. Thus *t̓ək-t̓ákayas gives t̓k-t̓áky7s by vowel-loss and glottal stop generation, then t̓k-t̓áke7s by the semi-vowel rule, then k-t̓áke7s by cluster-simplification,[2] then k-t̓áke7əs by shwa-insertion.

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[1] Note that it is unnecessary to know what this vowel may have been; we cannot recover its quality, for it would always disappear in inflection or derivation. We do not know the etyma concerned (etyma, for it is almost certain that at least two morphemes are involved), but would hazard the guess that the last element is -ayas 'round object,' as in dx^{w}-ɬə7á7esə-bəd 'eye,' analytically, 'round object, searching (ɬə7), plus agent-derivational dəx^{w} + stem + bəd.

[2] Chap. II, sec. 7.2.

As we shall amply confirm in treating the Attenuative, a form such as the derived čo?yóx^{w}a?ese also shows that the vowel-loss rule must be amplified somewhat to handle forms in which more than two unstressed vowels follow the stress. If we derive this form now, we see the following: *čo?yóx^{w}ayas-ay gives čo?yóx^{w}a- ; that is, we do not lose 'all the vowels following the stress.' Rather, 'the vowel following the stress is retained, provided at least two unstressed vowels follow.'[1]

It remains to point out that even the first glottal stop in the form čo?yóx^{w}e?əs may in fact be 'secondary.' If the underlying form, by analogy with *čəwáš → čo?wáš above (Chap. II, sec. 12.1), is held to be *čVwyóx^{w}ayas, then we could derive č?wyóx^{w}y?s by vowel loss and ?-production, then čw?yóx^{w}y?s by glottal-attraction,[2] then čo?yóx^{w}e?s by semi-vowel rule, etc.

II.13. Stem-Internal Glottal Stop and Glottal Absorption

	Unaugmented	Augmented	Gloss
(a)	yədés	yəd-?yədas	tooth
	cədéɬ	cəd-cədaɬ	he
	təbéx^{w}	təb-təbax^{w}	land
	wədáw?	wəd-?wədaw	horn
	s-q̓^{w}óbay?	s-ɬ^{w}əb-q̓^{w}óbay?	brain
	s-q^{w}əbáy?		dog
	həbéb-ay		cascara
	təbəx^{w}		gooseberry
	qəbəc	qəb-qəbac	wrinkled
	wədəbax^{w}		blackberry[1]
(b)	sə-báded	sə-bəd-báde	mountain
	bədəh	bəd-bədəh	child
	k^{w}ábələx^{w}	k^{w}əb-k^{w}ábələx^{w}	cedar root
	?as-ɬób	?əs-ɬəb-ɬób	scarred
	?as-x^{w}əd	?əs-x^{w}əd-x^{w}əd	tired
	?as-k^{w}ədad	?əs-k^{w}əd-k^{w}ədad	held

(c)	Unaugmented	Derived	
	yətáwad	yətá?wəd-e	salmon-berry; - bush
	ɬéleq^{w}	ɬél?q^{w}-e	wild strawberry; - bush
	q̓^{w}ələde(h)	q̓^{w}əl?-q̓^{w}əlde(h)	ear; ears

Fig. 19.--Stem-Glottal-Stop Absorption

[1] wədə?bax^{w} (Elmendorf).

[1] We delay the formal statement of the rule, for more conditions remain to be explicated (Chap. II, sec. 16, Rule Summary 3).

[2] It also seems from these examples that the glottal-attraction rule does not operate across more than one non-vowel segment (cf. pp.45-46).

It was shown above (Chap. II, sec. 9) that glottal stop must be held to be generated, in the augment, in association with b,d (that is, *m,n) as well as with l,y,w. We have now also shown that glottal stop may also be generated within stems, and that it must be held to be of phonological rather than morphological origin. It is thus reasonable to suppose that within stems, too, b,d are in fact proper environments for the generation of glottal stop. As will be seen from Figure 19, which draws together forms from various of the Corpora already given, output b,d are again found to lack the glottal stops we supposed to have been generated.

So far as sub-corpora (a) and (b) forms are concerned, the glottal-absorption rule requires only minor amendment. If the vowel-loss rule is applied to the unstressed (first) syllable of forms such as yədés, a glottal stop is produced, just as it is for the corresponding augmented form: thus, both y?dés and y?d-yədas. The glottal-attraction operates on both these forms alike, to give yd?és ; yd?-yədas. Now the glottal-absorption rule operates on yd?-yədas to give yd-yədas, but on yd?és to give ydés.[1]

Sub-corpus (c) recalls part of Figure 18 (sub-corpus [b]), from which it is noted that for the case of glottal stop generated from vowel-loss after the stress, the glottal-attraction rule seems to be optional,[2] at least for l. If this is the case, then we may also explain the form q̓ʷəláde(h); q̓ʷəl?-q̓ʷəlde(h) 'ear.' If we assume a derivation (for the augmented form) *q̓ʷəl-q̓ʷəláneh, then q̓ʷl?-q̓ʷəl?ne(h) then q̓ʷl?-q̓ʷəl?ne(h), then we must assume that the glottal-attraction has not applied to the glottal stop after the stress, but the glottal absorption rule has applied, giving q̓ʷl?-q̓ʷəlne(h); we may then assume the normal derivation for a glottalized nasal, viz., change of obstruency giving q̓ʷl?-q̓ʷəlde(h), then loss of glottalization on a voiced obstruent giving q̓ʷl?-q̓ʷəlde(h), then shwa-insertion giving q̓ʷəl?-q̓ʷəlde(h).

We must extend the glottal-absorption rule to handle those cases such as q̓ʷəl?-q̓ʷəlde(h), where post-tonic absorption occurs as a result of the option on glottal-attraction. Schematically, the rule now has the following parts:

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[1] The original rule is modified only by the bracketing of the following environmental consonant before the stress. yd?es → ydes now parallels exactly tb?-təbaxʷ → tb-təbaxʷ (see p. 70).

[2] Compare a parallel situation in the development of glottal stops in the Attenuative where, again, an optionality is noted for l, although not for w.

$$\left\{\begin{matrix} [\,ʔ\,] \begin{bmatrix}+\text{cons}\\+\text{voice}\end{bmatrix} \\ \begin{bmatrix}+\text{cons}\\+\text{voice}\end{bmatrix} [\,ʔ\,] \end{matrix}\right\}_{2}^{1} \longrightarrow \begin{bmatrix}-\text{cons}\\+\text{voice}\\+\text{checked}\end{bmatrix} \text{ in env.} \Big/ \left\{\begin{matrix} {}^{1}\left\{\begin{matrix}\acute{V}\underline{\ \ }\text{-}\\ \text{-}\acute{V}\end{matrix}\right\} \\ {}^{2}\underline{\ \ }\text{-}\left\{(C_x)\right\}\acute{V} \end{matrix}\right\}$$

II.14. Twana Number Systems

Cardinal	Ordinal	Distributive	
dáhqas	təčə́ləh	dáqs	one[1]
ʔəsále(h)	sʔɔsáləbs	ʔəsə́səle(h)	two[2]
č̓ɔ́ʔɔs	šc̓ɔ́ʔsəbs	č̓ɔʔɔ́ʔɔs	three
bósas	səbósəbs	bosósas	four
č̓xʷə́s	sc̓xʷə́sabs	č̓xʷə́xʷas	five
yəpáče(h)	syəpáčəbs	yəpə́pče(h)	six
t̓k̓ʷós	st̓k̓ʷósabs	t̓k̓ʷə́k̓ʷas	seven
tqáče(h)	stqáčəbs	tqə́qče(h)	eight
x̣ʷə́l	sx̣ʷə́labs	x̣ʷəlʔə́lal	nine[3]
ʔópədəčs	sʔópədəčsəbs	ʔópopədəčs	ten[4]
cəbƛ̓áq̓ʷ	scəbƛ̓áq̓ʷabs	-	twenty[5]

Fig. 20.--Twana Numeral Derivations

[1]'One' is suppletive in the Ordinal čə́ləh 'fore, front.' 'One' is later shown to be perfectly regular in Distributive, Chap. II, sec. 15.8.

[2]While ʔəsále(h) could derive from ʔəsáleh or ʔəsályh, distributive ʔɔsəsəle(h) can only be from *ʔəsáleh.

[3]The distributive 'nine by nine' is quite irregular, but only ad hoc rules can be given, for it is the only monosyllabic numeral stem. The a in the last syllable suggests, of course, that the underlying string is *x̣ʷəl-əl-əl.

[4]The irregular stressing of 'ten' in Distributive is probably to be attributed to the (analogical!) operation of the optional rule for shifting stress to affixes (Chap. II, sec. 15.6). It is clear that no option in stress-assignment is involved, for we should otherwise get **ʔóp-apədəčs.

[5]'Twenty' is not attested in Distributive.

As a final demonstration of the rules for vowel reduction and generation of glottal stop in stems so far explicated, we take the derivational morphology of the Ordinal and Distributive Numerals (Fig. 20). Assuming that the constituent structure or Ordinal Numerals has the phonological spelling s-Num-ab-s,[1] the forms are discussed according to the number of vowels from the stressed vowel to the end of the stem.

The stems for '1,' '5,' '7,' '9.' and '20' retain the single vowel after the stress. On the other hand, the stems for '2,' '3,' '4,' '6,' '8,' and '10' lose the two vowels following the stress.

Note particularly, however, that the form yəpáčəbs 'sixth' confirms the formulation we gave above (Chap. II, sec. 11) concerning the environment for vowel-loss. Reconstructing the underlying *s-yəpáče(h)-ab-s, we see that both post-tonic vowels are indeed lost, for the -e which is stem-final and word-final before h in yəpáče(h) is no longer so in the ordinal derivative.

It will be important later, in the discussion on ʔ/h-initial stems,[2] that here too, the rules are simpler if we assume forms like ʔəsále(h) 'two' and ʔópədəčs 'ten' to have glottal stop as their first segment, rather than hold the glottal stop as 'automatic for vowel-initial stems.'

The constituent structure of the Distributive Numeral is assumed to be $C_1V_1C_2$ plus $\acute{V}_1C_2$[3] plus the remainder of the unmarked stem. It is from the Distributive forms that we are able to recover the 'lost' vowels of the initial syllables for the (simplex) numbers 5, 6, 7, and 8. We are also able to show that a full vowel must be assumed for the second and third syllables of '10.'[4] 'Nine' shows the development of a glottal stop in Distributive, in agreement with the discussion above (Chap. II, sec. 12).

The full underlying forms for Distributive are thus:

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[1] -'Nom' - Numeral - ab(ʔ) + s (possessive?).

[2] See Chap. II, sec. 17.2, and Chap. III, sec. 3.

[3] The underlying structure cannot be (e.g.) *bós-os-as, with the stress re-assigned by rule, for we should then get **basósas.

[4] We shall show that utterances phonetically transcribed as having initial glottal stop must also be so described phonologically (Chap. II, sec. 17.2, Chap. III, sec. 3). Here, it suffices to point out that the Distributives for '2' and '10' thus require no special rule for 'vowel-initial stems.'

'5'	*c̓əx^{w}-ə́x-ə^{w}s	with unstressed ə replaced by a and vowel-loss
'7'	*təq^{w}-ə́q^{w}-os	with unstressed o replaced by a and vowel-loss
'2'	*ʔə s-ə́s-aleh[1]	with lowered vowel and vowel assimilation.[2]
'3'	*č̓ o^{ʔ}- ó^{ʔ}-Vs	
'4'	*bos-ós-as	
'6'	*yəp-ə́p-ačeh	with vowel-loss
'8'	*təq-ə́q-ačeh	with vowel-loss
'10'	*ʔop-óp-VdVčs[3]	with vowel-loss
'9'	*x^{w}ə1-ə́1-ə1	

II.15. Twana Laryngeals

II.15.1. Introduction

In our treatment of the phonology of Twana so far, we have attempted to show the sources of certain glottal stops, and their relation to the processes of vowel-loss. In conjunction with this, we have developed rules for vowel-loss, demonstrating vowel-loss to be itself closely connected with stress alternations governed by the rules of constituent structure.

At the outset, however, we expressly omitted from consideration all stems with glottal stop or h in the root. We propose now to discuss in detail certain phenomena involving glottal stop and h, an understanding of which will enable us to explore profitably two important further problems. These are, first, the behavior of h and glottal stop as C_1 or C_2 in stems in augment reduplication; and second, the source of the vocalisms in the reduplication for Attenuative, and the alternations exhibited by them.

At least five important facets of the parallel behavior of glottal stop and h will be examined. These are: laryngeal affection, glottal-stop derivation from h, vowel-assimilation, stress-alternation, and ʔ/h-attraction by the stress. In the process of the discussion we shall touch on some

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[1] See fn. 4, p. 84. [2] See Chap. II, secs. 15.3.2, 15.5.

[3] The vowel-loss rule requires us to supply either no vowel or two vowels beyond the stress in the underlying form for 'ten.' We choose to supply two, on the basis of external comparison. Compare U.Cheh. pánačs. The Puget Sound languages have 'ambiguous' shwa, as in pádəc for Nisqually. It is likely that Proto-Salish 'ten' had two non-shwa vowels in the root; thus *ʔópan, contra Elmendorf (1962), p. 9.

evidence for the phonological Cycle for Twana, as well as developing criteria for the proper underlying specification of glottal stop and <u>h</u>.

For clarity of presentation, a single homogeneous body of data will be used for the initial discussion of glottal-stop and <u>h</u> phenomena. We choose the morphology of the possessive, for which a usefully large corpus is available, and shall supplement this as necessary with other data.

II.15.2. Affix Truncation

	Non-Possessive	3rd Sing. Possessive	1st Plural Possessive	
(a)	s-kʷól	s-kʷól-as	s-kʷól-ł	school
	s-q̇áxʷ	s-q̇áxʷ-as	s-q̇áxʷ-ł	ice
	yabéd	yabéd-as	~ yabéd-ł } yabé-ł }	fruit
	wəq̇ə́b	wəq̇ə́b-as	wəq̇ə́b-ł	box
	s-teqéw	s-teqéw-as	s-teq-ew-ł	horse
	ʔas-q̇ʷə́t	ʔas-q̇ʷə́t-as	ʔas-q̇ʷə́t-ł	fire
	də-sədə́ʔ	də-sədə́ʔ-as	də-sədə́ʔ-ł	belongs to
(b)	q̇ʷéle	q̇ʷéle-s	q̇ʷéle-ł	cedar
	čə́q̇pe	čə́q̇pe-s	čə́q̇pe-ł	fir
	s-pə́čo	s-pə́čo-s	s-pə́čo-ł	berry basket
(c)	s-xʷákʷkʷ	s-xʷákʷkʷ-s	s-xʷákʷkʷ-ł	breath
	sk̓ʷə́spł	sk̓ʷə́spł-s	sk̓ʷə́sp-ł	trout
	qʷést	qʷést-s	qʷést-ł	cow
(d)	ʔásaxʷ	ʔásaxʷ-s	ʔásaxʷ-ł	seal
	kʷtábac	kʷtábac	kʷtábac-ł	husband
	s-łáday	s-łáday-s	s-łáday-ł	woman
(e)	šáwʔ	šáʔw-as	šáwʔ-ł	bone
	wədáwʔ	wədáʔw-as	wədáwʔ-ł	horn
	ṗəwáyʔ	ṗəwáʔy-as	ṗəwáyʔ-ł	flounder
	s-qʷəbáyʔ	s-qʷəbáʔy-as	s-qʷəbáyʔ-ł	dog
	s-ədəxʷ-q̌ólʔ	s-ədəxʷ-q̌óʔl-as	s-ədəxʷ-q̌ólʔ-ł	blood
	ċałádʔ	ċałáʔd-as		coal
(f)	ṫəbə̌́xʷ	ṫəbə̌́xʷ-s		gooseberry
	ṡpéxʷ	ṡpéxʷ-as } ~ ṡpéxʷ-s }		gull
	dəxʷ-cáč	dəxʷ-cáč-s		tongue

Fig. 21--Affix Truncation (Possessive)

In the development of the rules for vowel-loss under different stress conditions, we examined the behavior of the derivational vocalic suffix (-ayh, 'growing thing, plant'). We now compare the behavior of a grammatical vocalic suffix; a simple example is that of the third singular possessive suffix -as.

Consider Figure 21. Comparing ʔásax^{w} ; ʔásax^{w}-s 'seal' with s-ɬáɬaq ; *s-ɬáɬq- y 'thimble-berry bush', we see that the derivative noun follows the vowel-loss rule (Chap. II, sec. 16), whereas the noun with possessive suffix truncates the suffix but does not also lose the second stem vowel. We thus assume that in ʔásax^{w}-as, ʔásax^{w} keeps its autonomy as a di-syllabic, i.e., must be considered to be followed by 'word-boundary': while *s-ɬáɬaq-ay[1] behaves as a single phonological unit (e.g., 'word').

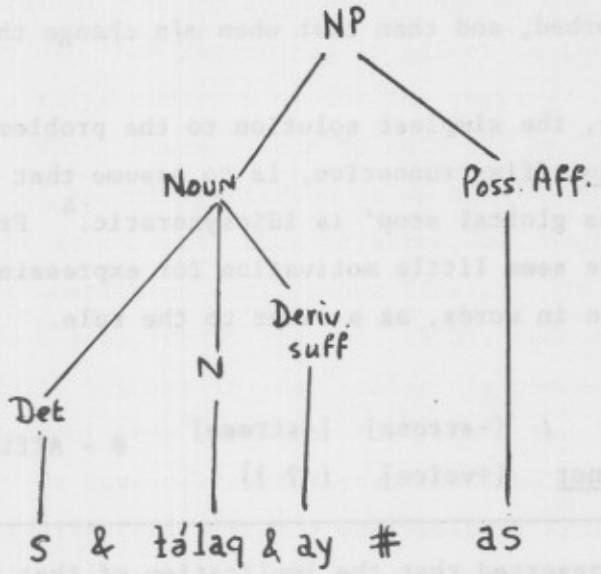

Fig. 22.--Surface Structure for 'his berry-bush'

Having established 'possessive' as a potentially-truncating suffix, we may consider the proper form for the truncation rule required.

From sub-corpora (a) to (d) above, it is seen that truncation occurs when the last two segments are unstressed. Thus s-k^{w}ól-as 'his school' : but s-x^{w}ák^{w}k^{w}-s 'his breath,' q̓^{w}éle-s 'his cedar tree,' and s-ɬáday-s 'his woman.'

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[1] Compare Fig. 18 (Chap. II, sec. 12.3) for typical derivatives.

However, taking sub-corpus (e), we find this simple formulation apparently contradicted. The form (e.g.) s-q^{w}ɔbáy? ; s-q^{w}ɔbá?y-as 'his dog' should, on the above segment-counting criterion show a truncated suffix (**s-q^{w}ɔbá?y-s, then **s-q^{w}ɔbá?es, by semi-vowel rule). At first sight, it might appear that glottal-stop absorption has in fact applied to stem-final voiced segments; and that would certainly enable these forms to satisfy the segment-counting rule. On the other hand, such an assumption would largely destroy the power of the rule for glottal-stop deletion,[1] for a form like that for 'coal' would now be ċałád-as, and we should thus be obliged to constrain the ?-deletion rule so that it does not delete ? on final voiced obstruents.

For the moment, we should prefer not to abandon the position we have taken on the derivation of glottal stops; in particular, we should still wish to hold that glottal stops are generated in association with m/n,[2] and that these glottal stops are absorbed, and then lost when m/n change their obstruency.[3]

In the circumstances, the simplest solution to the problem of forms such as s-q^{w}ɔbá?y-as, with no affix-truncation, is to assume that the environment 'non-obstruent plus glottal stop' is idiosyncratic.[4] From the point of view of rule-format, there seem little motivation for expressing this exclusion in any other way than in words, as a rider to the rule.

Affix-truncation:

$$\begin{bmatrix} -\text{cons} \\ +\text{voc} \end{bmatrix} \longrightarrow \emptyset \text{ in env. } / \begin{matrix} [\text{-stress}] & [\text{-stress}] \\ (\text{but not } [\text{+voice}] & [\ ?\ ]) \end{matrix} \quad \# - \text{Affix}$$ [5]

---

[1] We recall, that we asserted that the implication of that rule was that once m/n had become obstruents they could no longer also be glottalized. It is this generalization that, both for the present grammar and for its historical implication, we wish to preserve.

[2] As well as with l, w, y.

[3] The alternative positions, that the change of obstruency has changed dictionary entries, or that it occurs in the grammar but before the generation of glottal stops by vowel-loss, are discussed at length above (Chap. II, sec. 8 end); we there preferred to hold the present view, since (for example) it also handles otherwise inexplicable cases such as bóle- ; bał-bóle, dɔ́?wat; do-dɔ́?wat.

[4] A possible interpretation of the so-called 'idiosyncracy' has to do with the identification of glottal stop as itself a semi-vowel. We discuss this further (Chap. II, sec. 18).

[5] We hold the specification of ? for the moment (see Chap. II,

It remains to explain the apparently anomalous forms of sub-corpus (f), where the affix is apparently truncated with only one consonant between it and the stressed vowel.

Instead of marking these forms as 'exceptional' to the affix-truncation rule, we shall hold that there are indeed two consonants stem-finally. For 'gooseberry' and 'gull' there are at first sight two possibilities. We could assume that the final x^w is in fact a cluster hw, which would not differ auditorily from x^w.[1] But it will be seen[2] that h exerts a lowering effect on stressed e or shwa, an effect not found in these forms. The second possibility is that we have to do with xw.

One of the few stable sound-changes inside Salish is that of k to č, with the parallel x to š. Equally to the point, however, is the fact that the parallel rounded segments k^w and x^w did not partake of this palatalization. What we are thus suggesting in effect is that the cluster x plus w constitutes a relic environment for the survival of original Salish x.[3]

What, however, can be said of dəx^w-cáč-s, where we have no obvious choice of re-interpretation as we had for the other two cases? If the above argument is correct, then here too, we ought to be able to assume a two-segment unstressed environment finally. It will be seen from the discussion on h-loss (Chap. II, sec. 15.3), that the most plausible candidate for the 'lost' segment in dəx^w-cáč-s is perhaps -h-. We thus tentatively re-construct *dx^w-cáhč (or *dx^w-cə́hč) for 'tongue.'

We have now established that the grammatical affix 'possessive' behaves differently from a derivational affix such as *-ayh, 'growing thing,' in that the former truncates by a rule directly relating to the position of the stress in the stem, and have mentioned briefly the implications

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sec. 18). For fuller specification of Affix-Truncation, see Chap. II, sec. 15.4, where ordering is also dealt with.

[1] In Twana, x^w commonly shows very little friction (as compared to x^w), and is often indistinguishable auditorily from hw (or h^w).

[2] Chapter II, sec. 15.3.

[3] We distinguish original x^w from this by pointing to forms such as x^wə́d 'tired,' x^wəd-x^wə́d 'all tired,' where the reduplication shows that x^w is treated as one segment. See also Chap. IV, sec. 3.5, on k - č, x - š.

for the Phonological Cycle. Equally important, at least from the point of view of the following discussion, is the behavior of the glottal stop when stem-final (e.g., sqʷəbáy?-) in conjunction with a preceding non-obstruent. We proceed now to compare with this the behavior of stem-final h, again making use of the 'truncating' possessive affix.

II.15.3. Laryngeal Affection

II.15.3.1. By h

Non-Poss.	3rd Sg. Poss.	1st Pl. Poss.	Gloss
se?óh ~ se?ó? ~ se?ó	se?óh-as ~ se?əh-ás	se?á-ɬ	house[1]
ɬe?óh ~ ɬe?ó? ~ ɬe?ó	ɬe?óh-as ~ ɬe?əh-ás	ɬe?á-ɬ	thing here[1]
dəcóh ~ dəcó ~ dəcó			I
bədəh ~ bádə	bád-as	báda-ɬ	child
sélah ~ sélə	sél-as	séla-ɬ	grandfather
mə́?əh ~ mə́?ə	mə́?-as	mə́?a-ɬ	dad
kə́?əh ~ kə́?ə	kə́?-as	kə́?a-ɬ	mother
kə́yəh ~ kə́yə	kə́y-as	kə́ya-ɬ	grandmother
q̓o?óləh ~ q̓o?ólə	q̓o?ól-as	q̓o?óla-ɬ	loon[2]
dəhádəh ~ dəhádə	dəhád-as	dəháda-ɬ	clothes
bəlálgʷəh ~ bəlálgʷə	bəlálgʷ-as	bəlálgʷa-ɬ	navel
yəxʷáləh ~ yəxʷálə	yəxʷál-as	yəxʷála-ɬ	hawk
yé?yəstəh ~ yé?-yəstə	yé?-yəstəhe-s	-	wild rose[3]

Fig. 23.-- h- Affection

[1] For the stress alternation, see Chap. II, sec. 15.6.

[2] See Chap. II, sec. 8 for d- alternants.

[3] See Chap. II, sec. 15.3.1 end.

Considering the forms of Figure 23, the following rule obtains for the unmarked forms: 'Utterance-final h (optionally) alternates with glottal stop or zero after a stressed shwa, and with zero after an unstressed shwa.'

For the cases of stressed shwa in the final syllable, the forms for third singular show the allomorph of 'possessive' that we expect, viz., -as. However, the first plural forms show two irregularities; shwa here gives a, and h is lost. Since the first plural morpheme in Twana is everywhere else simple -ɬ, and never -Vɬ, we do not feel justified in assuming an allomorph here, and thus cannot assume the source of the a-vowel to lie in some kind of vowel-coalescence. It is therefore held that -h exercises a lowering influence on the preceding stressed shwa before being lost. Call such an effect 'h-affection.'

What are the precise conditions for this 'h-affection' of vowels, and for the loss of -h thereafter? Since we must assume the forms underlying the alternants (e.g.) bə́dəh ~ bə́də to contain final -h, we may certainly suggest that the diverse outputs for third singular as between se?ə́h ; se?ə́h-as and bə́dəh ; bə́d-as[1] are attributable to the presence or absence (respectively) of stress on the final vowel.

Restoring the h throughout these paradigms for representative forms, we have:

se?ə́h	se?ə́h-as	se?ə́h-ɬ
ɬe?ə́h	ɬe?ə́h-as	ɬe?ə́h-ɬ
bə́dəh	bə́dəh-as	bə́dəh-ɬ
séləh	séləh-as	séləh-ɬ
kə́?əh	kə́?əh-as	kə́?əh-ɬ

Compare the forms for third singular with those for first plural. Note first that h- affection may occur regardless of the stressing of the stem-final vowel; all the forms of the first plural show it. Second, h- affection is apparent for those (and only those) forms of the third singular which meet the condition for suffix-truncation, viz., where the stress is not on the last syllable. On the other hand, h-loss occurs in the present corpus only when h is followed by a consonant, that is, when suffix-truncation has already operated.

The following ordered rules capture the above generalization:

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[1] As in Figure 23, so here in the text such forms are, of course, wrongly divided, for reasons of exposition. The proper division is (e.g.) bə́da-s.

1. Truncate the initial vowel of a grammatical suffix if the stress conditions are met (see p. 88).

2. Lower a shwa to a, when followed by -hC.

3. Delete h before a consonant.[1] Word-final h is optionally replaced (only) by zero after an unstressed vowel.

We show now the derivation of seɁə́h 'house' and bə́dəh 'child' by the above three rules.

'house' 3 sg. poss:

s-eɁə́h-as gives s-eɁáh-as (Rules 1-3 not applicable)

1 pl. poss:

s-eɁə́h-ɬ gives s-eɁáh-ɬ (Rule 2), then s-eɁá-ɬ (Rule 3)

unmarked:

s-eɁ-áh gives s-eɁə́h ~ s-eɁə́Ɂ ~ s-eɁə́ (Rule 3).

'child' 3 sg. poss:

bə́dəh-as gives bədəh-s (Rule 1), then bədah-s (Rule 2) then bəda-s (Rule 3).

1 pl. poss:

bə́dəh-ɬ gives bədah-ɬ (Rule 2), then bəda-ɬ (Rule 3).

unmarked:

bə́dəh gives ~ bə́də (Rule 3).

The form yéɁ-yəstəh-e-s 'his wild-rose bush' is, finally, derived as follows: *yéɁɛ-yəstəh-ay+as, then yéɁɛ-yəstəh-ay+s (truncation of affix), then yéɁ-ystəh-y+s (vowel-losses),[2] then yéɁ-ystəh-e+s (semi-vowel rule),[3] and finally yéɁ-yəstəh-e+s (shwa-insertion).

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[1] There must be an option on this rule. Compare seɁə́h : but bə-č-seɁ-áh-čəd alternating with bə-č-seɁá-čəd 'I'm building a house.' This option is probably limited to cases with following [-Cont] segments.

[2] For the treatment of unstressed vowels in the environment V́Ɂ-, -ɁV́, see Chap. II, sec. 17.2. For the vocalisms and the constituent structure of Attenuative, see Chap. III, sec. 3. Note also that the stem-final shwa before h is not lost (see Chap. II, sec. 11), so that h remains.

[3] As will be confirmed from the Attenuative, stem-initial semivowels do not vocalize (cp. Chap. III, sec. 3).

11.15.3.2. By ʔ

	Non-Poss.	3rd Sg. Poss.	Miscellaneous	Gloss
			bə́da-ɬ	our child
əh	seʔə́h	seʔə́h-as	seʔá-ɬ	house, his, our
eh	həlé(h)	səléh-ɛs	ʔəsələ-hále-ɬ	alive, his life, we're alive
oh	heʔɔ́dəxʷ		heʔódəxʷ	he was coming, he came
	ɬəs-heʔɔ́-čəd ~ ɬəs-heʔɔ́h-čəd			I'll come[1]
ə?	dəsədáʔ	sədáʔas	sədáʔləp	mine, his, your(pl.)
e?	skəlɛ́ʔ	skəlɛ́ʔɛs		anus, his
	s-ɬčɛ́ʔ		s-ɬč-ɬə́čɛ	island, islands
	sq̓əlɛ́ʔ		s-q̓ɛ́ʔɛ-q̓əle	monster, animal[2]
a?	xaxáʔ	xaxáʔas		taboo, his holiness
o?	qʷɔ́ʔ	qʷɔ́ʔɔs		water, his water
	sʔeyɔ́ʔ		s-ʔeyəʔə́yo	remedy, remedies
	ʔəs-q̓ʷsɔ́ʔdəxʷ		ʔəs-q̓ʷs-q̓ʷə́so	strung, all strung[3]

Fig. 24.--ʔ- Affection

[1] ɬ- future particle, plus -s- nominal.

[2] (Under 'Miscellaneous') An Attenuative formation (see Chap. III, sec.3).

[3] Probably *q̓ʷəsóh.

It was seen above that stem-final h lowers a preceding stressed shwa. Moreover, limited though the data is, there is good reason to suppose that not only does h have a similar effect on the other vowels, but that glottal stop has a parallel effect.

The crucial forms for the presence of stem-final h are those (such as 'possessive' third singular) in which a vowel-initial affix follows. Figure 24 shows that h-infection occurs with stressed e and o just as with stressed shwa, but that for the former the environmental condition 'with a following consonant' is not necessary.

It is equally clear from this corpus that glottal stop has the same lowering effect as has h. For shwa forms (e.g. sə-də́ʔ-as 'his,' but sə-dáʔ-ləp 'belonging to ye') the 'following consonant' is again required. On the other hand, s-kəléʔ-ɛs 'his anus,' etc., show that for non-shwa forms, glottal stop requires no following consonant to produce what we have so far called 'h-affection' on a stressed vowel.

By analogy from the above argument, we shall assume that forms such as qʷɔ́ʔ-ɔs 'his water' have the underlying shape qʷóʔ ; it is clear from the third singular possessive forms that the stem-final consonant in such forms must be glottal stop and not h.

Additional support for what we must clearly re-name, more generally, as 'laryngeal affection' is found in the few relevant attested contrasts between (unmarked) completive and (marked) derived incompletive. We assign to 'derived incompletive' the phonological spelling 'h', and are thus able to account for such a contrast as that between heʔódəxʷ 'come in,' 'he came,' and heʔɔ́dəxʷ 'he was coming along.' The latter is underlyingly *heʔó-h-dxʷ.

II.15.4. h-Mutation

	Unaugmented	Augmented	Gloss
(a)	wədáwʔ	wəd-ʔwədaw	horn
	ƛ̓áwʔ	ƛ̓oʔ-ƛ̓áw	mussel
	ʔəs-tq̓áwʔ	ʔɔs-q̓tə́q̓aw	patched
	x̌ʷəláyʔ	x̌ʷəlʔ-x̌ʷə́lay	shovel-nosed canoe
	Non-Attenuative	Attenuative	
	p̓əwáyʔ	p̓éʔɛp̓əwe[1]	flounder[1]
	s-qʷəbáyʔ	s-qʷéʔɛqʷəbe	dog
	Unaugmented	Augmented	
(b)	šáwʔ	šoʔ-šáwʔ	bone
	qəlwáyʔ	qəlʔ-qə́lwayʔ	crippled
	s-q̓ʷóbayʔ	s-q̓ʷəb-q̓ʷóbayʔ	brain

Fig. 25.--h-Mutation

[1]No augmented form is attested for p̓əwáyʔ 'flounder.' For s-qʷəbáyʔ 'dog,' the attested plural is s-qʷəbaʔy-óbəš, -óbəš being always an alternative plural-marker to the reduplication we have discussed. Since the point at issue is, whether or not the glottal stop appears despite retraction of stress, the use of these 'Attenuative' forms here is quite legitimate. For Attenuative formation, see Chap. III, sec. 3.

Passing reference has been made to the alternation ʔ/∅ (Chap. II, sec. 3 [end]) exemplified by the form wədáwʔ ; wəd-ʔwə́daw_. Figure 25 draws together a number of examples of this phenomenon.

Compare first s-q^{w}əbáyʔ ; s-q^{w}ɛ́ʔɛ-q^{w}əbe (attenuative) 'dog.' Reconstructing the Attenuative form from our understanding of the vowel-loss rules, we recover *s-q^{w}ɛ́ʔɛ-q^{w}bayʔ then derive s-q^{w}ɛ́ʔɛ-q^{w}byʔ (vowel loss), then s-q^{w}ɛ́ʔɛ-q^{w}beʔ (semi-vowel rule), then s-q^{w}ɛ́ʔɛ-q^{w}əbe. Now we may not suggest that the loss of the final glottal stop results from remoteness of stress in the derived form; for then, why does s-q̓^{w}əb-q̓^{w}óbay_ʔ 'brain' retain its glottal stop in the augment? Adding to this the fact that t̓áwʔ 'mussel' loses its glottal stop in augment (t̓oʔ-t̓áw), while šáwʔ 'bone' retains its (šoʔ-šáwʔ), it is clear that something other than stress is involved.

We recall that -h freely alternates with glottal stop (and with zero) finally after a stressed vowel, and now suggest that the respective underlying forms for 'dog' as against 'brain' must be reconstructed as follows. For 'dog,' with loss of glottal stop in Attenuative, *s-q^{w}əbáyh ; but for 'brain,' which retains glottal stop in Augment, *s-q̓^{w}óbayʔ. That is, we propose that glottal stop which alternates with zero is derived from final h in a cluster, while non-alternating glottal stop is 'original.'

The rule required for the forms concerned must provide for h becoming ʔ finally after a semi-vowel, provided a stressed vowel precedes the cluster. The case of t̓áwʔ ; t̓oʔ-t̓áw 'mussel' shows that the alternation with zero must also be allowed for, just as with simple (i.e., non-clustering) h-final after a stressed vowel.

The ordering of the rule for deriving ʔ from final h as explicated above is clear; since the glottal-attraction rule is to operate on the output from the string (e.g. *s-q^{w}əbáyh-as), shapes such as s-q^{w}əbáyʔ-as must be presented to it, for we get s-q^{w}əbáʔy-as. On the other hand, the rule for suffix truncation must itself be very slightly modified now to enable it to handle forms such as the present *s-q^{w}əbáyh-as as well as *šáwʔ-as. The amendment will consist, simply, of adding 'or h' to the rider expressing the exclusion environments.[1]

The rules newly discussed are thus as follows:

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[1]See p. 88. See Chap. II, sec. 18 'Specification of ʔ/h.' We shall at length specify simply 'laryngeal.'

1. Affix truncation, before laryngeal affection : *bə́dəh-as → bə́dəh-s
2. Laryngeal affection : bə́dəh-s → bə́dah-s
3. h optionally gives {ʔ, ∅} finally after a stressed vowel dəcə́h ~ dəcə́ʔ ~ dəcə́
   h optionally gives {ʔ, ∅} finally after V́ plus semi-vowel *wədáwh → wədáwʔ; *toʔ-táwh → toʔ-táw
   h[1] is deleted finally after an unstressed V plus semi-vowel wəd-ʔwə́daw
   h is optionally deleted finally after an unstressed vowel bə́dəh ~ bə́də
   glottal stop is deleted after an unstressed vowel s-ʔč-ʔə́čə
   h is optionally deleted before a consonant ɬ-əs-heʔə́h-čəd ~ ɬ-əs-heʔə́-čəd
4. Glottal attraction sqʷə́ báʔyas

II.15.5. Vowel Assimilation

We note from forms in Figure 24 and Figure 26(a) that in the presence of a laryngeally-affected vowel, the possessive morpheme -as assimilates its vowel to the affected vowel. Figure 26(b) adds a further sample of forms, from which we conclude that what we shall now call 'vowel-assimilation'[2] is a phenomenon not at all confined to 'possessive' but of wide-spread occurrence in Twana, in phonologically-definable environments. The following rule conveys the notion simply. Notice that the rule proposed must follow that for laryngeal affection, since it must operate on the products of that rule.[3]

Vowel-Assimilation:

$$\begin{bmatrix}+\text{voc}\\-\text{cons}\\-\text{stress}\end{bmatrix} \longrightarrow \text{copy of V} \quad \text{in env./} \quad \begin{Bmatrix}1\begin{bmatrix}-\end{bmatrix}\\2\begin{bmatrix}+\text{voc}\\-\text{cons}\\+\text{stress}\end{bmatrix}\end{Bmatrix} \begin{Bmatrix}\text{ʔ}\\\text{h}\end{Bmatrix} \begin{Bmatrix}1\begin{bmatrix}+\text{voc}\\-\text{cons}\\+\text{stress}\end{bmatrix}\\2\begin{bmatrix}-\end{bmatrix}\end{Bmatrix}$$

(Condition: V is not ʔ)

[1] Ordering of these sub-rules is so far not crucial--they may be much later.

[2] Assimilation, not 'harmony.' Clearly, we do not have to do with a feature of morphemes; the rule is stateable in terms of local influence on segments. Cf. Kiparsky (1968).

[3] For instance, if *s-kəléʔ-as first underwent vowel-assimilation, we should get s-kəléʔes; laryngeal-affection would then give **s-kəléʔes, and we should require another rule to give the vowel-adjustment for s-kəléʔəs.

	Example			Gloss
(a)	dəsədə́ʔ			it's mine
	ʔesədə́ʔ			it's thine
Compare	sədə́ʔ-as[1]	~	sədəʔ-ás	it's his[1]
	dəsədəʔ-óbəš	~	dəsədoʔ-óbəš	they're mine
	ʔesədəʔ-óbəš	~	ʔesədoʔ-óbəš	they're thine
	sədəʔ-óbəš-s	~	sədoʔ-óbəš-s	they're his
(b)				
Compare	čəʔə́d !	wet it!	' s-čeʔéwad	wet inside[2]
	ʔéwad	inside		
Compare	čə́č	across		
	ččáyas	eye-brow[3]	dəxʷ-ɬaʔáʔes-ə-bəd	eye[4]
	ɬəʔə́dəxʷ	search!	~dəxʷ-ɬəʔáʔes-ə-bəd	
Compare	skʷól	school	s-kʷól-as	his school
	skəlé$\underline{ɛ}$ʔ	anus	s-kəlé$\underline{ɛ}$ʔ$\underline{ɛ}$s ~ s-kəl$\underline{ɛ}$ʔés	his anus[5]
	spəlwé$\underline{ɛ}$ʔ	swan(?)	spəlwé$\underline{ɛ}$ʔ$\underline{ɛ}$s ~ spəlw$\underline{ɛ}$ʔés	his swan(?)
	həlé$\underline{ɛ}$	alive	səlé$\underline{ɛ}$h$\underline{ɛ}$s ~ səl$\underline{ɛ}$hés	his life
Compare	čəʔwáš-ab	got be-wived		
	həlé$\underline{ɛ}$h-$\underline{ɛ}$b	got well		
	həl$\underline{ɛ}$h-é$\underline{ɛ}$b			
Compare	s-ṗéxʷ	gull	s-ṗéʔxʷ-aɬ	baby gull
	wəhə́w	owl	w$\underline{ɛ}$hé$\underline{ɛ}$ʔw-aɬ	baby owl
Compare	qʷə́ʔ	water	~ qʷəʔə́s- təyabéd	fruit juice[6]
			~ qʷə́ʔə́s	
	həhə́ʔ	lots	~ həhə́ʔəb	got to be lots
			~ həhəʔə́b	

Fig. 26.--Vowel Assimilation

[1]Compare seʔə́h-as ~ seʔəh-ás 'house, his house.' But a stress-less suffix vowel does not assimilate to stem ə́. Cf. Tense-Lax, Chap. IV, sec. 4.4.

[2]Cf. čeʔ-éqʷədəb 'wet your head' (-éqʷad 'head'): but čaʔ-áčəb 'wet you hand' (-áče(h) 'hand.')

[3]čə́č 'across'; -áyas 'round object' suffix.

[4]dəxʷ--bəd Instrumental derivation, *nxʷ-- mn, thus *nxʷ-ɬəʔ-áyas-mn.

[5]For stress shift, see Chap. II, sec. 15.6.

[6]Genitival construction *qʷóʔ-as t-ə-yamén 'water-of fruit.'

II.15.6. Stress Shift to Affix

A further alternation is illustrated by the forms of Figure 26. This is the alternation in the position of the stress between the last vowel of the stem, and the initial vowel of suffixes such as -as 'possessive,' -ab 'verbalizer.'

The occurrence of forms such as se?ə́h-ás 'his house' ~ se?ə́h-as, demonstrates that the alternation is not limited to stems with [+compact] vowels; on the other hand, it is limited to forms containing h/? as stem-final consonant.

Could a rule providing for this optional stress-shift in fact operate on the converse situation, i.e., could it be assumed that the suffixes concerned are in fact stressed, and that the optional stress-shift then puts the stress on the stem vowel? Clearly not, since for e/o stems 'laryngeal-affection' requires a stressed vowel, and the latter rule is not optional. Thus the rule for optional stress-shift follows that for 'laryngeal-affection.'

A further question is that of the interpretation of the alternates with unstressed ə (as se?əh-ás), in the case that the stress-shift option has been taken. Recall that in di-syllabics with stress on the second syllable it was found expedient to assume a preceding (and unstressed) shwa is always lost; in certain definable conditions, a shwa would then later be inserted. It will be shown,[1] in connection with ?/h-initial stems, that any unstressed vowel before ?/h preceding a stressed vowel is optionally lost.

II.15.7. C–h Metathesis

Another aspect of the behavior of h is illustrated by the forms of Figure 27. Here the cluster -V́hC is in free(?) variation with -V́C : we hear qáhse(h) ~ qáse(h). First, this variation is found in a number of forms, but never found in others; it is thus difficult to dismiss the phenomenon as 'sporadic intrusive h.'

Much more important than this is the fact that for the few attested augmented forms corresponding to -V́hC stems, we find that the reduplication

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[1] See Chap. II, sec. 17.2.

h-Form		Non-h Form		Gloss
báhčad	~	báčad		shag
qʷəláhq	~	qʷəláq		late
s-páhqʷał	~	s-páqʷał		waterfall
ʔáhčəb-čəd	~	ʔáčəb-čəd		I gather wood
cáhpə(h)	~	cápə(h)		daughter-in-law
dáhqas	~	dáqas ~ dəqas		one
qáhse(h)	~	qáse(h)	: pl. qs-qáhse(h)	uncle
čáhtas	~	čátas	: pl. čt-čáhtas	stone
s-táhkəd	~	s-tákəd ~ s-təkəd	: pl. s-k-tákəd	stocking
čəʔwáht	~	čəʷwát		fine

Fig. 27.--C-h Metathesis

apparently takes no account of the h segment. We get qáhse(h) ~ qáse(h) but only (augmented) qs-qáhse(h) ~ qs-qáse(h); never **qah-qáhse(h) or **qa-qáhse(h), etc.

It is, of course, open to us to modify the reduplication rule to allow for such forms; that is, we could say that 'reduplication consists of CV(h)C.'[1] This is certainly better than marking the individual forms in the dictionary as having allomorphs of the shape (e.g.) [qáhse(h); qáse(h) (Augment)].

However, recalling that a glottal stop is attracted by the stress, and that in other respects h behaves in parallel fashion to glottal stop, we could now suggest that h is likewise 'attractable' by the stress. We might then propose that forms like qáhse(h); qs-qáhse(h) in fact derive from underlying forms of the shape CVCh- and then show h-metathesis in the stressed syllable of the stem itself, while the reduplication shows simply the regular CVC structure we have so far assumed for the Augment.[2]

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[1] It being understood that the h would be lost in the resultant cluster qhs-.

[2] This is perhaps related to the problem of 'lost x' in Twana. Compare Elmendorf's Inventory (Chap. I, sec. 3.3.2), and see also Chap. IV, sec. 4.2 for an alternative explanation (fn.3 on p.214).

How, now, are we to account for variations such as dáhqas ~ dáqas ~ dəqas, etc.? First, it can be shown that in certain of these forms, the underlying stressed vowel cannot be a : such a form is s-páhqʷaɬ,[1] where the a vowel must then be attributed to 'laryngeal affection.' With this in mind, we may well suggest that the alternation ə ~ a must result from an option in the rule for h-attraction.[2] If, as is clear from the corpus, the h-loss rule is also optional, then it follows that: (1) if h is metathesized we get dáhqas; with (optional) h-loss, dáqas; while (2) if h is not metathesized we get only dəqas.[3]

It is now clear that, despite the parallelism between the behavior of h and glottal stop, the h-metathesis rule cannot be incorporated together with the glottal-attraction rule into a single ʔ/h attraction rule. h-metathesis precedes laryngeal-affection, vowel-harmony, and optional stress-shift; while glottal-attraction cannot operate until the stress-shift option has been taken (or not), whereupon the vowel-loss rule will produce certain glottal-stops[4] then to be attracted.

II.15.8. The Derivation of 'One by One'

As was seen above the underlying form for 'one' must be *dəqhas. However, the Distributive 'one by one' is dáqs: how can this be derived from *dəqhas if the constituent structure of Distributive is, as we have shown,[5] CVC-V́C plus stem? If we attempt to reconstruct using *dəqhas, we get **dəq-əq-has, from which it is impossible to derive the correct output.

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[1] See Attenuative. It is clear that s-pəʔəpqʷəɬ 'small waterfall' can only derive from *s-pəhqʷaɬ. *s-páhqʷaɬ would give **s-paʔápqʷaɬ

[2] This parallels to some extent the option we have already noted on the glottal-attraction rule (e.g.) in word-final position. Compare čaɬáʔd ~ čaɬádʔ 'coal.'

[3] The implication, of course, is that *dəqhas is the proper underlying form for 'one.'

[4] We recall that the vowel-loss rule proceeds by 'counting' the vowels following the stress.

[5] See Chap. II, sec. 14. We are, of course, at liberty to assert that 'one by one' is simply (suppletively) dáqs, with appropriate dictionary marking. It is, of course, clear, on the other hand, that we cannot derive (surface) dáqs from *dáqs.

Consideration of the vowel in dáqs, however, suggests a solution. Clearly the original ə̲ has undergone h- affection; we therefore reconstruct the first three segments as *də́h- . Now if this must stand as the initial CVC for the underlying form, then that underlying form must have the shape *dáhqas.

If, now, we reconstruct the total underlying Distributive form, we have *dəh-ə́h-qas. The shwa in the unstressed syllable before the stress will be lost, giving dh-ə́h-qas. This, too, is incorrect. We recall, however, that there is an optional stress shift (compare č̓ɔʔɔ́ʔɔs ~ č̓ɔ́ʔɔʔɔs 'three by three') from the infix to the initial syllable.[1] Such a stress shift parallels the shift described in connection with suffixes (Chap. II, sec. 15.6). Let us assume that, like that rule, the present stress-shift operates before the vowel-loss rule. We then set up *dəh-ə́h-qas,which gives dəh-áh-qas (h-affection), then dah-áh-qas (vowel-assimilation), then dáh-ah-qas (optional stress shift), then dáh-h-qs (vowel-loss) and finally dáqs (h-loss).

No contradiction is involved, of course, in deriving the cardinal 'one' from *də́qhas, but the distributive from *dáhqas, for these are simply examples of allomorphy in the dictionary.[2]

II.15.9. h and the Unvoicing of l

	l-Forms	ɬ-Forms	Gloss
(a)	ʔélal-dəx^{w}		sang[1]
	q^{w}ál-dəx^{w}		painted
	č̓épal-dəx^{w}		afraid
	ɬaqél-dəx^{w}		many sitting[2]
	ʔosél-dəx^{w}		dived
	čél-dəx^{w}		lazy
	q^{w}ól-dəx^{w}		filled
	sk^{w}ól		school[3]

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[1] Cf. also ʔóp-op-ədəčs, 'ten by ten,' Chap. II, sec. 14.

[2] Note that we are unable to utilize the rule for metathesis to solve the distributive dáqs, since the C.S. rule would give us **dəq-ə́q-has. It is precisely the notion that dəh-ə́h is supplied by the C.S. rule, that is recaptured by the use of dictionary allomorphy. 'Distributive' simply selects də́hqas.

	l-Forms	ɬ-Forms	Gloss
	xʷə́l-dəxʷ		gathered
	q̓ʷə́l-dəxʷ		cooked
(b)	s-ɬókʷəl-əb	ɬókʷaɬ	moon; sun[4]
	ɬqʷədálad	ɬqʷədáɬ	grave-yard; ghost[5]
	ɬqʷədál-ɔbəš		ghosts
	ʔopál-ab	ʔopáɬ̣dəxʷ	one eats it; eat it!
	dəxʷ-ʔácəwəl-bəd	ʔacáwaɬ̣dəxʷ	vehicle; on board
	dəxʷ-x̣q̓aʔwél-bəd	be-x̣q̓aʔwéɬ	landing-place; landing
	ʔəs-əbəčólatəb	bəčóɬ	it's festering; pus
	beʔá cadəwəl-əb-st	ʔácadoɬ	made s'one pregnant; pregnant[6]
	ɬəʔwálbəd	ɬəʔwáɬ̣dəxʷ	a legacy; left him
(c)	ʔəsólab-dəxʷ		he takes him ('goes him')
	ʔəsól-dəxʷ	ʔəsóɬ̣dəxʷ	he took it; go![7]
(d)	ʔəsóldəxʷ		it was taken
	ʔəsóɬ̣dəxʷ		go now!
	sólʔ		going to (a place)
	s-ɬókʷələb		moonlight
	ɬókʷaɬ		moon
	ʔas-kʷə́lʔ		sunshine

Fig. 28.--h - Unvoicing of l

[1] dxʷ. Completive suffix. Homonymous with 'unmarked' Imperative.

[2] ɬaqél. Suppletive collective plural stem 'many sit.' Compare ʔabót-dəxʷ 'he sat down.'

[3] s-kʷól 'school.' A loan from English, with characteristic labialization of k before or after o. Compare bók̓ʷ 'book.'

[4] The exact relation between ɬókʷəl-əb (apparently a derived intransitive) and ɬókʷaɬ is not clear. Also unclear is the relation of these to ʔas-kʷə́lʔ 'sunshine.'

[5] The suffix -d (lost before ɬ) makes derived nouns. The vocalism is rarely present, and it is not clear whether -d is reduced from -ad or is another suffix.

[6] The l-form is derived intransitive (-b), causative (-st-).

[7] The relation here is explained in the text. But the relation of

Fig. 28--cont.

these (if indeed they are related) with sól' 'going' is obscure. Compare ʔas-k^{w}ól' in footnote 4 above. If sól' is connected with ʔəsól-dəx^{w}, then we must of course re-write the latter as *ʔas-sól-dx^{w}.

Figure 28 cites forms in which l alternates with its voiceless counterpart ɬ.

Sub-corpus (a) gives a small sample of forms for which no l ~ ɬ alternation is attested. Sub-corpus (b), on the other hand, shows that the alternation between certain parts of the total word-paradigms involves l ~ ɬ. We recall the distinction made above (Chap. II, sec. 15.4) between 'original' glottal stop and glottal stop deriving from h in certain clusters finally: after a voiced semi-vowel (w,y), h gave glottal stop in such forms as wədáwʔ 'horn' and ɒəwáyʔ 'flounder.' We now propose that the forms in the right-hand column of sub-corpus (b) in fact contain h, and to interpret the alternation l ~ ɬ as arising from the operation of a rule by which l assimilates its voice to that of a following semi-vowel (h).[1]

What, then, is the domain of such an assimilation rule? Note that the forms of the left column in sub-corpus (b) all contain l in non-final position; on the other hand, some of those of the right-hand column contain final l but some do not. From the Notes to the corpus, however, it will be seen that the left-hand column consists of forms in which the hypothesized -lh cluster is not stem-final; conversely, those of the right-hand column all contain stem-final lh. The domain of the rule for h-assimilation is thus clearly that span bounded by whatever marker suitably characterizes 'stem-final.'

The forms so far cited clear show the environmental contrast by

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[1]The one form in the total corpus where the alternation l ~ ɬ is patently attributable to the presence of -h- is, unhappily, a form which we are unable to explain fully. This is ʔəs-hə-héɬ-čəd 'I'm happy.' If, as seems likely, this form has the same root (*həléh) as we find in həlé-čəd 'I'm alive,' then we may reconstruct the shape *ʔas-hə-həléh-čəd, a Stative which follows the 'intensive' derivation. But we are unable to account for the stress-shift and vowel-loss which would give us the derivation-stage *ʔas-hə-hélh-čəd from which the ɬ-form must arise.

It is possible that q̓^{w}élo (*q̓^{w}éloh ?) 'cedar bark,' and q^{w}eɬóʔy ~ q̓^{w}éɬəʔy (*q̓^{w}éloh-ay ??) 'leaf' are also examples of the l ~ ɬ alternation (Chap. II, sec. 15.9).

means of which they are to be distinguished by the (h) voice-assimilation rule. The forms of sub-corpus (c), however, seem to contradict this formulation. We thus assume that they are not to be considered as precisely parallel to the forms of sub-corpus (b). What, then, is the difference?

We recall that the distinction between (.e.g.) he7ó-dəx^{w} 'he was coming' and he7ó-dəx^{w} 'come on!' was attributed to the presence in the former of the constituent 'derived incompletive,' to which we assigned the phonological spelling -h-.[1] It seems reasonable to maintain that the same aspectual distinction holds here between ʔəsóɬɬdəx^{w} 'go!' and ʔəsól-dəx^{w} 'he took it.' We thus re-spell these as *ʔas-sól-h-dx^{w} and *ʔas-sól-dx^{w}.

The rule for h-assimilation of l is thus:[2]

$$\begin{bmatrix} +\text{lateral} \\ -\text{checked} \end{bmatrix}^{3} \rightarrow [-\text{voice}] \quad \text{in env.} \quad / \; - \begin{bmatrix} -\text{cons} \\ +\text{voc} \\ -\text{syllabic} \\ -\text{voice} \\ +\text{cont} \end{bmatrix}^{4})_{\text{stem}}$$

h is of course assumed to be deleted later in the environments C- (obligatorily) and -C[5] (optionally).

With Figure 28(d) we re-open the question, mentioned in the Notes, of the alternation l ~ ɬ ~ lʔ, making the assumption that the groups of forms are in fact semantically and phonologically related.

It is likely that the interpretation of the h-mutation phenomenon as one applying only to semi-vowels y and w[6] was unnecessarily narrow; it may well be that l is also involved. If this is so, then we have a further criterion for asserting that the rule for h-unvoicing must precede the h-mutation rule (compare footnote 2 below). On the other hand, it is

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[1] See Chap. II, sec. 15.3.2.

[2] h must clearly unvoice l before the h ⟶ ʔ rule; we should otherwise get (e.g.) *ɬq^{w}ədálʔ, with no way of deleting the final ʔ. For ɬ ~ l, see Chap. II, Sec. 20.3.

[3] [-checked] is required to distinguish l from ɬ, in the rule.

[4] ʔ<u>never</u> unvoices l. We thus exclude the [-cont] semi-vowel.

[5] Compare Chap. II, secs. 15.3/4; h-loss is <u>optional</u> in V́-ɬC (heʔɔ́h-čəd)$_{\text{stem}}$.

[6] Chap. II, sec. 16.4.

difficult to see just what difference in shape or constituent structure would guarantee the outputs sól? and ?ask^{w}ə́l? : One can only suggest that these be suitably marked in the dictionary with the rule-feature [not l-unvoicing], for they would then automatically arise from *sólh and *?ask^{w}ə́lh, by the h-mutation rule.[1]

II.16. Rule Summary 3[2]

1. Constituent Structure, for Augment.
2. Stress assignment for Augment.
3. V - a mutation, under secondary stress.

** 4. Affix truncation.

** 5. C-h metathesis.

** 6. Laryngeal affection.

** 7. Vowel assimilation.

** 8. Stress-shift to affix (optional).

** 9. h unvoicing of l.

*10. V-losses (to h) { in unstressed (Augment) reduplication. / by modified 'counting' rule.

11. h → $\begin{Bmatrix} \emptyset \\ ? \end{Bmatrix}_2^1$ before voiceless stop abutting R.

12. ?- metathesis.

13. Y-metathesis. (Augment only?)

14. Vocalization of semi-vowels.

*15. Glottal absorption. Environment very constrained, but probably occurs within stems too.

16. Change of obstruency for N.

17. B̓ lose glottalization.

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[1] It is, of course, just as reasonable to hold that these forms have been re-shaped, and are to be written in the dictionary *sól? and *?ask^{w}ə́l? directly. Compare 'dictionary final ? ' in (e.g.) sədəx^{w}-q̓ól? 'blood,' x^{w}él? 'lose,' təl? 'take off.'

[2] Compare Summary 2, Chap. II, sec. 10 (p. 71): * shows rules modified; ** shows rules added; of course, with re-numbering. Note that the rules are no longer all confined to the Augment.

N = Nasal
B = Voiced obstruent
R = Resonant

18. Cluster-simplification.

19. s-assimilation. (Prefix ʔas-)

20. Geminate simplification.

21. Shwa insertion

22/23. Treatment of voiced obstruents.

**N.B. Rule for loss of remaining h in cluster with consonants--ordering unclear, but follows Rule 10. A form like ʔáləsqəh 'outside' would otherwise lose its final shwa--which is not replaceable by shwa-insertion.

II.17. Laryngeal Stems

Unaugmented	Augmented	Gloss
ʔáx̣cəd	x̣aʔáx̣cəd	bed[1]
ʔaléš	laʔálaš ~ ləʔálaš	sister[2] (m.speaker)
s-ʔáptšəd	s-pa-ʔáptšəd ~ s-páʔaptšəd	heel[3]
dəx^{w}-ʔácəwəlbəd	dəx^{w}-cə-ʔácəwəlbəd	vehicle[4]
ʔas-ʔáṗ	ʔəs-ṗaʔáṗ ~ ʔəs-ṗáʔaṗ	wiped
ʔébac	be-ʔébac	grandchild
s-ʔélal	s-leʔélal ~ s-lə-ʔélal	song
ʔas-ʔéx̣	ʔəs-x̣e-ʔéx̣ ~ ʔas-x̣éʔex̣	scraped
ʔas-ʔéwad	ʔəsə-weʔéwad	invited
bo-ʔóləsqə(h)	bə-ləʔo^{w}ləsqə(h)	go out[5]
s-ʔobát	s-bə-ʔóbat	name
s-ʔólax̣eʔəd	sə-ləʔólax̣eʔəd	dish[6]
ʔas-ʔóšab	ʔəš-šə-ʔóšab	charitable
ʔas-ʔóx^{w}šəb	ʔəs-x^{w}o-ʔóx^{w}šəb ~ ʔəs-x^{w}əʔóx^{w}šəb	having bought a wife
ʔas-ʔopáɬ	ʔəs-po-ʔópaɬ	eaten
ʔəbətəbéd	bə-ʔə́bətəbèd	seat[7]
ʔas-ʔə́yʔ	ʔəs-yə-ʔə́yʔ	paid
ʔəs-ʔəléx^{w}	ʔəs-lə-ʔə́lax^{w}	hunter
ʔas-hóbšəd	ʔəsə-bə-hóbšəd	red foot
həɬé-čəd	ʔəs-lə-hə́le-ɬ	I'm alive,[8] we're alive

Fig. 29.--Laryngeal-Initial Stems

[1] Compare ʔax̣éc 'go to bed'; thus *ʔax̣éc-Vd as Nominal derivative, with normal vowel-loss following stress-retraction.

Fig. 29--cont.

[2]For the optional vowel-loss in l?álaš (later lə?álaš, by shwa-insertion) see Chap. II, sec. 17.2.

[3]For optional stress-shift giving s-pá-?aptšəd, see Chap. II, sec. 15.6.

[4]Compare ?acáwal- 'be riding.' Here Nominal derivation dx^{w}-stem-bd, with retraction of accent. Stress-retraction in derived nouns is common, but not entirely predictable.

[5]The glottal stop in bə-lə?ó?ləsqəh results from vowel-loss after the stress (see Chap. II, sec. 12) followed by glottal attraction. The final shwa remains, before final h.

[6]s-?ólaxe?əd apparently contradicts the vowel-loss rule: we therefore reconstruct *s-?ólax-ayad, by analogy with forms like ɬkáyas ; k-ɬáke?əs (see Chap. II, sec. 12.3 [end]).

[7]Compare ?abót 'he sat down.' Here, with Nominalizing suffix -béd ; uniquely, the suffix bears primary stress in the unmarked form.

[8]From *həléh ; compare həleh-ədə-bət 'he saved himself,' a transitive (-d-) reflexive (-bət-) formation.

II.17.1. Introduction

With the insights on the behavior of glottal stop and h already gained, we turn now to the question of the behavior of stem glottal stop and h. We shall show that, although stem-initial ?/h behave differently from other consonants, their idiosyncracies there parallel those shown by ?/h elsewhere. In particular, no compelling motive will appear for re-interpreting ?V-initial stems as underlyingly vowel-initial, that is, for assuming that initial glottal stop is automatically inserted before what are really vowel-initial stems.

Similar idiosyncracies occur in the augment when the final consonant of the initial syllable (C_2 hereafter) is glottal stop or h. We shall characterize stems having a laryngeal as C_1 or C_2 simply as 'laryngeal stems,' for the remainder of this thesis.[1]

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[1]Thus, 'laryngeal-initial' refers to ?/h as stem-initial; while 'laryngeal-final' refers to ?/h as C_2 of a stem.

II.17.2. Laryngeal-Initial

Suppose we attempt to derive the augmented forms for some of the examples in Figure 29, assuming that the 'spelling rule' for Reduplication in the Augment is exactly the same as for forms with other than ʔ/h - initial, viz., C_1VC_2. Let us take ʔéx̣ 'scrape' and ʔélal 'sing.'[1] *ʔex̣-ʔéx̣ gives ʔx̣-ʔéx̣ (by vowel-loss) then x̣ʔ-ʔéx̣ (by glottal attraction), then x̣-ʔéx̣ (geminate-simplification)[2] then xə-ʔéx̣ (shwa-insertion). We notice that, unless we invoke a second vowel-assimilation rule, we cannot get the alternant output, xeʔéx̣ (or xéʔex̣, by [optional] operation of stress-shift).[3]

The case of *ʔélal is even worse. *ʔel-ʔélal gives ʔʔl-ʔélal (vowel-loss and ʔ production). Then, assuming one glottal stop is attracted, we are left with ʔlʔ-ʔélal, with no way of deleting the initial glottal stop. The completely ad hoc convention that both glottal stops will be attracted must then be matched by the equally ad hoc convention that the triple glottal stop now appearing after glottal attraction (**lʔʔ-ʔélal) is simplified by the geminate-simplification rule. As with ʔex̣, of course, there is no way to produce the (commoner) alternant leʔélal.

With the h-initial stems, we are in no better a position. Deriving the augment for a form such as ʔas-hóbšəd, we get *ʔas-hob-hóbšəd, then ʔs-hʔb-hóbšəd (by vowel loss and glottal stop development), then ʔs-hbʔ-hóbšəd (by glottal attraction), then ʔs-bʔ-hóbšəd (by h-loss before a consonant). Now while the medial glottal stop will be absorbed (by b), there is (as before) no way to derive the alternant ʔəs-bohóbšəd without invoking a second vowel-assimilation rule.

One simple solution to the problem of the additional glottal stops in these derivations is to adopt the convention that ʔ/h-initial stems do not develop glottal stops from the vowels lost in Augment, even if 'C_2' is a voiced consonant. This certainly gives the alternants xəʔéx̣ and ləʔélal, assuming only that geminate glottal stops are simplified. But how are we to derive the alternants xeʔéx̣ and leʔélal, without an additional rule for vowel-harmony?

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[1] Compare the argument from the Distributive Numerals, Chap. II, sec. 14.

[2] Chap. II, sec. 7.6.

[3] See Chap. II, sec. 15.6.

The notion that the presence of stem-initial ʔ/h somehow inhibits the development of a glottal stop, is clearly not powerful enough to enable us to generate the second alternant (e.g., leʔélal). Recalling that a laryngeal may in certain circumstances be lost when stem-final, we now propose that stem-initial laryngeals are in fact also lost in the unstressed reduplicating syllable.

The fact that glottal stop is not developed for such stems in augment is then very simply explained: If 'C_1' is first lost, then there is no 'C-C' environment, and the vowel itself is not lost. What, then, becomes of the vowel in such a case? We do not get forms such as **el-ʔélal. We propose that, after the loss of the initial ʔ/h segment, the vowel of the reduplicating syllable metathesises with the 'C_2' segment. Thus, the derivation is as follows: ʔel-ʔélal gives el-ʔélal (loss of initial ʔ/h), then le-ʔélal (by metathesis), which is the 'common' alternant.

We found it implausible to derive the alternant leʔélal from the alternant ləʔélal (above); can we now hold that ləʔélal may be derived from leʔélal? In the light of what has been discovered concerning the loss of vowels in unstressed syllables, especially those preceding the stress, the suggestion seems most plausible. Let us review some supporting evidence.

Two situations in which an optional vowel-loss occurs in pre-tonic position are the following:

1. With the present-continuative aspect prefix be-. Thus we have bəʔélal ~ beʔélal 'he's singing'; bə-łeč-é-čəd 'I'm scattering,' but (commonly) be-łéč-a-čəd 'I'm scattering them.'

2. In di-syllabics containing shwa in the first and unstressed syllable (see Chap. II, sec. 4). Here we contrast yəlʔə́x ; yəlʔ-yə́lax̣ 'gathered,' with s-yələ́b;[1] s-yəlʔ-yə́lab 'year.'

With the above data in mind, we see how the alternants such as ləʔélal can be derived from those such as leʔélal.

We suggest that, as above, the unstressed pretonic vowel is optionally lost (with following laryngeal) in the forms under discussion. Maximum productivity is gained for the rule if it also deals with forms like beʔélal~ bəʔélal above: thus, the proposed rule must follow the Augment

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[1] Alternant to s-yəl·ə́b. We should expect s-yəlʔə́b if the rule were obligatory.

metathesis that gives le?élal from the stage el?élal (i.e., after deletion of initial laryngeal). Thus:

1. ?/h deletion.
2. Augment metathesis.
3. Optional deletion of V_1 in env./ -?/hV_1.[1]

But if we derive (augmented) 1-?élal according to this series of rules, it is immediately obvious that the shwa-insertion rule will not be able to operate to give the desired iə?élal, for glottal-absorption (which necessarily precedes shwa-insertion) will give **ʾl-élal, the environment for shwa-insertion being thereby lost.

It is therefore in order to re-examine glottal-absorption. Here we note that (Chap. II, sec. 13), in order to allow for stem glottal-absorption (thereby including cases such as yədés), sub-rule 2 was modified to read:

$$\begin{bmatrix}+\text{cons}\\+\text{voice}\end{bmatrix}\ [?] \longrightarrow \begin{bmatrix}+\text{cons}\\+\text{voice}\\+\text{checked}\end{bmatrix} \quad \text{in env. / - (C) } \acute{V}$$

This allowed for both tb?-tə́bax^{w} and yd?és.

To prevent the same sub-rule taking 1-?élal to **ʾl-élal, it is clear that we must constrain glottal-absorption from operating when the absorbing segment is initial (1-?élal), if there is no consonant following. This constraint is best expressed as a 'condition' on the sub-rule above, reading:

Condition on sub-rule 2: If C is null,

Then $\begin{bmatrix}+\text{cons}\\+\text{voice}\end{bmatrix}$ may not be in env. / # -

II.17.3. Laryngeal-Final

The reason for the retention of the vowel of the reduplication syllable, as suggested above, was that the 'C_1' segment had been lost, since it was a laryngeal. Consider now the forms of Figure 30, where the reduplication seems to be 'C_1V_1.' It seems reasonable to maintain that the retention of the vowel can be attributed to the same cause, viz., the loss of ?, this time as 'C_2' of the reduplicating syllable.

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[1] For the generalization and further ordering of this rule, see Attenuative (Chap. IV, sec. 4).

	Unaugmented	Augmented	Gloss
(a)	q^{w}ɔ́ʔ	q^{w}o-q^{w}ɔ́ʔ	water; river[1]
	dɔ́ʔ	do-dɔ́ʔ	rotten
	čáʔləš	čə-čáʔləš	branch
	dáʔ šəd	da-dáʔšəd	foot-print
	dášəd	šədášəd	foot-print
	q̓áʔbe	q̓a-q̓áʔbe	girl
(b)	čáʔyat	čeʔ-čáʔyat	fish gill
	dəʔwat	do-dəʔwat	wave waves

Fig. 30.--Laryngeal-Final Stems

[1] sq^{w}oq^{w}ɔ́ʔbəš 'Skokomish' is thus s-q^{w}o-q^{w}ɔ́ʔ-bəš 'river people,' regularly derived (from the plural of 'water' as 'river') with s- nominal prefix, and -bəš 'people' (probable related to pluralizing -óbəš). *s-q^{w}o-q^{w}óʔ-obəš would give the correct output by the rules already given.

We therefore propose amending the rule for laryngeal[1] deletion (Chap. II, sec. 17.2), which now reads as follows:

$$ʔ/h \longrightarrow \emptyset \text{ in env. } / \left\{ \begin{matrix} -V_1C_2 \\ C_1V_1 - \end{matrix} \right\} \& \text{)Aug redup.}$$

We thus derive not only:

ʔel-ʔélal ⟶ el-ʔélal ⟶ le-ʔélal ⟶ (opt) l ʔélal ⟶ ləʔélal,

but also:

q̓oʔ-q̓óʔ ⟶ q̓oʔ- q̓ɔʔ ⟶ q̓o-q̓ɔʔ.

---

[1] There is no certain attestation of Augmented forms from stems containing h as 'C$_2$.' Nevertheless, the parallel behavior of h in other respects leads us to suppose a parallel here, too. Cf. Attenuative with h as C$_2$.

A solitary form, sədádə(h) 'money,' may prove to be our single example. If it is indeed an augmented form, then its underlying shape would be *s-də-dáh: but this suggests that 'laryngeal affection' precedes the loss of (C$_2$)h. Cf. Rule Summary 4, Rule 3, where it is assumed that a laryngeal as either C$_1$ or C$_2$ is lost earlier than laryngeal affection.

It is crucial to distinguish these forms from those of sub-corpus (b). If we postulated underlying forms such as **čá²yat, **dá²wat, we could not derive the correct outputs. Thus (e.g.) **ča²-čá²yat gives **ča-čá²yat (by deletion of C_2 as glottal stop), but this would require a completely ad hoc rule to replace the a by e to get če²čá²yat. The underlying form, as has already been shown (see p. 46) must be *čáy²at.

The case of də́²wat is even more interesting. If we assumed **də²-də́²wat, we should derive **də-də́²wat, which is clearly wrong just as we saw above for čá²yat. But the derivation which will give the correct vowel in the reduplication can only result from an original w. However, reconstructing with a w gives us *dəw-də́w²at, then d²w-də́w²at (by vowel loss and ²-production in the reduplication), then dw²-də́²wat (by ²-attraction, both in the reduplication and in the stem), then do²-də́²wat (by semi-vowel rule). Why, then, do we get do-də́²wat as the correct output? Clearly, the glottal-absorption rule must operate here, so that the glottal stop is later deleted when non-obstruent nasals change their obstruency.

Let us recapitulate the derivation, restoring the underlying nasal segments for clarity: nəw-nə́w²at, n²w-nə́w²at, nw²-nə́²wat, no²-nə́²wat; then no-nə²wat (by glottal absorption), then do- də́²wat (by change of obstruency), then do-də́²wat (by loss of glottalization on voiced obstruents).

The case of dá²šəd ~ dášəd ; da-dá²šəd ~ šədášəd in turn shows that we must on occasion recognize free alternants in the dictionary: but the augmented forms match these alternants perfectly! For dá²šəd, the form da-dá²šəd corresponds, as shown above; while for dášəd, šədášəd corresponds, derived from *naš-nášən with the addition of the cluster simplification rule (Chap. II, sec. 7.3).

II.18. Specification of h/ , w/y

II.18.1. General

From the whole of the preceding discussion, the following summarizes the behavior of glottal stop, h, and y.

First, these are the non-vowel segments which participate in metathesis. Glottal metathesis (or attraction); h-metathesis (as in

qáhse; qs-qáhse); and y-metathesis (as in yəšəd; še-ʔyə́šad) are all well attested in the preceding corpora. Setting these segments apart from both the vowels and the other non-vowels (including l), let us call them the class of [+oral][1] semi-vowels.

Glottal stop and h behave distinctively as regards laryngeal affection, vowel-assimilation, optional stress-shift, and deletion as stem 'C_1' or stem 'C_2' in reduplication: these constitute the sub-class of voiceless semi-vowels, a class divided internally by the feature of [continuousness].[2] By the same token, w and y constitute the sub-class of voiced semi-vowels, distinguished primarily[3] by the feature of [oral].

II.18.2. w/y and the Semi-Vowel Rule

So far as the specification of the segment alternations w/o and y/e is concerned, the definition of w/y as semi-vowels would normally include the feature [-vocalic], the alternation being then defined as a change of [-vocalic] to [+vocalic] for both.

Thus:

$$\begin{bmatrix} -\text{Cons} \\ -\text{Voc} \\ +\text{Voice} \end{bmatrix} \longrightarrow \quad [+\text{Voc}], \text{ in certain environments.}$$

However, although the formulation just given is certainly simple, we should prefer one more closely corresponding to the notion that we have to do with the syllabification of certain segments. How may we convey this notion within the present framework?

It is most probable, questions of 'phonological markedness' aside, that any universal theory of phonology will require the addition of

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[1] For the motivation of 'Oral,' see Chap. II, sec. 7.

[2] The classification of h/ʔ as semi-vowels has thus been made purely on the grounds of similarity of behavior with w,y. We note that, for Twana, it would have been difficult to consider h/ʔ as obstruents, for we already have a segment marked [+Grave, +Compact, +Checked, -Cont], viz., q̇. For discussion of h, see Chap. IV, sec. 4.4.3.2.

[3] 'Primarily' refers to the minimal specification possible in the rules (here, the Semi-vowel Rule).

Syllabicity to the total roster of distinctive features.[1] If we assume that this is so, then clearly we are at liberty to use this feature; indeed, we are required to use it, if its use in any sense clarifies the phonology of the language under discussion.

Suppose, then, we specify all the non-vowel segments of Twana as [-syllabic]. We are now able to define the process of vocalization of semi-vowels as a syllabification, as we desired. We do not want this syllabification, however, to apply to w,y by virtue of their partaking of 'voice'; we should also prefer to avoid having to reverse the sign on the feature [vocalic] (for w,y are at present defined as [-vocalic]) in the rule in question.

We may avoid both these problems by the simple expedient of re-defining w/y as [+vocalic]. As before, the binary quantity of a single feature (syllabicity) is reversed in the semi-vowel rule; instead of $\begin{bmatrix}-\text{cons}\\-\text{voc}\\+\text{voice}\end{bmatrix}$, the left hand side of the rule will require to specify $\begin{bmatrix}-\text{cons}\\+\text{vocalic}\\-\text{syllabic}\end{bmatrix}$, for w/y are now distinct from ʔ/h by the feature of vocalicity, and not voice, but distinct from l primarily by consonantality.

We now define the 'environment' of the semi-vowel syllabification rule.

Examples:

ƛ̓ʷóy		ƛ̓ʷeʔ-ƛ̓ʷóy	mother, pl.
łáwalbəš		łoʔ-łáwalbəš	Indian person, pl.
s-łə́łaq		s-łə́łq-eh[2]	thimble-berry,-bush
yəq̓ʷólʔwəltxʷ	~	eq̓ʷólʔwəltxʷ	washing the house
ʔas-láw		dəxʷ-láʔo-bəd	baked, baking-pan
t̓káyas		k-tə́keʔəs	basket, pl.
s-yoʔés	}		wood, pl.
~ s-eʔwés	}	s-yoʔ-yáwas	
s-qʷəbáyʔ		s-qʷɛ́ʔɛ-qʷəbeh	dog, puppy

[1] This suggestion is owing to MacCawley (personal communication). He remarks that 'Syllabicity' will be required for any language (such as Sanskrit) exhibiting both semi-vowel~vowel alternation and syllabification of r and l, and claims that the new feature must therefore find a place in the roster of features. See MacCawley (1967), and fn.2, p.115 on redundancy of vocalic.

[2] *s-łə́łaq-ayh (Chap. II, sec. 12.3).

Taking w,y,ʔ, h,b and d (at this point, m,n) as non-obstruents, the above sample corpus shows that all combinations of obstruent and non-obstruent are proper environments for syllabification of a semi-vowel. In addition, syllabification occurs (optionally) word-initially before an obstruent.

We note, finally, the alternants s-yoʔés ~ s-eʔwés, which illustrates the alternative syllabifications of semi-vowels that follow the stage of derivation s-yʔwés (from underlying *s-yəwés,[1] compare augmented s-yoʔ-yə́was), depending on whether or not glottal attraction occurs: with glottal attraction, we get s-ywʔés, then s-yoʔés; without glottal attraction, we get s-yʔwés, then s-eʔwés.

The semi-vowel rule may thus be formulated as follows:

Amended Semi-Vowel Rule:[2]

$$\begin{bmatrix} -\text{cons} \\ +\text{voc} \end{bmatrix} \longrightarrow [+\text{syll}] \quad \text{in env.} \quad / \left\{ \begin{matrix} \begin{bmatrix} -\text{cons} \\ -\text{syll} \end{bmatrix}_1 \\ [-\text{syll}]_2 \\ \text{opt: } [\ \#\ ]_3 \end{matrix} \right\} - \left\{ \begin{matrix} \begin{bmatrix} -\text{cons} \\ -\text{syll} \end{bmatrix}_1 \\ [-\text{syll}]_2 \\ [-\text{syll}]_3 \end{matrix} \right\}^3$$

II.19. d-Loss, n-Loss

Our final topic so far as Twana consonants are concerned, will be the loss of 'final d'.[4]

Comparing Figure 31 sub-corpora (a) and (b), we note that stem-final -d is lost before third singular possessive -s and first plural -ɬ, but that stem-final -t is not lost in these environments. This suggests that we consider the segments lost to be still distinctively non obstruent at the point

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[1] By the vowel-loss rule, applying to the unstressed shwa in pretonic position.

[2] But see the revised formulation (Chap. IV, sec. 2.3) made possible by redefinition of the Major Class features as Sonorant, Consonant, and Syllabic. Note that this redefinition makes the Feature [Vocalic] redundant.

[3] The affix-truncation rule must also be amended accordingly. The 'exception rider' must now read 'but not [+voice] $\begin{bmatrix} -\text{cons} \\ -\text{voc} \\ -\text{syll} \end{bmatrix}$'

[4] Compare the discussion of the specification of 'output b,d.' See Chap. II, sec. 8.

	Non-Poss.	3rd Sg. Poss.	1st Pl. Poss.	Gloss
(a)	s-ʔobát	s-ʔobát-s	s-ʔobát-ɬ	name
	qʷést	qʷést-s	s-qʷést-ɬ	cow
	x̌ʷǒʔbat	x̌ʷǒʔbat-s	x̌ʷǒʔbat-ɬ	paddle
(b)	yəšə́d	yəšə́d-as		leg[1]
	s-q̓-šə́d	s-q̓-šə́d-as		toe
	s-q̓-sə́q̓-šəd	s-q̓-sə́q̓-šə-s		toes
	sə-báded	sə-báde-s	sə-báde-ɬ	mountain
	báčɬəd	báčɬə-s	báčɬə-ɬ	flea
	bád	bád-as	bá-ɬ	father
(c)	lékʷa-čəd	lékʷa-ɬ		I speak; we speak
	lékʷa-č	lékʷa-čp		you speak(sg.,pl.)
	lékʷad	lékʷad-ʔəɬ		he speaks;they speak[2]
	pésat	pésat-če		big ones;big hands
	táwəd	sólʔ táwə-čəd		town; I go to town
(d)	hédab-dəxʷ-čəd	hédab-dəxʷ-čə-xʷ'tél		I went;I went down
	be-qʷéc-čəd	ʔədá-čə-q̓ʷ-be-qʷéc		I dance; I just dance[3]
	be-qʷéc-č	ʔədá-č-q̓ʷ-be-qʷéc		you dance; you just dance

Fig. 31.--d (n) - Loss

[1]Note the relation of the 'bound' to the free form for 'leg,' in the form for 'toe.' Compare ʔas-sə́q̓ 'split' for the other etymon involved. The plural must exhibit cluster-simplification, but the presence of s-nominal masks the simplification for s-initial stems, since s-s in any case gives s by geminate simplification.

[2]The person marker for third plural is *wəɬ, the output from which is -ʔwəɬ (the vowel-loss giving glottal stop, which is then attracted towards the stress); this gives allomorph ʔəɬ after consonant-final stems: no general w-loss rule obtains in Twana, so a special rule will be required here.

[3]ʔədá(h) is one of a number of pre-posed 'auxiliaries.' Since subject person is marked only once per phrase (ʔədá-čəd-), the following main verb (e.g., qʷéc 'dance') is marked for aspect (be- continuous, neutral tense) but not for subject.

of loss, i.e., that the rule for (what we must re-name) 'n-loss' precedes the rule for change of obstruency.[1]

Sub-corpus (c) consists of the (unmarked) paradigm of the verb 'speak.' Third person singular is the 'unmarked' person, and only there and in third plural does stem-final *-n remain. We thus add 'consonantal person markers' to the list of environments for n-loss. Support for this interpretation is offered by the loan word 'town' in the same sub-corpus.

Sub-corpus (d) shows that the one n-final person marker (first singular) also loses its n before a word-initial consonant. Here, however, the attestation from texts suggests that the n-loss rule is one which may be suspended in slow speech, or where a phrase is re-divided for rhythmic purposes. We compare the citation in (d) with ʔədá-čəd ∩ q̓ʷ-bə-laláb 'there I was, just rowing!'[2]

n-Loss Rule:[3]

$$\begin{bmatrix}+\text{nasal}\\-\text{grave}\end{bmatrix}^{4} \longrightarrow \emptyset \text{ in env. } / \text{ - } \begin{matrix}\& [+\text{cons}]\\ )\text{stem}\end{matrix}$$

II.20. Shwa-Insertion

II.20.1. General

Swadesh[5] refers to '. . . the false vowel, a vocalic murmur between consonants in clusters, whose timbre is much influenced by the neighbouring consonants. . . .' '. . . the fact that the false vowel is actually recorded with the same symbols as the phonemic vowels caused errors even in Boas' work.'

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[1]For the relative ordering of 'n-loss' and 'glottal absorption' rules see Chap. II, sec. 20.5.

[2]From "The Storm Mountain." ∩ signifies phrase-internal pause. The unity of the total citation as a single phrase is proven by the single occurrence of the subject morpheme -čəd 'I.'

[3]Despite the phrasal unity shown by the syntax (fn. 2, above), -čəd(∩) above must be considered as word-final still, and hence not liable to 'n-loss.'

[4]Perhaps $\begin{bmatrix}+\text{nasal}\\+\text{oral}\end{bmatrix}$ is better. This parallels the cluster-resolution rule which requires [oral] (Chap. II, sec. 7).

[5]Swadesh (1952).

We have shown above that certain occurrences of shwa must be considered segments of dictionary entries, while others are the result of an insertion rule--even, in certain cases, replacing an 'original' shwa where the latter was deleted by the vowel-loss rules. The inserted shwas correspond to Swadesh' 'false vowel,' although it must be clear that, for a given environment, all unstressed shwas in Twana have the same phonetic shape.[1]

	Augmented		Gloss
(a)	q-əbə́qsəd		noses
	x̌ʔ-əmə́x̌ʔ		proud
	x-əlʔə́x		lights
	ɬ-əbóɬ		suckled
	čʔ-ədéčʔ		scratched
	də-s-ədə́ʔ	Unaugmented	mine
	də-kʷtábac		my husband (non-definite)
	t-ɔd-kʷtábac		my husband (definite)
(b)	s-q̓-sə́q̓-šəd		toes
	q-ɔbə́qsəd		noses
	łáwalbəš		Indian person
	kʷt-kʷə́təbəc		husbands
	pq̓ʷ-pə́q̓ʷ-q̓ʷəd		hair all feathered
	k-tə́keʔəs		baskets
(c)	qəb-qə́bad		axes
	q̓ʷəlʔ-q̓ʷə́lde		ears
	łəb-łób		scarred
	s-əbəd-báde		mountains
	wəd-ʔwə́daw		horns
	yəd-ʔyádas		teeth
	Unaugmented		
(d)	pətáb		when
	pətóʔlas		spring
(e)	sələ́ʔəlʔkʷəs		his speech, language
	ʔədá-čə-q̓ʷ-betéqʷab		I'm just playing
	ʔədá-č-q̓ʷ-betéqʷab		You're just playing

Fig. 32.--Shwa Insertion

[1] See Chap. IV, sec. 4.4.2.

We deal here fully only with those aspects of shwa-insertion which are purely phonological, mentioning in a brief note (Chap. II, sec. 20.4) one or two complications attaching to the specific morphemes s- nominal and ʔas- stative.

Figure 32(a) exemplifies two regular environments for shwa-insertion: these are, after an initial voiced consonant (e.g., d- first singular possessive, as in də-kʷtábac 'my husband') and before a voiced consonant preceded by a single initial consonant (as in forms such as q-əbə́qsəd, with cluster-simplification, from *bəq-bə́qsəd).

Sub-corpus (b) adds the two environments 'before a final voiced consonant preceded by a consonant,' and 'after a voiced consonant preceding a final consonant,' as in s-q̓-sə́q̓-šəd 'toes,' and kʷt-kʷə́təbəc 'husbands.' The form k-t̓ə́keʔəs[1] now shows that 'voiced consonant' is not a wide enough term for our purpose. If glottal stop is to be included, then it is reasonable to suppose that shwa-epenthesis precedes the change of obstruency of the nasal non-obstruents, and that its environment refers to 'non-obstruent,' instead of 'voiced consonant.'

Sub-corpus (c) generalizes the first environment we found in sub-corpus (b), to 'before any voiced consonant preceded by a consonant': thus ɬəb-ɬób, from ɬb-ɬób. On the other hand, two important constraints on shwa-insertion also appear.

Cf. q̓ʷəláde; q̓ʷəlʔ-q̓ʷə́lde with kʷtábac; kʷt-kʷə́təbəc: then the original a of q̓ʷəláde is lost in augment without shwa-replacement, whereas the a lost in augment from kʷtábac is replaced by shwa later. It is reasonably clear that no shwa is inserted between a segment specified as [+vocalic], [-syllabic], (i.e., w,y,l), and a following nasal within the primary stem, e.g., yətáwad ~ yətáwde[2] 'salmon-berry,' ɬáwalbəš 'Indian person,' səʔwésaldəxʷ 'sky.'

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[1] Compare unmarked t̓káyas, and thus augmented *t̓ək-t̓ákayas, t̓k-t̓ákyʔs. For the same environment initially, compare the many cases of ʔas → ʔØs-, then ʔəs- in stative augment.

[2] The corpus attests the interesting doublet yətáʔode ~ yətáwde; the former showing glottal-attraction and syllabification of w, the latter showing no glottal-attraction but subsequent absorption and loss of the glottal component (from *yətáwad-ayh)(see Chap. II, sec. 12.2).

The second constraint is rather more problematic. For the type ɬəb-ɬób 'scarred' or cəd-cədaɬ 'they' we require no explanation for the non-appearance of inserted shwa at the morpheme-boundary, since we asserted that (except for initial and pre-final voiced consonants) the shwa-glide is always inserted before the voiced consonant. However, the augmented bəd-bədəh 'children,' etc. (sub-corpus [c]) suggests that the constraint must also operate for morpheme-initial voiced consonants within a stem.

Shwa-Insertion Rule: $\phi \longrightarrow \text{ə} \;/$

$$\begin{cases} \left\{ \begin{matrix} C_1 \\ ? \end{matrix} - \begin{matrix} C_2 \\ s \end{matrix} \right\} \text{ in pause}^1 & 1 \\ C_1 - C \\ \quad [+\text{voice}] & 2 \\ \# \; C - ? & 3 \end{cases} \quad \begin{matrix} 1[\text{Condition } 1.\ \text{Either or both } C_1, C_2 \text{ is [+voice]} \\ \qquad\qquad 2.\ C_2 \text{ is not a laryngeal}] \\ 2[\text{Condition } 1.\ C_1 \text{ is not l w y} \\ \qquad\qquad 2.\ \text{Not across Augment '\&'}] \\ 3[\text{Condition (?) but not with s- Nominal}] \end{matrix}$$

II.20.2. With n-Loss

We asserted above (Chap. II, sec. 1.2.1) that in di-syllabic stems we could assume that unstressed shwa in the first syllable is deleted by the vowel-loss rule: the 'saving clause' was, of course, that the stems then considered never showed a shwa in the position concerned except where 'C_1' or 'C_2' was voiced. How, now, are we to explain forms such as pətáb ?

If the vowel-loss rule deletes the shwa, as it should (since shwa is between voiceless consonants), is the shwa-insertion rule to operate and replace it?

Consider sub-corpora (d) and (e). Clearly, the answer to the question above is that the shwa is lost and is in fact replaced. It is thus obvious that the n-loss rule which produces forms of the shape pətáb must operate after the rule replacing lost shwas (as well as supplying ə̓- glides, as in q-ə̓bə́qsəd).[2] However, while *pən-čéx̣ gives pə-čéx̣, just as *lék^{w}an-čn gives lék^{w}a-čəd, we note that pəd-qə́p, pəd-séɬə(h)[3] and pəd-q̓a?aɬəd have not lost -n. Suppose we hold that we have to do with instances of 'frozen forms': how is such a notion to be formalized within the theoretical framework we have adopted? Specifically, we must represent the constituents

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[1] 'In pause' here means initial or final.

[2] But see Chap. II, sec. 20.4.

[3] Cf. sélad 'food.' An ill-understood d-loss.

involved in such a way that the n-loss rule operating on *pən-čéx does not operate on *pən-séɬə(h).

There are two ways of achieving our purpose. The first is simply to mark the dictionary entries concerned with the feature [not n-loss rule]. However, although this marks the appropriate forms as 'exceptional' and guarantees the correct outputs, the marking suggested does not seem to correspond in any way to the notion we started out to explicate, viz., 'frozen form.'

A better correspondance might well follow from the assertion that a form like *pən-séɬə(h) is not being treated as a compound. If (e.g.) pəd-čéx is considered to contain 'simple morpheme boundary,'[1] then we might represent pəd-séɬə(h) with 'internal word boundary': thus *pən-čéx but *pən#$_i$séɬə(h). It is now quite simple to explain the different treatment of the two forms; the rule (p. 117) for n-loss refers to 'simple morpheme-boundary,' and *pən#$_i$s-éɬə(h) thus requires no further special marking to ensure that it will not lose its n.[2]

(a) With following - b

séɬl̥-bad	half brother	cf. ʔeɬ-sə́q̓	split
be-ʔeɬl̥-bə́ʔyac-čəd	I'm eating meat	cf. ʔéɬad	eat : bə́ʔyac meat
but: sə́ʔɛsɬə̲d	a snack (Atten.)		

(b) With following - d

kʷə́ɬ-aɬl̥-dəxʷ	it spilled	cf. kʷə́ɬ	pour
s-ɬáʔa-ɬl̥de(h)	little girl (Atten.)	cf. s-ɬáday	woman
-ɬeʔéɬl̥-dəxʷ	he's way over there	cf. ɬeʔéɬ	yonder
dəʔwə́ɬ wəɬl̥ dəcə́ɬ	you and I	cf. wəɬ te dáqas	and the other
But: ʔəs-ɬəb-ɬób	scarred (Aug.)		

(c) With following - w

s-kʷác-a-ɬl̥wəlbəš	half-breed	cf. ɬáwalbəš	Indian
but ɬə̲wə́q̓ədəxʷ	he got frightened		

[1] The view here held concerning the nature of junctures is that they simply delimit the spans over which rules operate. There is no implication (cf. Joos, 2nd Texas Conference) that internal open juncture corresponds to a 'delay within the utterance,' or indeed to any constant acoustic property (see Lehiste [1960]).

[2] Since #$_i$ is a higher 'ranking' boundary, forms containing it will simply not be affected.

(d) With following - y

seséd-aɬl̥ yədəʔwəs	big-heart	cf. yədəʔwás	heart
but: ʔəsóɬ yəq̓ʷósab	go and wash!	ʔɔsóɬl̥ɬəxʷ	go!

Fig. 33.--Syllabification of ɬ

II.20.3. Syllabic Offglide with ɬ

The forms of Figure 33 show the development of a syllabic offglide for ɬ in certain environments. Thus, 'half-brother' as against 'half'; I'm eating meat' as against 'eat,' etc.

On the other hand, while the offglide only develops where ɬ is followed by a voiced consonant, forms such as 'he got frightened,' 'scarred,' and 'a snack' show two complications. First, initial and pre-final ɬ before a voiced consonant do not develop the offglide; and second, these same forms show an 'inserted shwa.'

However, despite the evidence of the inserted shwas, it is by no means clear that shwa insertion precedes the insertion of the syllabic offglide for ɬ: if it did, we should derive (e.g.) **ʔéɬəd̥əlʔwəltxʷ, instead of ʔé-ɬl̥dəlʔwəltxʷ.

It must further be noted that, whereas the syllabic offglide develops in 'and me' and in 'half-breed' and 'big-heart,' it does not do so in 'go and wash!' We must consider wəɬ ('and') enclitic to dɔcə́h ('I, me') in the phrase 'you and I,' just as 'half-breed' and 'big-heart' must be considered as phonological words.

The order of the rules must thus be:

1. Syllabic-l rule, with positional constraints.
2. Shwa insertion rule.

The Syllabic-l rule may be written:

$$\underset{[1]}{\begin{bmatrix}+\text{Lat}\\-\text{voice}\\-\text{checked}\end{bmatrix}} \longrightarrow [1] \begin{bmatrix}+\text{Lat}\\+\text{Syll}\end{bmatrix} \text{ in env. } / \ \#\ [+\text{seg}]_1 \ - \ B\ [+\text{seg}]_1 \#$$

[1] # Stands for a word boundary, and $[+\text{seg}]_1$ means 'at least one segment;' thus the rule only applies within, and not at word boundaries. B represents b,d (but see Chap. II, sec. 20.5, where it is shown that b,d are still nasals at the point of application of this rule).

II.20.4. Shwa Insertion with Nominal and Stative

s-ə́baded	mountain
s-ə́debálaɬ	ours
s-nənə́kéyəh	diving duck
s-ə́wəlós	chief
s-ə́ləṗ	covering
s-yələ́b	year
ʔas-bə́ɬ	sated
ʔəs-ə́bolóq̓^{w}	round
ʔas-ə́dəʔ	rotten
ʔəs-ə́wəɬə́k^{w}	crazy
ʔas-mə́x̓'	proud
ʔəs-leṗéč̓	covered
ʔəs-yəlʔə́x	gathered

Fig. 34.--Shwa Insertion with Nominal and Stative

As will be seen from the sample corpus in Figure 34, s- nominal and ʔas- stative are idiosyncratic in their behavior as 'preceding consonant' as regards shwa-insertion. For n and y-initial stems,[1] preceding s-nominal produces no shwa. With *ʔas- stative, no shwa is produced in conjunction with stem-initial m,b,l, and y.

II.20.5. Ordering of Shwa-insertion

It is clear from forms such as bəqsə́d; q-ə́bə́qsəd 'nose,' leṗéč̓; ṗ-ə́léṗač 'covered' that shwa-insertion must follow cluster-simplification. We should otherwise derive forms such as **bəq-bəqsəd, whereupon the cluster-simplification rule would be rendered inoperative.

On the other hand, assuming that the underlying form for 'lst person singular subject' is -č̓n,[2] the shwa-insertion rule must operate before the 'n-loss' rule; this is because, in a string such as hédab-dax^{w} -č̓ə-x^{w}, tél,[3]

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[1] No m-initial forms with s-nominal occur in the corpus.

[2] We assume non-root morphemes may be of the shape CC (see Appendix I, sec. 5.2).

[3] Chap. II, sec. 19, Fig. 31(d).

the environment for shwa-insertion only exists so long as the -n is still present.

A crucial form in the present argument is s-ɬánay; s-ɬ·ánay 'woman.' From *s-ɬan-ɬánay we derive s-ɬ$^{?}$n-ɬánay, then s-ɬn$^{?}$-ɬánay. Now to derive the correct output, we must assume the operation of the 'n-loss' rule before the shwa-insertion rule, for we should otherwise get **s-ɬən$^{?}$-ɬánay, from which the correct output is impossible to derive.

Thus we seem to require, for 'I went down,' the rule order:

1. shwa-epenthesis, then 2. n-loss : but for 'women'

1. n-loss, and then 2. shwa-epenthesis.

How are we to resolve this apparent contradiction in rule ordering? Noting that in 'I went down' the -n is stem-final, while in 'women' it is stem-internal, it is apparent that we have to do with a cyclical application of the rules. Taking the constituent 'stem,' we apply the rules in the order 1. n-loss then 2. shwa-insertion: this guarantees the correct output for 'women,' for -n will be lost. At the same time, a morpheme such as -nx^{w} or -čn will gain a shwa; thus hénam-nəx^{w}-čən#. Taking next (on the second pass of the cycle) the next-largest constituent hédab-dəx^{w}-čəd# x^{w}'tél, the n-loss rule now applies, giving correctly hédab-dəx^{w}-čə-x^{w}tél.

But we have thus created a fresh problem. We have written hédab-dəx^{w}-čəd#x^{w}tél as the constituent that meets the second pass of the cycle; but we have continued to call the rule the 'n-loss' rule. It is clear[1] that the rule for change of obstruency (giving b,d for underlying m,n) must be delayed until the last pass of the cycle, which is accomplished by the simple expedient of marking that rule (and those dependant on it) as requiring the environment $ - $.[2] The spelling of the constituent given above is thus correct, insofar as it is a complete utterance.

It remains to point out that the form for 'women' (s-ɬ·áday) also enables us to determine the relative ordering of the glottal-absorption and n-loss rules. Clearly, if we assume there is a stage s-ɬn$^{?}$-ɬánay, then the glottal stop must be absorbed before n-loss, for we should otherwise get an output such as **s-ɬ$^{?}$-ɬáday.

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[1] Provided we insist on the interpretation given above (Chap. II, sec. 19), which motivated our placing of this rule before change of obstruency.

[2] $ represents 'utterance boundary.'

The order of the rules here referred to is thus:

1. Glottal-absorption.
2. n-Loss.
3. Shwa-insertion.
4. Change of obstruency.

II.21. Irregular Stress

II.21.1. General

	Non-Possessive	3rd Sg. Possessive	Gloss
(a)	s-ṗéx^{w}	s-ṗéx^{w}-s	gull
	həδéq^{w}	həδéq^{w}-as ~ həδéq^{w}-s	hump-backed salmon
	ṯəbʔáx^{w}	ṯəbʔáx^{w}-s	gooseberry
	təbéx^{w}	təbéx^{w}-s	land
	səléx^{w}	səléx^{w}-as	hunter
	čátas ~ čatás	čátas	stone
	čaláš ~ čálaš	čaláš-as ~ čálaš-s	hand
	čəʔwáš	čəʔwáš-s	wife
	šə́ləs ~ šələ́s	šə́ləs	fish

		Augmented	
(b)	ʔə s-χəδáq^{w}-če	ʔə s-χəδ-χáδaq^{w}če ~ ʔə s-χəδ-χəδáq^{w}če	hurt hand
	ʔəs-łəwáʔldəb	ʔə s-łoʔ-ləwáʔldəb	left behind
	ʔəs-cəlʔáp	ʔəs-cəlʔ-cəlʔáp	smothered
	ʔə s-x^{w}eʔáq̓	ʔəs-x^{w}eʔ-x^{w}eʔáq̓	passed
	sq̓^{w}əháp	sq̓^{w}-sq̓^{w}áhap	tree-stump
(c)	sctay	sct-ctáy ~ sct-cátay	pan
	spqálšəd	spq-pqálšəd ~ spq-páqalšəd	foot

(c) cont.

	Non-Possessive	Augmented	Gloss
	ʔasx̌ʔáxʷ	tsxʷ-sxʷ-x̌ʔáxʷ	elder
	txʷəʔwás	xʷ-txʷə́ʔwas ~ xʷ-tə́xʷəʔwas	enemy
	Unaugmented		
(d)	wəq̓ʷə́təb	q̓ʷ-əwəq̓ʷátəb	drifted
	p̓əlʔə́qʷ	p̓əlʔ-p̓əláqʷ ~ p̓əlʔp̓əlaqʷ	gravel-cook
	s-x̣ʷéx̌ʔay	s-x̣ʷéʔ-x̣ʷəx̌ʔay[1]	sheep
	s-qʷópč̓əlʔəš	s-qʷó-qʷapč̓əlʔəš ~ s-qʷo-qʷápč̓əlʔəš	stick, cane
(e)	s-qʷópč̓əlʔəš	s-qʷó-qʷapč̓əlʔəš[2]	stick, cane
	š-čeʔál-aɬ	š-čéʔ-čayl-əɬ	baby
	təʔas-péwčə	təʔas-pó-pewčə[2]	follower
	ʔópədəčs	ʔóp-opədəčs[3]	ten(by ten)
	də́hqas	dáqs	one(by one)

Fig. 35.--Irregular Stress

[1]For the reduplication to be s-x̣ʷeʔ, we must postulate *s-x̣ʷə́yx̌ʔay; *s-x̣ʷəyx̣ʷə́yx̌ʔay. We are quite unable to explain the loss of -y- in the Augmented form. But see Note 94, Appendix I, sec. 5.

[2]The loss of 'C_2' in 'stick,' and of the expected glottal stop in 'follower' is not well understood. For the latter we derive *te-ʔas-pew-péwčə, then tʔs-pʔw-péwčə, then tʔs-poʔ-péwčə, then stress-shift to tʔs-póʔ-pewčə.

[3]See Chap. II, sec. 14.

It remains to consider, albeit tentatively, the problem of certain stress-irregularities which appear to contradict some of the conclusions given above. We shall show evidence that at least four different phenomena are involved, these being stress allomorphy in dictionary entries, non-operation of the stress retraction rule for augment, secondary stress-shift, and stressing of the reduplicating syllable.

II.21.2. Stress Allomorphy

First, it is noted that many disyllabic stems, in citation as well as in the texts, have freely alternating stress.[1] Such are x^{w}esqam 'few'; łok^{w}ał 'moon, sun; s-ʔobat 'name'; sedaq 'fly'; ṗestab 'all, everything.' Figure 35 consists of a sample of those forms showing stress-alternation in contexts where it is possible to show which must be considered the underlying stress; from such forms we are able to shed some light on the general nature of the problem.[2]

Sub-corpus (a) gives forms which effectively 'control' the underlying stress and spelling of selected dictionary entries such as həδéq^{w} 'hump-backed salmon.' By comparison with s-ṗéx^{w}-s, which was earlier (p. 89) re-spelled[3] *s-ṗéxw, we see that we could explain the alternation həδéq^{w}-as həδéq^{w}-s by re-spelling the latter as həδéqw-s. Similarly, we might re-spell the forms təb$\acute{ə}$x^{w} and təbéx^{w} as *təbʔə́xw and *təbéxw.[4]

However, consideration of the forms čátas ~ čatás 'stone' and čálaš ~ čaláš 'hand' suggest another possibility. The allomorphy which we assigned to the spelling of the earlier forms may well, at least for the non-monosyllabic forms, in fact be an allomorphy of stress.

The expression 'allomorphy of stress' implies that we assign the alternation to the dictionary entry itself. But this is by no means an inevitable choice. For the forms given, we have no criterion within Twana, but it is not implausible to assert that a very late optional stress-shift rule[5] is responsible for an output such as čəʔwáš-s (instead of čəʔwáš-as).

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[1] But compare ʔélal 'sing'; ʔelál 'weep'; bə́təb 'murdered'; bətə́b 'warm';

[2] The problem is extremely important from a comparativist's point of view, too, since there are stress alternations between (e.g.) Twana and Nisqually. Further internal reconstruction of the kind here attempted should offer a starting point towards understanding the comparative situation.

[3] 'Re-spelling' of course implies re-analysis; here, a single segment is re-interpreted as two segments.

[4] See Chap. IV, sec. 3.5 for the bearing of this re-analysis on the question of *x in Twana.

[5] The affix-truncation rule operates at earliest during the second pass of the cycle; it is quite possible that the secondary stress-shift is in fact a post-cycle rule.

II 21.3. 'Not Retraction Rule'

Sub-corpus (b) of Figure 35 gives forms showing another aspect of stress-alternation. In these cases, the stress has not shifted, when we expect it to do so. According to the stress-assignment rules, stress retracts to the first syllable of the stem when the augment is present. Here, other details aside,[1] the rule has failed to operate, so that the augmented form of (e.g.) ʔəs-cəlʔə́p 'choked' is ʔəs-cəlʔ-cəlʔə́p instead of the expected **ʔəs-cəlʔ-cə́ləp.

It is not clear[2] from the total corpora for Twana whether we must consider the stress-retraction rule to be optional, or whether the forms concerned must be marked in the dictionary as [not augment-retraction rule].

While the existence of doublets for forms such as (sub-corpus [c]) 'pan' and 'foot' tends to confirm that we have to do with either a rule option or an exception to a rule, there is still a further possibility, viz., that we have to do with further cases of CC-stems,[3] or with CC ~ CəC- stem allomorphy. For 'pan' and 'foot,' stem allomorphy is suggested; we recall that the shwa will not appear in the output of the unmarked form, where it falls between voiceless consonants. For 'elder' we have to do with a (unique) case of reduplication of a compound prefix.[4] No vowel is hypothesized for this prefix. For 'enemy,' a similar morpheme-structure is supposed,[5] again without vowel in the prefix.

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[1] *xədə́q^{w}-ačə , *ɬVwálVdab, *cələ́p, *x^{w}əyə́q̓ are reasonable underlying forms.

[2] Despite the alternation in 'hurt hand.'

[3] See p. 47 . Compare the argument on s-x̌ə́b (Chap. II, sec. 4). The case for holding that all Twana roots are (minimally) C V C is calibrated, not contradicted, by the existence of forms like šʔ-čtáy; šʔ-čt-čtáy 'pan.' For the shapes of morphemes, see Appendix II, sec. 2, Fig. 76. There is only one other form like 'pan,' and it is not clear whether we must modify the C.S. rule for reduplication or employ dictionary markings for the two cases.

[4] t- article; s- nominal(?); x^{w}- human agent; ʔáx^{w} root.

[5] t- article; x^{w}- human agent; ʔwás (or hwás) root. It is recalled that nominal and derivative prefixes do not elsewhere partake of reduplication.

If we here concede, contrary to our former assertion, that CC stems occur in Twana, then the Constituent Structure rule for reduplication must be modified accordingly: it must allow CC[1] as well as CVC to reduplicate.

II.21.4. Secondary Shift

Sub-corpus (d) shows the most interesting of all the stress-alternations, viz., a secondary shift back to the (unaugmented) stem-stress.[2] Deriving the output of (e.g.) augmented *pəl-pələ́q^{w},[3] we get pəl-pə́lə̀q^{w}, then pəl-pə́lə̲q^{w} by the ablaut rule for vowels under secondary stress. We should then derive p$\overset{\wedge}{\text{l}}$-pə́laq^{w}, then pl?-pə́laq^{w}; then pəl?-pələ́q^{w}. Note that we cannot hold that in pəl?-pələ́q^{w} the stress has failed to retract; for it is only through this retraction that the original shwa loses one degree of stress and thus is ablauted to a. We must therefore assume that the stress has first retracted, giving a, and later shifted back to its original position.[4]

As with the forms of sub-corpus (b), it is not clear just where the (optional?) rule for this secondary stress-shift should operate; certainly after the ablauting of vowels under secondary stress, and also after the vowel-loss rule. If stress-reversion preceded ablaut, we would not get an a vowel in the stem; if it preceded vowel-loss, we would then get **pəl?-pəl?áq^{w} (as in the unaugmented form). Further, the secondary stress-shift must follow glottal metathesis and the semi-vowel rule for we should otherwise not get shapes like ?as$\overset{\backprime}{\text{t}}$ó?-$\overset{\backprime}{\text{t}}$əwab[5] (e.g.).

The rule has the shape:

$$\text{Secondary Stress-Shift:}\quad \begin{bmatrix}-\text{Cons}\\+\text{Voc}\\+\text{Stress}\end{bmatrix}\begin{bmatrix}+\text{Cons}\\-\text{Voc}\end{bmatrix}\begin{bmatrix}-\text{Cons}\\-\text{Voc}\\+\text{Stress}^{2}\end{bmatrix} \longrightarrow \underset{\text{opt.}}{1}[-\text{Stress}][2]\overset{3}{[+\text{Stress}]}_{(\text{Aug})}$$

---

[1] But note the special conditions on laryngeals.

[2] Comparison with ?ə́s-cəl?ə́s; ?əs-cəl?-cə́?las 'rattled' suggests that there is no purely phonological explanation for the anomaly.

[3] See pp.74ff. The unaugmented form is pəl?ə́q^{w}, with 'secondary' glottal stop.

[4] We have in a sense recaptured the notion of 'analogical levelling,' here under the influence of the unmarked form.

[5] Compare unaugmented ?as-$\overset{\backprime}{\text{t}}$ó?wab 'guessed.'

Since such a stress alternation occurs only with forms having original secondary stress, the necessary environment here is, perforce, 'in a vowel having secondary stress.' This confirms the position taken on the vowel ablaut rule given earlier (Chap. II, sec. 4).

Two forms in the corpus show a further process at work. Assume (as we shall show below that it must be assumed for the forms of corpus [d]) that 'stick' has its stress somehow assigned to it by the stress-assignment rule for augment, giving s-qʷó + stem. It is now not difficult, from the argument above, to explain how the vowel in the first syllable of the stem comes to be a. We must simply assume that this syllable now has secondary stress, so that the vowel ablaut rule will operate.

II.21.5. Stressed Reduplication

Figure 35(e) presents four cases where the reduplication is (apparently) anomalously stressed. In the first two cases, the first stem vowel, as mentioned above, is treated as being secondarily stressed; thus a-vowels appear, for original shwa and o respectively.[1] For 'canes' and 'babies' we must assume that the primary stress has been assigned to the reduplication, but by a rule operating on a structure of the shape Redup'n & stem,[2] or by some kind of option in the stress-assignment rule, which allows the reduplicating syllable to have primary stress.

In the forms for 'follower' and 'ten by ten,' the stress-shift could well be of the same type as that shown above (Chap. II, sec. 15.6) in affixes for forms such as səlǽh-ǽs ~ səlǽh-ǽs 'his life.'

II.22. Rule Summary 4

1. Constituent structure.
2. Stress-assignment.

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[1] *s-qʷópčV́lVš, where V V are not recoverable (but perhaps < čálaš 'hand'?); and *cəyál-ał.

[2] It is implied that the proper structure for Augment may well involve stressed CVC reduplication; the stress-assignment rule could then optionally or exceptionally assign (primary) stress to 'the first stress' in the constituent 'Augmented stem.'

**3. Loss of stem C_1, C_2 laryngeals, in Augment reduplication.

**4. Augment metathesis (laryngeal stems).

5. Vowel-a mutation.

*6. Affix truncation.

7. Ch metathesis.

8. Laryngeal affection.

9. Vowel assimilation.

10. Afix stress shift (option)

11. h unvoicing of l.

**12. Opt. V-loss in /-laryngeal+identical vowel.[1]

13. General Vowel-loss $\longrightarrow$ h.[1]

14. $h \longrightarrow \begin{Bmatrix} \emptyset \\ ? \end{Bmatrix}_2 / \begin{Bmatrix} \text{voiceless stop} \\ R \end{Bmatrix}_2^1$

15. Glottal metathesis.

16. Y-metathesis

*17. Semi-vowels syllabify.

**18. Secondary stress-shift.

19. Glottal absorption.

**20. n-loss.

21. Cluster simplification.

22. s-assimilation.

23. Geminate simplification.

**24. ɬ gains syllabic offglide.

*25. Shwa insertion, generalized

26. N --> ^{N}B, except in / - & dissimilar N

27. ^{N}B ---> B, except (opt.) initially.

28. $\overset{?}{B}$ -----> B.

29. h-losses, not clearly ordered.

Note: N = Nasal
B = Voiced obstruent
R = Resonant
* shows rules modified
** shows rules added (cf. Summary 3, Chap. II, sec. 16.

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[1] Ordering of Rules 12/13 clarified at Chap. III, sec. 4, 'Options.'

CHAPTER III

THE ATTENUATIVE

III.1. Introductory

III.1.1. Survey of Vowel Contrasts

ṗéč-	ṗáč	ṗóc	ṗə́č
milk	sew	float	ordure
téq^{w}	ṫáq^{w}	ṫóq^{w}	tə́q
play	lick	find	closed
čél	čáɬ	bəčóɬ	čə́l
lazy	night	pus	win
q^{w}ést	ƛ^{w}áš	tḵ^{w}ós	ḵ^{w}ə́š
cow	cut	seven	count
sél	ʔəsále(h)	sól ʔ	
rag, cloth	two	go	
bét	bád	bót ʔ	bə́təb
dime	father	suckle	murdered
yéq̓	yáq̓^{w}	yóq̓^{w}	yə́q̓^{w}
squeak	turn back	rot	wash
ʔéx̣	ʔáx̣cəd	ʔóx^{w}šəb	ʔə́x̣ad
scrape	bed	buy wife	clear the throat
héd ʔ	s-háboh	ʔas-hóbšəd	
long time	tale	mallard	
s-q̓^{w}əléb-as	dəx^{w}-əlé̱b-əs		
his drying-rack	his life[1]		
ho-hóʔb-as	həhɬʔ	heʔódəx^{w}	heʔɔ́dəx^{w}
red bluff	many[2]	come on	he was coming[3]

Fig. 36.--Vowel Contrasts

[1] *dx -həléh-bd-as, giving dəx^{w}-əlé̱bə̱d-s, etc

Fig. 36.--cont.

[2] *hó? , with 'laryngeal-affection' (Chap. II, sec. 15.3) and vowel-assimilation (Chap. II, sec. 15.5).

[3] See above, for the aspectual constituent -h- (Chap. II, sec. 15.9).

As will be seen from the data in Figure 36, it is necessary to provide for six vowels in output forms in Twana. Quite apart from the question of so-called 'length,' this is not to say that it will be necessary to employ six vowels in underlying representations. However, it is as well to tentatively assign features sufficient for the segments of the output forms, before attempting to show which segments must be considered 'secondary.'

From what has been said concerning 'laryngeal affection,' it is clear that at least two vowel heights will be required.[1] Since h is compact,[2] let us for the moment call these heights compact and non-compact.

The feature-definition of the distinctions between ɛ, ə, and o, and between ɛ, a, and ɔ respectively are for the moment not so clear. For the operation of the 'laryngeal-affection' rule, the vowels e/ɛ, ə/a, and o/ɔ must obviously be paired. So far as ə/o and a/ɔ are concerned, we tentatively adopt the feature of roundness;[3] this suggests that the proper features for the vowels must also include gravity, which will distinguish o, ɔ, ə, and a from e and ɛ. The following feature-matrix (Figure 37) shows this tentative division; for clarity, all other features are omitted.

The various environments in which the compact vowels ɛ and ɔ are derived from the corresponding non-compact e and o (Chap. II, sec. 15.3) have

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[1] We shall consider later, in the comments concerning vowel allophony, the question of height (Chap. IV, sec. 3.3).

[2] Again, recalling that h will be fully specified, the fact that its compactness is redundant is of no relevance. On the contrary, the use of this feature in the 'laryngeal-affection' rule makes that rule correspond entirely to the notion that we have to do with assimilation of compactness.

[3] We shall refer to allophonic variants later (Chap. IV, sec. 4.2); in particular, shwa has many allophones, especially when unstressed. The identification here is simply auditory-impressionistic.

	o	ɔ	ə[1]	a	e	ɛ
Grave[2]	+	+	+	+	-	-
Round	+	+	-	-	-	-
Compact	-	+	-	+	-	+

Fig. 37.--Tentative Distinctive Features for Twana Vowels (matrix)

[1] From the discussion above (Chap. II, sec. 4) it is clear that shwa, both stressed and unstressed, will necessarily appear as a segment in dictionary entries, regardless of the fact that many occurrences of shwa in output forms are predictable (i.e., inserted by rule). Compare the remarks of Swadesh (1952), Kinkade (1963-64), Snyder (1968).

[2] See Chap. IV, sec. 3.3 for re-definition.

been shown. We have also shown[1] some important sources of the sequence V́ʔ, with which the sequences ɛʔ and ɔʔ are thus potentially in contrast. It remains to clarify some of the sources of the sequence V_1ʔ V_1; it will then be possible to examine the analogous sequences (V́ʔ and V_1ʔ V_1) found in Attenuative formations.

III.1.2. Survey of V_1ʔV_1 Sequences

As will be seen from the forms in Figure 38, there are a number of ways in which the sequence V_1ʔV_1 can arise in Twana. Sub-corpus (a) gives a sample of transitive verbs with singular (unmarked) object. First recall (Chap. II, sec. 4) that the transitive stem-formative morpheme is a copy of the root vowel: then for the case of roots of the shape CV_1ʔ, the sequence V_1ʔV_1 arises.

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[1] In stems, as in ḍáʔbe; ḍa-ḍáʔbe 'girl,' s-cə́ʔqe 'sock-eyed salmon'; and, as a result of glottal-attraction, as in forms of the type čáʔyat; čeʔ-čáʔyat (p46ff), as well as the type s-qʷəbáʔy (with glottal-stop from an h-cluster (Chap. II, sec. 15.4).

(a)	ƛ̓e?é-čəd	I'm ringing (a bell)
	be-da?á-dəx^{w}-čəd	I'm making a foot-print[1]
	p̓o?ó-də-bət-dəx^{w}	I'm passing wind[2]
	c̓ə?ə́-dəx^{w}	wet it!
(b)	*s-ədə?-óbəš ~ s-ədo?óbəš	it's theirs
	*ƛ̓ə?-áx̣ad ~ ƛ̓a?-áx̣ad	hunting
	*c̓ə?-éwad ~ c̓e?-éwad	wet inside
(c)	be-?éwad	I'm inviting
	be-?ex̣é-čəd	I'm scraping[3]
	be-?éspx^{w}əb-čəd	I'm smoking (tobacco)
(d)	be-?e?é?lal?-čəd	I'm humming[4]
	be-?e?éɬa-čəd	I'm eating slowly
	?o?ócay	very slow
(e)	be-č̓á?aɬbəcè-čəd	I'm listening to you[5]
	?a?ăšč̌s	rock-cod
	šaya?áp	shopping-basket
	ɬe?éɬ	yonder
	?o?ótx̣s	ocean canoe
	ho?ól?	really
	qo?óləh	loon
	kə́?əh	mother
	mə́?əh	dad
	q̓^{w}asɛ́?ɛx^{w}	porpoise[6]
	x̣ƛ̓é?ɛč̓	dentalium[6]
	dɛ́?ɛɬ	still, despite[6]
	s-ɬɔ́?ɔb	dog-salmon[6]
	c̓ɔ́?ɔs	three[6]
	q̓^{w}eɬɔ́?ɔy ~ q̓^{w}éɬə?ɔy	leaf[6,7]

Fig. 38.--V_1 ? V_1 Sequences

[1]For the stem *da?, compare Chap. II, sec. 17.3.

[2]Compare póx^{w}- 'blow': if this is connected, then it constitutes one of the very few instances of an alternation p ≠ p̓; d = transitive; bət = reflexive.

Fig. 38.--cont.

[3]Compare s-px^{w}ə́b 'smoke.' Possible from *ʔéɬ-s-pox^{w}ób-čəd; but compare be-ʔeɬ-šələ́s-čəd 'I'm eating fish,' and ʔe-ɔ-ásqx^{w} 'good smell' (*ʔəy-ʔásqx^{w}); ʔas-ədɔʔ-áɬqx^{w} 'rotten smell' (*ʔas-dóʔ-áɬqx^{w}).

[4]Compare Coeur d'Alene, where 'diminutive' consists in glottalization of every 'resonant' in the word. See Reichard, par. 614. The present form may be a relic case of a once-productive rule of that kind.

[5]-cè- is an allomorph of 2nd singular object.

[6]See Chap. III, sec. 7.2. Simple Infix Atten.

[7]Compare q̓^{w}élo(h) 'cedar-bark,' and q̓^{w}éle 'cedar tree.' q̓^{w}éle most likely is from *q̓^{w}éloh-ay(?). It is not clear just how (if at all!) q̓^{w}eɬɔ́ʔɔy is related to these, although it appears as if h-assimilation has occurred. -ay(h), 'growing thing.'

A second source (sub-corpus [b]) of $V_1ʔV_1$ is through vowel-assimilation (Chap. II, sec. 15.5): again, the stem must be glottal-stop final, although the assimilation may operate progressively (*q^{w}óʔ-as give q^{w}ɔ́ʔəs) or regressively (s-ədəʔ-óbəš gives s-ədoʔóbəš).

Thirdly (sub-corpus [c]) $V_1ʔV_1$ may result by chance collocation; for example, it arises when the (neutral) aspect marker be- is used in conjunction with any stem of the shape ʔé- , as in be-ʔélal-čəd 'I'm singing' be-ʔéɬa-čəd. 'I'm eating.'

A fourth source (sub-corpus [d]) of $V_1ʔV_1$ is the 'CV' reduplication of the Intensive, which thus gives, for glottal-stop initial stems, forms such as ʔo-ʔócay 'very slow' (from ʔócay 'slow'); be- ʔe ʔé-ɬa-čəd 'I'm eating slowly' (from be-ʔéɬa-čəd 'I'm eating')

A fifth source (sub-corpus [e]) of $V_1ʔV_1$ consists of (as yet) unanalyzed stems containing the sequence, e.g., ʔoʔótxs 'ocean canoe.'[1] For this type most of the examples so far obtained are cited in the corpus.

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[1]Such forms may possibly prove to be examples of (a) complex stems with vowel assimilation (compare Nisqually ʔəʔótxs), or (b) complex stems containing Vʔeh or VʔoH, with vowel-assimilation (see Chap. II, sec. 15.5).

III.2. Types of Attenuative

In discussing the question of the source of the vowels in the Attenuative, it must be shown what is the appropriate underlying structure that may be assumed, as well as how alternations exemplified by sk^{w}édəb; sk^{w}ɛ́ʔɛ-k^{w}ɔ dəb 'chicken' but sél; sɛ́ʔ-səl 'rag,' and k^{w}opéc ; k^{w}opɛ́ʔcał 'master' come about.

As in the case of the Augmentative,[1] the semantic correlates pertaining to Attenuative constitute a small set of markings. For lexical items glossed by (English) nouns, Attentuative is equivalent to 'diminutive.' Thus:

čálaš	'hand'	čaʔá-čələš	'little hand'
s-łáday	'woman'	s-łaʔáɬ̩dɛ	'girl'
páce	'digging-stick'	paʔápce	'little digging-stick'

But Diminutive may also be used affectively, to denote 'small, and feminine,' as in

qəlá́b	'bad'	qɛ́ʔɛ-qələb-čəd	'bad little me'(fem.)'
łáwalbəš	'Indian'	łaʔá-łəwəlbəš	'little Indian girl'

Some kinship terms are inherently Diminutives, as:

s-yəlɛ́ʔɛč[2]	sibling, cousin	s-yəl-ʔyáleč	(pl.)
čabɛ́ʔɛq^{w}	grand-relation	čəb-čábəq^{w}	(pl.)

For lexical items glossed by English verbs, the Attenuative sense may belong to the action or the object. Thus:

be-k^{w}aš-á-čəd	I'm cutting things:	be-k^{w}aʔá-k^{w}šə-čəd[3] I'm cutting a little, I'm cutting things small
be-ʔéła-čəd	I'm eating :	beʔɛ́ʔɛ-łə-čəd[3] I'm having a snack
be-čx^{w}ə́-čəd	I'm slaughtering :	be-čɛ́ʔɛ-čx^{w}ə-čəd[3] I'm slaughtering little ones, or I'm slaughtering unimportant ones

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[1] See Chap. II, sec. 2.

[2] *yáleč is obviously the underlying form; with **yəléč, the Augmented form would show the V-a rule, giving **yəlʔyálač.

[3] For the stem-final shwa, see Chap. II, secs. 19, 20.

We recall that the proper underlying forms for the Augment were not the output forms of the unaugmented stem, but rather the same underlying shapes as were found necessary for the proper development of the unaugmented forms themselves: we formalized this conclusion by saying that the rules operated not on roots but on whole stems. It will become clear that the Attenuative, too, is to be considered a (derived) stem.

As in the treatment of the Augment, all stems in ʔ/h are temporarily lain aside and will be treated later. Non-monosyllabic stems are treated before monosyllabic stems.

III.3. Constituent Structure and Rules

III.3.1. 'Length' vs. Constituent $\{\acute{V}h\}$

	Non-attenuative	Attenuative	Gloss
(a)	čálaš	čaʔá-čələš	hand
	s-ɬáday	s-ɬaʔá-ɬ̓de	woman
	ɬáwalbəš	ɬaʔá-ɬəwəlbəš	Indian
	səbáded	s baʔá-bəde	mountain[1]
	s-ƛ̓ʷátad	s-ƛ̓ʷaʔá-ƛ̓ʷṫəd	rat
	tas-á-čəd	taʔá-tsəčəd	hit[2]
	xʷac-á-čəd	xʷaʔá-xʷcə-čəd	lift[2]
	táɬqəb-čəd	taʔá-taɬqəb-čəd	holler[3]
	sáxʷab-čəd	saʔá-sxʷəb-čəd	jump
	ƛ̓ʷápab-čəd	ƛ̓ʷaʔá-ƛ̓ʷpəb-čəd	correct
(b)	páce	páʔa-pce	digging-stick[4,5]
	ḳáɬe	ḳaʔá-ḳ̓ɬe	tump-line[5]
	bále	báʔa-bəle	roe[4,5]
	ƛ̓á-ƛ̓ə(h)	ƛ̓aʔá-ƛ̓̓kə(h)	crow[6]
	s-pəčo	s-pé-pčo	basket[5]
	səxʷo	sé-sxʷo	urine (male) 5,7
(c)	séɬad	sé-sɬəd	food
	s-téqʷab	s-téʔ-tqʷəb	toy
	s-kʷédəb	s-kʷéʔ-kʷədəb	chicken
	šedáq-čəd	šéʔ-šədəq-čəd	fly (1 sg.)

To say that e· and o· are lowered here is true, but is hardly an explanation that relates the phonology of these forms to anything else in Twana. What is even worse, there is no plausible sense in which one may assert that ɛʔɛ is related to ə· by lowering. A more plausible account of the relation between e/o and ɛʔɛ, ɔʔɔ would perhaps make use of the already-established properties of h.

Recall that ʔ/h exercise a lowering effect which we have named 'laryngeal affection', giving ɛ for e, and ɔ for o; the possibility then suggests itself that we might supply an h in the constituent structure of Attenuative. Suppose we now set up Attenuative as C_1 V́· h & stem: then assuming laryngeal-affection to operate just as if the vowel were short, forms such as séɬad; sɛ́ʔɛsɬad could be derived, setting aside for the moment the questions of vowel reduction, shwa-insertion, and the glottal stop in the reduplicating syllable. This begins to look acceptable.

However, the case of shwa-stems immediately makes such a simple formulation untenable; for, by the laryngeal-affection rule, a form such as šə́xʷab 'wind' should give **šɛ́ʔa-šəxʷab, whereas the correct output form is šɛ́ʔɛ-šxʷəb. Thus ə· is behaving in the same way as e·[1] which is to say that, while there are four 'short' vowels (e, a, o, and ə), there are only three 'long' vowels (e·, a·, and o·).

The question now arises, how do we explain the implication that there has at some point been a merger of ə· and e· ? The fact that the putative merger has occurred almost entirely within the domain of Attenuative suggests strongly that this merger is recoverable, that is, that we expect to be able to devise suitable rules to produce it within the grammar.

A rule producing the required merger of e· and ə· is easily written, from a formal point of view. However, we should prefer, in dealing with any phonological idiosyncracy, to show some rationale for the processes involved. We thus propose to interpret the putative merger under discussion as result-

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Kinkade (1964, pp. 256-267) says: 'Most diminutives are formed by adding a phoneme of length to the stressed vowel of the stem.' The difficulties attending this assumption in Kinkade's analysis will be discussed elsewhere.

[1] And not as ' ə plus "something"'; əhC, we recall, gives ahC (Chap. II, sec. 15.3).

ing from a constraint on certain non-consonantal sequences, just as we showed the Augment cluster-simplifications (Chap. II, sec. 7) to result from constraints on consonantal sequences.

We have defined h as a continuant voiceless semi-vowel; e as a non-compact, non-grave, non-rounded vowel; and shwa as a non-compact, grave, non-rounded vowel. We now suggest that the constituent structure of Attentuative be defined as $C_1\ V_1\ \acute{V}_1 h$ & stem.

III. 3.2. The VV Merger

The sequence above specifies schematically the set of possible sequences in Attenuative reduplication. Recall, first, the constraint on the sequence 'non-compact vowel plus h';[1] for shwa, the constraint operates only with a following consonant. But the sequences in Attenuative are all of the shape $-V_1\acute{V}_1 h$ & C, however, so that shwa may here be considered as quite similar to e and o, in respect to laryngeal-affection. Now since a is compact, aáh is not expected to undergo change; and in fact, only $C_1 a ʔ á$ is derived from a-stems. We thus limit our attention to the non compact vowels, e, o and ə .

Since laryngeal affection is responsible for the change of compactness, it is not clear whether the sequence-constraint to which we wish to attribute the (now spelled) eé /əə́ merger necessarily involves $V_1\acute{V}_1 h$ or merely $V_1\acute{V}_1$. The parallel with the behavior of consonant clusters[2] suggests that perhaps the sequence concerned is indeed VVh. On the other hand, the fact that the sequence VV only occurs in the environment of -h implies that we do not need to refer to -h in the rule.[3]

Tentatively, the constraint here might be interpreted as a constraint on gravity in stressed non-compact vowels: 'in a sequence of two non-compact vowels, the second member assimilates its gravity to the roundness of the first.' Using Greek letters to denote variables which range over binary

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[1] Part of the motivation for assuming stress on the second vowel of reduplication is the desire to leave the laryngeal-affection rule unchanged. The reason for assuming two vowels instead of adding the feature 'length' will be apparent later (Chap. III, sec. 3.3).

[2] Where the constraint was on certain sequences of 3 segments (Chap. II, sec. 7).

[3] But see Chap. III, sec. 6.2.4 'Laryngeal-final stems' for a reappraisal.

values of phonological features, the dependency of gravity on roundness may be formalized as follows:

$$\begin{bmatrix} -\text{cons} \\ +\text{voc} \\ -\text{compact} \\ +\text{stress} \end{bmatrix} \rightarrow [\alpha\,\text{grave}] \quad \text{in env.} \quad / \begin{bmatrix} -\text{cons} \\ +\text{voc} \\ -\text{compact} \\ \alpha\,\text{round} \end{bmatrix} \_$$

Thus ó, which is round and grave will remain grave; é, which is non-round and non-grave will remain non-grave; but ə́ , which is non-round but plus grave will become non-grave, i.e., will becomes é.

The underlying shapes (e.g.) *s-baáh-bàded 'mountain,' *s-k^{w}eéh-k^{w}èdəb 'chicken,' *toóh-tòq^{w}od 'pick up,' and *šəə́h-šə̀x^{w}ab 'wind' are thus developed to the stage s-baáh-baded, s-k^{w}eéh-k^{w}èdəb, toóh-tòq^{w}od, but šəéh-šə̀x^{w}ab. The rule for laryngeal-affection will now give us s-baáh-bàded, s-k^{w}eéh-k^{w}èdəb, toóh-tòq^{w}od, and šəéh-šəx^{w}ab.

It is necessary to modify the vowel-assimilation rule only slightly to assimilate the first segment of the VV sequences to the (stressed) second. As it stands, the rule allows assimilation across a voiceless semi-vowel; we require simply to allow the option of having a null segment between the stressed and unstressed vowels concerned.

The forms used as our examples may now be derived thus: s-baáb-bàded, s-k^{w}ééh-k^{w}edəb, tɔɔ́h-tòq^{w}od, šééh-šəx^{w}ab.

III.3.3. Glottal-insertion and Ordering

The motive for assigning the stress to the second of the two vowels of the Attentuative reduplication was to allow the laryngeal-affection rule to operate within its accustomed domain, viz., with an adjacent stressed vowel. However, the output forms of the corpus to far given show an alternation in stress-position. For instance, although q̓á ɬe 'tump-line' gives q̓aʔá-q̓ɬe, páce 'digging-stick' gives páʔa-pce.

It seems necessary to employ a rule allowing an optional stress-shift from the stressed to the unstressed vowel in the VV sequence. However, we have already formulated a rule allowing just such a stress-shift from the stem to a suffix (Chap. II, sec. 15.6), the only difference being that the rule referred to operated across h or glottal stop.

On the other hand, the output forms of the Attenuative also contain a glottal stop, which we have so far assumed might well be the product of

a much <u>later</u> rule, a rule formalizing the notion that 'the glottal stop heard in these forms is the result of careful re-articulation of what is, fundamentally, a long vowel.'[1]

Suppose we <u>insert</u> a glottal stop in the sequences V-V of the Attenuative;[2] then where must the appropriate insertion rule stand? Clearly, before the rule for optional stress-shift; and if so, then equally clearly before the rule for vowel-assimilation too, for the latter rule would then need no modification. There seems good reason to suppose, however, that glottal stop insertion should <u>follow</u> the vowel-merger rule. If the vowel-merger rule is allowed to operate on the domain V_1V_1, it has a unique environment; the sequence $V_1ʔV_1$, on the other hand, arises from a <u>number</u> of sources, and the vowel-merger rule would require severe environmental constraint.

The order of the rules here referred to may thus, for convenience, be recapitulated:

Vowel-merger[3]	-	for V_1V_1 sequence
Glottal-stop insertion	-	in V V (optional?)
Laryngeal affection	-	for stressed vowels
Vowel-assimilation	-	across ʔ/h
Stress-shift (optional)	-	across ʔ/h

For the corpus so far considered, it is clear that the operation of the rule for vowel-loss will give the correct outputs, quite regardless of the optional nature of the stress-shift rule which precedes it.

For example, *s-kʷáƛ̓ad 'rat'; *s-kʷa-áh-kʷaƛ̓ad (sub-corpus [a]). We derive the Attenuative as follows: *s-kʷa-áh-kʷaƛ̓ad, then (the vowel-merger rule operating vacuously) s-kʷa<u>ʔ</u>áh-kʷaƛ̓ad (glottal stop insertion),

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[1]Thus Thompson (personal communication).

[2]Probably to be made optional. Cf. sq̓ɛ́ʔɛq̓əle ~ sq̓ɛ́ɛq̓əle 'dog.'

[3]It is not clear whether a-mutation under secondary stress comes before or after glottal-insertion. Certainly, if we assume that the constituent-structure rule for Attenuative assigns V_1 <u>with its stress</u>, then of course the a-mutation rule must follow the vowel-merger rule; we should otherwise lose the identical vowel sequence. If, on the other hand, the reduplication is assigned zero stress in the first place, then the merger and glottal insertion rules are constrained only to operate before laryngeal-infection.

then (h-affection and vowel-assimilation being inapplicable) s-k^{w}á?ah-k^{w}a̓tad or s-k^{w}a?-áh-k^{w}a̓tad (stress shift option): we see now that the tentative rule we adopted for 'tetra-syllabics'[1] operates on the form s-k^{w}á?ah-k^{w}a̓tad to give s-k^{w}á?ah-k^{w}t̓d, where the stressed vowel and the following vowel are retained, but the last two vowels are lost. On the other hand, the 'tri-syllabics' rule operates on the form s-k^{w}a?áh-k^{w}a̓tad, giving precisely the same output, apart from the position of the stress.

Sub-corpus (b) of Figure 39 demonstrates that vowel-final stems behave just as did vowel-final stems in augment, so far as the vowel-loss rule is concerned. If *pa?áh-pace becomes pá?ah-pace (by optional stress-shift), the vowel-loss rule allows retention of the vowel after the stress, deletes the next, but leaves a final vowel intact; this gives pá?ah-pce. If the stress-shift option is not taken, the 'tri-syllabics' rule again gives exactly the same result, apart from the position of the stress, which is pa?áh-pce.

For all these cases, we of course assume the later operation of the h-deletion rule. However, this rule is not optional for Attenuative, and it is necessary to mark the special environment (thus, 'oblig in env / - & stem') in that rule.

III.4. Options

Considering now the forms of Figure 40, we must account for the fact that the second vowel of the Attenuative prefix is sometimes lost where we do not expect this to occur, viz., when the stem contains two or more vowels, as in q̓^{w}ə́čədə(h); q̓^{w}ə́?-q̓^{w}əčədə(h) 'rabbit.'

Recall that, in connection with ?/h-initial stems (Chap. II, sec. 17.2) an option must be allowed for the deletion of an unstressed vowel in the environment - ?/h V́ ; this gave lə?élal or l-?élal (with later shwa-insertion giving lə?élal for the latter). We now suggest that the same option obtains in the (converse) environment, viz., V́ ?/h - ; this allows for lə́?ə-ləxšəd and lə́?-ləxšəd (again, with lə́?ələxšəd later).[2]

Since the etyma for the forms of the present corpus are as yet unclear, it is difficult to offer any alternative explanation to the above;

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[1] See Chap. II, sec. 11.

[2] The rule must thus operate after the (counting) vowel loss rule.

Non-Attenuative	Attenuative	Gloss
lə́xšəd	lə́ʔ-ləxšəd	lamp
qə́lʔxəd	qə́ʔ-qəlʔxəd	fence
łə́qšəd	łə́ʔ-łəqšəd	canoe-mat
q̓ʷə́čəde(h)	q̓ʷə́ʔ-q̓ʷəčəde(h)	rabbit
s-xʷə́lʔə́qʷče	s-xʷə́ʔ-xʷəlʔəqʷče	clam-basket[1]
be-p̓ə́lʔče-čəd	be-p̓ə́ʔ-p̓əlʔče-čəd	I turn it over[2]
yəlbelʔə́qsəd	yə́ʔ-yəlbelʔə̀qsəd	skirt[3]
p̓ə́təd̓exp	p̓ə́ʔ-p̓təd̓exp	iron; wire[3]
s-xʷə́ʔay	s-xʷə́ʔ-xʷʔay	sheep[3]

Fig. 40.--Attenuative, Options

[1] *s-xʷəlʔə́qʷ-ačče(?). In s-xʷə́ʔ-xʷəlʔəqʷče, we are unable to account for the shwa. Compare 'I turn it over.'

[2] The vowel-loss rule applies to the stem. (-čd, 1st sing. subject). Stem-final *-ačče(h?) does not lose its final vowel

[3] The survival of vowels in the stems of 'skirt' and 'wire' is problematic. We suggest *yələb-yələ́qsd, *p̓ét-d-yəx̣Vp. As with 'skirt' and 'wire,' 'sheep' may well be a complex stem: in that case, -ay must be numbered among the 'non-truncating' suffixes (which include also -ób s 'plural,' and -aɬ 'diminutive') see Chap. III, sec. 7.1, on -aɬ. A 'non-truncating suffix' is one which is part of the (derived) stem, and is counted but not deleted by the vowel-loss rule.

another possibility, however, at least for 'lamp' and 'canoe-mat,' might be to assume that the counting domain of the vowel-loss rule is blocked by (underlying) -CC. Then, forms like lə́xšəd will give Attenuative lə́ʔə-ləxšəd, but the vowel-loss rule will treat this as though it were monosyllabic, giving lə́ʔ-ləxšəd.

We now come to Figure 41, the forms in which represent the monosyllabic stems, again excepting those in initial ?/h. We shall assume that the constituent structure of these stems in Attenuative is exactly the same as that for the disyllabic stems treated above.

Non-Attenuative	Attenuative	Gloss
s-x̣áč	s-x̣á^{ʔ}-x̣č	rib
sél	sé^{ʔ}-səl	cloth, rag
léq̓	lé^{ʔ}-ləq̓	dig
q^{w}éc	q^{w}é^{ʔ}-q^{w}c ~ q^{w}é^{ʔ}ɛ-q^{w}c	dance[1]
t̓és	t̓é^{ʔ}-t̓s	shoot
s-ƛ^{w}ésp̓ɬ	s-ƛ^{w}é^{ʔ}-ƛ^{w}sp̓ɬ	trout
s-xə́l^{ʔ}	s-xé^{ʔ}-xəl^{ʔ}	mark
də́x̣	dé^{ʔ}-dəx̣	converse, gossip
č̓ə́q̓	č̓é^{ʔ}-č̓q̓	drip

Fig. 41.--Attenuative, Monosyllabic

[1] If we assume *q^{w}écVs, then vowel losses are regular for this form. The check-form would be the inchoative with C_2 reduplication.

If we reconstruct (e.g.) the underlying forms for sél 'cloth,' s-x̣áč 'ribs' s-də́x̣ 'conversation,' we have

se-éh-sel,	s-x̣a-áh-x̣ač,	s-də-ə́h-dəx̣	
se-éh-sel,	s-x̣a-áh-x̣ač,	s-də-éh-dəx̣	by vowel-merger,
se^{ʔ}éh-sel,	s-x̣a^{ʔ}áh-x̣ač,	s-də^{ʔ}éh-dəx̣	by glottal-insertion
se^{ʔ}é^{ʔ}h-sel,	s-x̣a^{ʔ}áh-x̣ač,	s-də^{ʔ}é^{ʔ}h-dəx̣	by laryngeal affection
sɛ^{ʔ}é^{ʔ}h-sel,	s-x̣a^{ʔ}áh-x̣ač,	s-dɛ^{ʔ}é^{ʔ}h-dəx̣	by vowel-harmony,
sé^{ʔ}ɛh-sel,	s-x̣á^{ʔ}ah-x̣ač,	s-dé^{ʔ}ɛh-dəx̣	by stress-shift option,[1]
with stress-shift option taken			
sé^{ʔ}h-sl,	s-x̣á^{ʔ}h-x̣č,	s-dé^{ʔ}h-dx̣	by vowel-loss
sé^{ʔ}-sl ,	s-x̣á^{ʔ}-x̣č,	s-dé^{ʔ}-dx̣	by h-loss
sé^{ʔ}-səl,	s-x̣á^{ʔ}-x̣č,	sədé^{ʔ}-dəx̣	by shwa-insertion
without stress-shift option taken			
sɛ^{ʔ}é^{ʔ}h-sel,	s-x̣a^{ʔ}áh-x̣ač,	s-dɛ^{ʔ}é^{ʔ}h-dəx̣	without stress-shift,
s^{ʔ}é^{ʔ}h-sel,	s-x̣^{ʔ}áh-x̣ač,	s-d^{ʔ}é^{ʔ}h-dəx̣	by optional vowel-loss (Chap. II, sec. 17.2)

[1] A special difficulty with a language which can justly be characterized as 'hardly spoken' is that we are uncertain as to what the notion of 'optional rule' is describing. In the present case, the so-called 'option' is nearly always taken.

s$^{\text{ʔ}}$é-sel, s-x̣ʔá-x̣aċ , s-dʔ-é-dəx̣ by h-loss

sə$^{\text{ʔ}}$é-sel, s-x̣əʔá-x̣aċ , sədəʔé-dəx̣ by shwa-insertion

Similarly, if the stress-shift option is not taken, and the vowel-loss option is not taken, we derive:

sɛʔé-sel, s-x̣aʔá-x̣aċ, and sədɛʔé-dəx̣ .

III.5. Rule Summary 5

*1. Constituent Structure, Augment and Attenuative.

*2. Stress assignment, Augment and Attenuative.

3. Loss of initial laryngeal, Augment reduplication.

4. Augment metathesis.

**5. VV merger

**6. Glottal epenthesis, for V-V (opt)

7. Vowel→a mutation.

8. Affix truncation.

9. C-h metathesis.

10. Laryngeal affection.

11. h unvoicing of l.

12. Vowel assimilation.

13. Affix stress-shift.

14. General Vowel loss, to h.

15. V_1 loss in /- H V_1, and mirror env. (opt)

16. h ----> $\left\{ \begin{matrix} \emptyset \\ \text{ʔ} \end{matrix} \right\}_2^1$ in / - voiceless stop
R plus stressed syllable and mirror env.

17. Glottal metathesis.

18. Y-metathesis.

19. Syllabification of Semivowels.

20. Secondary stress-shift.

21. Glottal absorption.

22. N-loss.

23. Cluster-simplification.

24. s-assimilation.

25. Geminate simplification.

26. Syllabic offglide for ɬ.

27. Shwa insertion.

28. N ----> ^{N}B, with exception env's.

29. ^{N}B ---> B, with exception env's.

30. ʔ ----> Ø.

31. h ---> Ø oblig in prefix; but other losses unclear for order.

Note: H = a laryngeal

R = a voiced consonant.

N = a nasal

B = b,d.

* shows rules modified (cf. Rule Summary (4), Chap II, sec. 22)

** shows rules added since Summary (4).

III.6. Laryngeal Stems

III.6.1. Laryngeal-Initial

III.6.1.1. General

	Non-Attenuative	Attenuative	Gloss
(a)	ʔáx̣cəd	ʔaʔáx̣cəd	bed[1]
	ʔexéčəd	ʔɛʔɛ́x̣əčəd	scrape[2]
	ʔéɬačəd	ʔɛʔɛ́ɬəčəd	eat[2]
	ʔesáwac	ʔɛʔɛ́səʔwəc	chew[3]
(b)	ʔə́x̣ad	ʔɛ́ʔx̣əd	clear the throat
	s-ʔobát	s-ʔɔ́ʔ bət	name
	ʔopáɬ	ʔɔ́ʔpɬ	eat, feed on
	s-ʔélatx^{w}	s-ʔɛ́ʔlətx^{w}	timber, board
(c)	ʔaɬʔ ócədəb	ʔaɬʔɔ́ʔɔcədəb	eat quickly
	s-ʔécəbəɬq^{w}e(h)	s-ʔɛʔɛ́cəbəɬq^{w}e(h)	clothes
	s-ʔóʔlax̣eʔəd	s-ʔɔ́ʔɔlʔx̣eʔəd	dish[4]
	ʔeyəʔɔ́hčəd ~ ʔeyəʔɔ́čəd	ʔɛ́ʔɛyəʔočəd	untie[5]
(d)	ʔax̣éc	ʔaʔáxac	go to bed
	ʔólasqəh	ʔɔʔɔ́ʔləsqəh	go outside--child goes to toilet

Non-Attenuative	Attenuative	Gloss
ʔaléš ʔáleš	ʔaʔáʔlaš	sister (male speaking)[6]
ʔélal	ʔɛʔɛ́ʔlal	sing

Fig. 42.--Attenuative, Lryngeal-initial

[1]*ʔaxéc-Vd. The full stem is seen in the verb form be-ʔaxéc-čəd 'I'm going to bed.' The unmarked form for 'bed' thus shows vowel-losses as for tri-syllabics. Compare be-ʔaʔáxac, with vowel-retention as in di-syllabics.

[2]The shwa in forms like be-ʔɛʔɛ́xə-čəd shows that we must suppose -d (transitive) in the underlying string. Thus, *ʔexɛ́d-čd.

[3]Glottal stop generated in the stem itself, as explicated at Chap. II, sec. 12, then attracted to the stress in be-ʔɛ́ʔɛsəʔwac-čəd.

[4]Parallel with tkáyas; k-tɛ́keʔəs, we reconstruct (non-attenuative) *s-ʔólaxayad, which the vowel-loss rule reduces to s-ʔólaxeʔəd.

[5]Retention of stem-vowel in be-ʔɛ́ʔɛyəʔo-čəd: there are few cases of this kind, but it is reasonable to suppose that one constraint on vowel-loss is that we never lose both vowels in the environments - ʔ -.

[6]The alternation ʔaléš; ʔaʔáʔlaš suggests that the underlying stressing of the unmarked form must be *ʔaléš; the stressing ʔáleš must then arise by the rule for optional stress shift (Chap. II, sec. 21).

For the formation of the Attenuative from stems in initial glottal stop[1] (Fig. 42), we make the same assumption as we did with ʔ/h-initial stem in Augment, viz.: that exactly the same constituent-structure is required as for stems with other initial segments. We take the parallel forms for 'food' and 'eat' (sub-corpus [a]) as a starting point. Thus:

*séɬad:	se-éh-sèɬad	*ʔéɬad:	ʔe-éh-ʔèɬad
	seʔɛ́h-sèɬad		ʔeʔéh-ʔeɬad glottal-insertion

[1]The corpus unfortunately contains no example of an Attenuative based on an h-initial stem; from the account already given of h-initial stems in Augment, however, it is reasonable to assume that such stems will again behave similarly to glottal-stop initial stems.

se²é́h-seɬad	²e²é́h-²eɬad	laryngeal affection
sɛ²é́h-seɬad	²ɛ²é́h-²eɬad	vowel-assimilation
sé́²ɛh-seɬad	²é́²ɛh-²eɬad	stress-shift (opt)
sé́²ɛh-sɬd	²é́²ɛh-²ɬd	vowel-loss

Apart from later h-deletion and shwa-insertion, the Attenuative for 'food' is correct; however, the Attenuative for 'eat' contains an unwanted glottal stop (²é́²ɛh-²ɬd). We do not wish to invoke a further (and ad hoc) rule to 'delete glottal stop following h.' Rather, we recall that ?/h is deleted when initial in an unstressed reduplication (see Chap. II, sec. 17.2), and now propose to generalize that rule to 'delete ?/h when initial in an unstressed morpheme.' There is no reason to move the rule from the place of the original ?/h-deletion rule (Chap. II, sec. 22).

Figure 42(a) illustrates the rules so far given, and shows (e.g.) the option on stress-shift in the forms for 'I eat.' Sub-corpus (b) in turn illustrates the optional loss of an unstressed vowel after the vowel-loss rule proper, e.g., ²é́²x̣əd 'clear the throat.'

Sub-corpora (c) and (d), on the other hand, offer fresh problems. Compare the forms ²ex̣é-čəd; ²ɛ²é́x̣ə-čəd 'I scrape' (corpus [a]) and ²ax̣éc ; ²a²áx̣ac 'go to bed.' Before V-loss, the Attenuatives are ²ɛ²é́h-ex̣ad-čd and ²a²áh-ax̣ac. The vowel-loss rule gives ²ɛ²é́h-x̣d-čd[1] but***²a²áh-x̣c. The same apparently incorrect result of vowel-loss application obtains with all the forms of sub-corpora (c) and (d).

The different treatment of ²ɛ²é́h-ex̣àd- and ²a²áh-ax̣àc does not seem to be explicable in terms of any factor in the environment at this stage of the derivation. However, if we hold that the counting domain of the vowel-loss rule is not here violated, that could only be because the shape ²a²áh-ax̣àc is not correct for this stage of the derivation. The retention of the final a vowel would only be justified had the preceding (and morpheme-initial) vowel already been deleted, i.e., if the shape were now ²a²áh-x̣àc- instead of ²a²áh-ax̣àc.

The solution we propose is that this is the case for all the forms of sub-corpora (c) and (d). There are at least two ways of accounting for this situation. The first is to assume that not only the initial glottal stop but also the (newly) stem-initial vowel is lost in these derivations,

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[1] -d, 'transitivity' is responsible for the shwa in the output. -d- is later lost.

a loss that occurs before general vowel-loss. Thus (e.g.): ʔaxéc ; be-ʔa-áh-ʔaxéc, be ʔa-áh-axèc, then be ʔa-áh-xèc ; as against ʔexéd; ʔe-éh-ʔexèd-čd, ʔe-éh-exèd-čd, the additional (optional?) rule immediately following the deletion of initial glottal-stop.

An alternative solution would be to suggest that we have here to do with vowel-initial morphemes, despite our earlier argument to the contrary, and that the relevant constituent structure does not here involve a repetition of the morpheme-initial vowel (e.g., that we have beʔa-áh-xec instead of beʔa-áh-ʔaxec).

This suggestion must, however, be rejected for the following reasons. There is no independent evidence for the existence of vowel-initial stems[1] in Twana; in particular, the morphology of the Augment, where some of the same forms occur, required no such supposition. In exchange for a further optional rule, it supposes complementarity of constituent structure--which we have so far eschewed.

It is important to note one form whose derivation on the second analysis appears to imply a gottal stop initial base; this is ʔáxcəd 'bed.' But despite the shift of stress in the (derived)[2] non-Attenuative form, 'bed' is clearly related to the stem in beʔaxéc 'go to bed,' which must be *ʔaxéc. Thus we see that the surface form of 'bed' derives from ʔaxéc- ; whichever analysis we choose, the two diminutive forms are parallel, and do not require alternant bases.

On the whole, the evidence for distinguishing ʔ-initial vs. V-initial in Twana is weak, and the notion seems too powerful for our present grammar to make use of. We thus assume optional deletion of the newly stem-initial vowel.[3]

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[1]The case of the 'field-suffixes' will be discussed elsewhere; the relevance of the topic for historical and comparative studies cannot be rehearsed here, but compare Vogt (1940), who finds contrast between ʔ-initial and V-initial stems.

[2]Although the formatives involved in the commoner derivational processes are clear, stress shifts are not well understood, especially where the derivation is not clearly syntactical. In such cases, the process is perhaps to be associated with the dictionary and not the transformational and phonological components of the grammar. Here, *ʔaxécVd (with -ad[?] derivative Nominal).

[3]Even in the light of the analysis now proposed, the diminutives for 'dish' and 'untie' (sub-corpus [c]) remain irregular. As has been

The unexpected glottal stops in ʔaʔáʔlaš̌ 'sister' and ʔeʔéʔlal 'sing' in turn seem explicable. Again, two solutions are possible. We may assert that the initial vowel has been deleted, but not the initial glottal stop; this complicates the rule for initial-vowel deletion, which would otherwise specify the (unambiguous) environment 'at a morpheme boundary following h' but is not otherwise objectionable. Alternatively, however, a parallel may be appealed to, in the h-mutation already established.[1]

This rule was ordered after optional stress shift, since it must operate on the output-stressed shapes, and after vowel-loss, since it picks up the h-products of lost vowels too. But note that in sʔɔʔɔ́lʔxeʔəd, 'dish' there is no additional glottal stop, even though the environment is appropriate. We do not get **sʔɔʔɔ́ʔlʔxeʔəd. Here it may be assumed that the glottal stop has in fact been generated, but that a rule for dissimilation of glottal stops eliminates one when another follows the next consonant; that is, if the glottal attraction option has not been taken.

The order of the relevant rules is thus:

1. V-loss.
2. h-mutation.
3. Glottal-attraction.
4. Glottal stop dissimilation.[2]

III.6.1.2. Alternative Attenuative Structure

It would perhaps be plausible to assume the constituent structures of Attenuative to be $\underline{C_1\acute{V}_1}$ $\underline{hV_1}$ & stem. From a comparative point of view, certain Snohomish forms appear to lend color to such a view.[3]

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shown, the base for 'dish' is probably *ʔólaxayad; it is not clear why all the stem vowels are lost in diminutive, for we expect ʔɔʔɔ́laxyʔd, to give ʔɔʔɔ́laxeʔəd. Similarly, ʔeʔéyəʔočəd retains a vowel against the rules given.

The source (etyma and syntax) of many once-occurring forms is quite unclear. The existence of internal word boundaries may be one reason for uncanonical vowel-retention in these forms.

[1] Chap. II, sec. 15.4.

[2] Chap. II, sec. 6.2.5.

[3] In his (M.S.) account of Snohomish chameleon morphology, Hess cites the following forms:

ḳíḳxʷuʔ 'short of stature' : ḳí-hi-ḳxʷuʔ 'nice way of saying someone is short'

From the point of view of Twana morphology, crucial forms are ʔaʔáʔlaš̌ 'sister' (Attenuative) and ʔɔʔɔ́ʔlasqəh 'go out' (Attenuative) where the original h must be morpheme-final (ʔaʔáh-laš̌) at the point of the h-mutation rule; it clearly could not be *-hV and then become -Vh by an attraction-rule, for h would have to move away from the stress.

The priority of -Vh- may best be defended by demonstrating the unfeasibility of deriving a Twana form such as ʔaʔáʔlaš̌ using -hV-. Thus ʔa-há-ʔalés̆, then ʔa-há-ʔalàš̌, then ʔa-ʔá-ʔalaš̌, then ʔaʔá-laš̌, with no source for the additional glottal stop we require in Twana.

III.6.1.3. The V̀~a Rule

The above account omits mention of the rule for substituting a for vowels under secondary stress (Chap. II, sec. 4, Disyllabics stressed on V_2). But it must of course be supposed that this rule in fact applies to all the forms of Figure 42, although the vowels concerned are nearly always deleted by the vowel-reduction rule. Two forms, those for 'go to bed' and 'sister' show the operation of the V to a rule, where the relevant vowel is (properly) not so deleted.

III.6.1.4. Summary

In summary, Laryngeal-initial Attenuatives behave in a manner parallel to Laryngeal-initial Augmentatives.

The morpheme-initial laryngeal is lost in an unstressed morpheme; the following vowel is also apparently lost (optionally); the Attenuative h will then in certain cases be found abutting a Resonant, with the usual (glottal-stop) product; finally, if a vowel-loss within the adjacent syllable of the stem should in similar fashion produce a glottal stop, a dissimilation of glottal-stops occurs.

ʔúʔəd 'agree emphatically': ʔú-huʔəd 'agree by lending vocal support while another is talking.'

Although Hess has omitted the Attenuative sub-class $C_1V_1hV_1$ altogether from his IJAL paper (1966), it is quite possible that we have to do with the same -V̌h- as has been proposed for Twana Attenuative and not with -hV- at all. Note that, as is common in Salish Attenuatives, the prefix CV̌ takes the stress in the Snohomish type. Then, although Snohomish clearly lacks the (Twana) rule of laryngeal affection, a stress-attraction rule would take an underlying *q̓í-ih-q̓ʷuʔ and give q̓í-hi-q̓ʷuʔ.

III.6.2. Laryngeal-final

III.6.2.1. General

	Non-Attenuative	Attenuative	Gloss
(a)	sɬɔ́ʔɔb	sɬéʔɬɔʔɔb	dog salmon
	sɬɔ́ʔɔl	sɬéʔ ɬɔʔɔl	herring
	beqʷáʔčəd	beqʷéʔ qʷɔčəd	drink
	poxʷób	péʔpoxʷob ~ péʔpɔxʷɔb	blow
	səʔáčəb	séʔsaʔačəb ~ seʔsaʔáčəb	work "
(b)	táɬqəb	téʔtahɬqəb	shout
	spɔ́pən	spéʔpon ~ speʔpón	spoon "
	kápo	kékpo	coat
	stebʔát	stetéʔbat	man
	besoʔócədəb ~ besəʔócədəb	besesɔʔɔ́cədəb ~ besesəʔócədəb	cook "
(c)	kʷéšɔ ~ kʷešɔ́h	kʷéʔkʷšɔ ~ kʷékʷšɔ	pig "
	bɔ́ʔq	bɔʔqʷobəš	duck
(d)	bexʷákʷkʷ	bexʷéʔxʷakʷkʷ ~ bexʷéxʷakʷkʷ	breathe[1] "
	bewáʔweʔəct	bewéwawəyəct	tell news[2]
	čóc	čéʔčoc ~ čéčoc	rain[3] "
	bə́dəh	béʔbədəʔ ~ béʔbədəh	child[4] "
	sxʷəy̓ay̓	sxʷéʔxʷay̓ay̓ ~ sxʷéʔxʷay̓ay̓	sheep[5] "
	*	kʷékʷɛʔɛl ~ kʷékʷəʔɛl ~ kʷekʷɛ́ʔɛl	skate[6] " "

Fig. 43.--Attenuative, Laryngeal-final

[1]For 'breathe,' no related forms occur in the corpus (subcorpus d). The geminate k^w final seems to be a (unique!)

Fig. 43.--cont.

reduplication, although this hardly bears on the present question. If there is reduplication, then a CVC-plus-k^w stem may be supposed; and we are of course at liberty to assume a shape *x^wáh-k^w, or *x^wə́h-k^w.

[2]'Tell news' is suspected of being a reduplicating form in itself; no related forms occur, but a tentative reconstruction might well give *wVyVcVt - and no laryngeal is to be supposed.

[3]No Augmentative for 'rain' occurs, but clearly the stem must either look like **čóhVc or simply *čóc. The possibility of **čóhc is excluded by the lack of lowering in the forms (we would expect **čə́c), while a stem ** čóhVc would normally not lose its second vowel at all.

[4]The Augmentative bədbə́dəh clearly betrays a stem bə́dəh (we suppose *bə́dəh, for reasons already rehearsed). The e in the Attenuative is therefore not explicable on a 'laryngeal stem' theory. We note, further, that there is a semantic shift in this Attenuative; the gloss is 'doll.'

[5]'Sheep' is an especially interesting case; it is the only occurrence of a doublet in the Attenuative. There are three problems in connection with this form. First, it is not clear whether the stem is *x^wéʔay or *x^wəyʔay; the Attenuative in éʔe could of course come from either. Second, the retention of the final vowel in the stem suggests that -ay is a non-truncating suffix, although its phonetic homonomy with the suffix -ay(h) 'plant' must be coincidental. Third, whichever shape of stem we choose, we certainly cannot call this a 'laryngeal' stem, and hence account automatically for the alternant Ce Attenuative.

Cf. sx^{w}éššəd, 'deer,' however (see Note 94 and fn. in Commentary [Appendix I, sec. 5] to Tale). If the surmize there is correct, and if 'sheep' is indeed related to 'deer,' then s-x^{w}éʔay offers a true 'laryngeal-final' stem after all.

[6]No non-Attenuative corresponding to 'skate' has been elicited. A putative *k^{w}éʔVl is the shape we seek.

Figure 43 presents forms for which the corresponding Attenuatives always have the prefix Cé(ʔ). Note also that these forms apparently violate (at least) the rules for laryngeal affection and vowel-loss. The laryngeal-affection rule is violated in the prefixes, where we expect lowering of e under stress before a glottal-stop; and also in most of the stems, where, on the contrary, we do not expect lowering without stress. The vowel-loss

rule is violated in that both the vowels of disyllabics should be lost when the (monosyllabic) prefix is stressed.

Assuming, on the other hand, that the underlying structure is in fact identical with that previously established for Attenuative, brings in its train even further difficulties. Take first the simple case of *ta-áh-táhɬqəb 'holler' as an example (sub-corpus [b]). Then by stress-assignment, ta-áh-tàhɬqəb; by merger, the same; by ʔ-insertion, taʔáh-tàhɬqəb; by optional stress-shift táʔah-tàhɬqab; here the vowel-loss rule is violated. Although the optional vowel-loss would then allow táʔ-tahɬqəb,[1] it is clear that this form must be marked for at least two irregularities;[minus vowel-loss], and [e-Attenuative prefix].

Take now the form bɔ́ʔq 'duck,' underlying *bóʔq (sub-corpus [c]). The same rules would give bo-óh-bóʔq , bo-óh-bɔ̀ʔq ,[2] boʔóh-bɔ̀ʔq ; here, the rule for laryngeal affection must be suspended for the prefix, yet operate without stress for the stem; the best result with the present rules would be **bɔ́ʔ-bʔq, instead of bé-bɔʔq.

III.6.2.2. Re-appraisal of Stress-assignment

Since neither of the proposed solutions provides satisfactory outputs, we must re-appraise the fundamental question of stress-assignment. It has been assumed that the Attenuative prefix contains a stressed morpheme as a matter of constituent structure, and that the stress-assignment rule reads 'in the Attenuative, stress a stressed prefix.' Let us, instead, assume that the prefix (of whatever shape) is unstressed, but that the stress-assignment rule reads 'in the Attenuative, stress the prefix.' Is there, then, any distinguishing mark on these morphemes by which the stress-assignment rule may automatically give the stress to the stem instead?

Note that, in the Attenuative prefix CV-Vh-, the stress is necessarily assigned to the second vowel, i.e., the vowel immediately before the laryngeal (h). We now observe that the stems of most of the 'Ce-'

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[1] For this type, the dictionary must indicate that the second vowel-loss rule is obligatory and not optional.

[2] I omit the further complication that the rule for vowel-mutation under secondary stress would also be suspended here or constrained in some ad hoc way, e.g., by the environment.

attenuatives of Figure 43 are of the shape C-V-Laryngeal. For these forms, at least, a plausible stress-assignment rule is thus: 'in the Attenuative, stress the (first) vowel of a laryngeal stem; or (for non-laryngeal stems), the vowel preceding prefix-h.' More formally,

$$\begin{bmatrix} +voc \\ -cons \end{bmatrix} \rightarrow [+stress] \quad in \quad / \quad \left\{ \begin{matrix} \quad \& \; C - H_{(stem)} \\ -h \; \& \; C \end{matrix} \right\} \quad 1$$

III.6.2.3. Analogical Stress-Shift

If, as suggested, stress is assigned to the stem for these forms, then it must be the case that the output stress stands on the prefix as the result of a later, stress-switching rule. Such a rule is probably the result of the force of analogy,[2] another example of which was illustrated above (Chap. II, sec. 21.4). In the present case, the analogical stress-shift rule must operate after the rule for vowel-loss, and the lack of vowel-loss or even mutation under secondary stress in the stem is thus satisfactorily accounted for. Note that this makes the present rule quite distinct from the affix-shift rule, which operates before vowel-loss. Further, several forms, such as 'man' and 'coat' do not show the operation of this rule, while others ('spoon,' 'work') show that it is optional.

For the moment, we shall build the present conditions into the earlier secondary stress shift rule, which so far covers only the shift back to 'singular' stress in the Augment, and suitably follows vowel-loss.[3]

III.6.2.4. Re-appraisal of VV Merger

To support, indeed to validate the proposal to treat 'laryngeal' stems as calling for the same spelling for the Attenuative prefix as other stems, we must account for two further anomalies; these are the e vowel in the prefix, and the obligatory loss of the second vowel of the prefix. The stress-assignment rule distinguishes 'final-laryngeal' stems from others

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[1] The above formulation again stresses the affinity of ʔ/h for the stress, parallelling ʔ/h attraction by the stress.

[2] The analogy is, of course, with the non-laryngeal Attenuatives, with stressed prefix.

[3] Rule 20, Chap. III, sec. 5, Rule Summary 5.

by giving the stress to the stem for the former but to the prefix for the latter; thus, CV-Vh plus stressed stem, as opposed to CV-V̀h plus stem. Two questions arise, then: Is there a suspension of the merger rule for 'final-laryngeal' stems? If not, what role does the stress difference play in ensuring the distinction in the outputs of the merger rule?

The merger rule[1] assimilated the gravity of the second (stressed) mora of a two-mora vowel to the roundness of the first; this gave a, e, o as before, but dissimilated ə to e. But this rule seems ad hoc, on two grounds. First, the use of Roundness as one of the dependant variables was unmotivated; and second, the qualitative dependance of a stressed vowel on the preceding unstressed one appears counter to the run of the language--where, for instance, vowel-assimilation is certainly controlled by the stressed vowel. Besides this ad hoc manner of operation, the merger rule is of course quite unable to account for the vocalism e in the present case.

We now propose that the mergers, in both stressed and unstressed cases, are to be accounted for as effects of h on preceding geminate vowels. The difference is due to the fact that whereas of the stressed vowels only shwa is susceptible (as the weakest vowel[2]), all the unstressed vowels are affected. The effect is simply one of dissimilation of vocalic gravity in the presence of a laryngeal (h). Thus, particular qualities in the preceding vowel, such as roundness, prove to be irrelevant; on the other hand, the environmental feature previously considered unnecessary in the specification (viz., the presence of h) is seen to constitute the proper motive for the rule.

III.6.2.5. Loss of Prefix Vowel

We turn next to the loss of the second vowel of the prefix. For the 'normal' Attenuative, the loss of the second prefix vowel proved to be optional;[3] however, since the counting domain of the vowel-loss rule requires

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[1] See Chap. III, sec. 3.2.

[2] Of all the vowels, stressed or unstressed, shwa co-articulates most completely with abutting consonants; shwa is always very much shorter than the other vowels, even under primary stress, etc. (see Chap. IV, sec. 4.4 for discussion and an explanation).

[3] Chap. III, sec. 4.

both prefix vowels to be present, we concluded that the prefix-vowel-loss rule must follow the vowel-loss rule. With 'laryngeal' stems, however, the loss is obligatory: we may legitimately ask whether this is not perhaps a separate rule.

First, why is this vowel not simply lost by the Vowel-loss rule? To answer this question, we ask another; assuming it is thus lost,[1] then why is the first prefix-vowel not lost at the same time, since this vowel is even more vulnerable, as standing further from the stress? We thus suggest that the vowel concerned is in fact lost prior to the (counting) vowel-loss rule; again, we must consider the agent to be the laryngeal, whose effect is here exercised in a preceding completely stressless environment.[2]

Since we have assumed that the first prefix vowel becomes e by vowel assimilation (just as the corresponding first vowel for non-laryngeal stems), the loss of the second prefix vowel must follow vowel-assimilation. On the other hand, since in a stressless prefix no stress-retraction can occur, the two rules are in complementary distribution; thus the present rule cannot be ordered viz-a-viz the stress-shift rule.

The order of the relevant rules is thus:

1. Vowel-assimilation (oblig.).

2/3. Vowel-loss by h (unstressed prefix) (oblig.): Stress-shift-option.

4. Vowel-loss (counting) rule (oblig.).

III. 6.2.6. Rules Illustrated by the Corpus

We now comment on individual forms of the corpus (Figure 43) especially pointing out the sources, in rule options, of the variants recorded.

Sub-corpus (a) illustrates the operation of the rules for stress-assignment, merger, ʔ-insertion, laryngeal-affection (in the stem), vowel-assimilation, V-loss by h, analogical stress-shift, and h-loss. We assume the following underlying stem shapes, ignoring nominal s- and aspectual be-. *łoʔVb 'dog salmon,' *łóʔl 'herring,' *q^{w}óʔ 'water,' *póh^{w} 'blow,' *səʔ-áčᵉ(h) 'work.'

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[1] For vowels before the stress, the only regular rule found is that for shwa.

[2] Cf. glottal stop dissimilation (p. 153). If we allow Vh → hh, glottal dissimilation (now 'laryngeal dissimilation') will simplify this (Chap. III, sec. 8, Summary of Rules).

Sub-corpus (b) contains forms illustrating a problem with h. It is fairly clear from discussion above (Chap. III, sec. 3.3) that h-loss is optional in a stem, but obligatory in a prefix. The forms for 'shout' are thus simply accounted for. 'Spoon' and 'pig,' sub-corpus (c), on the other hand, are problematic. These are obvious loans, probably through Chinook Jargon, from English and French[1] respectively. If we assume (as I show elsewhere), that the vocalism has been heard as a 'long' vowel and thus re-interpreted as *spóhn (i.e., a 'laryngeal stem'), then the derived Attenuative is reasonable.

A second case of the re-interpretation of a loan word is that of kápo 'coat.' Here, however, no problem with the final vocalism arises, since no laryngeal effect occurs. On the other hand, in accord with the morpheme structure condition that no Twana stem ends in a vowel, we might re-write the stem as *kəhpw, or (since the sequence -pw perhaps nowhere else occurs stem-finally) perhaps *kəhpoh.[2]

'Man,' in turn, shows the option on the analogical stress-shift rule; while 'cook' shows the optional loss of the unstressed vowel in a series such as V$^{?}$V.

Sub-corpus (d) lists those Ce-Attenuative forms for which it is prima facie unlikely that we have to do with a laryngeal as C_2 in the stem. It was held above that the e-vocalism arose as a result of the merger of geminate unstressed vowels before h. To explain the present forms, it must thus be supposed that they present the following irregularity: the dictionary entry for each is marked [not Attenuative stress-shift]. On the other hand, the 'secondary stress-shift' (optional) still applies.

III.6.2.7. Contradictions in Apparently Laryngeal-Final Stems

It is crucial to the whole of the above argument on stems with laryngeal as C_2 that such stems occurring in Twana should always make their Attenuative with (output) Cé(?). Two forms in the corpus seem at first sight to contradict this implication; they are spáhq^{w}əɬ ; spɛ́ʔɛ́pq^{w}əɬ 'waterfall,' and x̣^{w}óʔbat; x̣^{w}ɔ́ʔbət 'oar.'

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[1] Chinook Jargon 'cosho.'

[2] The Augment is, however, kp-kápoh, which cannot have arisen from *kəh-. As with 'one,' we assume dictionary allomorphy.

However, it is simple to show that these stems are not in fact 'final-laryngeal' stems at all. The relation of the non-Attenuative and Attenuative vocalisms in 'waterfall' show us that laryngeal affection has occurred; we require an e/shwa vocalism to produce ɛ́ʔɛ in Attenuative. The h, present in the non-Attenuative form, has clearly been metathesized[1] to its present position, before the operation of laryngeal affection (as has been shown, the stem is *spə́q^{w}həɬ).

In the case of 'oar,' the augmented xbxóʔbat shows that the glottal stop reaches its output position in the non-Attenuative form by rule, this time by glottal-attraction.

III. 6.2.8. Non-Vh Attenuative

Non-Attenuative	Attenuative	Gloss
bəqsə́d	bəbə́qsəd	nose[1]
sápələ l	sə́spəlʔəlʔ	flour--little loaf[2]
q̓^{w}sɔ́ʔɔčəd	q̓^{w}ə́q̓^{w}sɔʔɔčəd	string things (fish)[3]
sqabóɬ	sqə́ʔqəboɬ	dug-out[4]
*	lə́ʔleʔəs	rice[5]

Fig. 44.--Attenuative Non- Vh

[1] 'Nose' is here triply irregular; the prefix contains a single, non-lowered vowel (as all these forms do), the stress has not retracted to the prefix, and the final vocalism is shwa and not a by alternation.

[2] 'Flour.' Chinook Jargon has shapes like sapolil, capelil. The vowel-losses are normal for Twana, by rules given, for the unmarked form. The Attenuative, with semantic shift, suggests a relic shape of the type of the diminutive in Coeur d'Alene (Chap. III, sec. 1.2, fn. to Fig. 38[a]). Even assuming a CV prefix, we should also have to assume an h in the stem (i.e., *sə́hpV1V1) to account for the a-vocalism in the non-Attenuative form. If we assumed the Chinook vocalisms to be the correct underlying ones, we should also have to remark that the Attenuative form fails to undergo the (Twana form of the) vowel-loss rule--we expect *sə́səpəlʔəlʔ.

[3] 'String things.' Here the additional irregularity is that the stem vowels have been lowered, but remain unstressed. This links the form

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[1] Ch-metathesis must be involved, and not h-attraction by stress, for the laryngeal-affection rule precedes glottal-attraction (see Chap. II, sec. 15.7).

	Non-Attenuative	Attenuative	Gloss
	xələ́wʔxələw	xələ́ʔwał	butterfly[2]
	šɛʔə́b	šɛʔɛ́ʔbał	crab[3]
	ƛakə́m	ƛakɛ́ʔmał	small[4]
	sƛéxʷ	sƛɛ́ʔxʷał	gull
	xʷóxʷ	xʷɔ́ʔxʷał	fat
(b)	xʷélʔ (?)	xʷexʷɛ́ʔəłał	small[5]
	ʔasɬə́c	ʔəsɬɬɛ́ʔcał	short
	páʔaqʷ	páʔqʷał	pipe
	ʔeʔə́qs	ʔeʔɛ́ʔqsał ~ʔəyɛ́ʔqsał	good-point (place name)[6]
	yə́xʷələh ~ yəxʷ́ələh	yəxʷɛ́ʔłał	hawk
	ʔə́yał	ʔɛʔɛ́ʔyał	pretty child
	élz	ʔɛʔɛ́ʔlsał	Eels (personal name)[7]
	ləl.ə́wap lələ́wap	ləlɔʔɛ́ʔ wpał ~ ləl·- ləlɛ́ʔɔwpał ləlɔʔɛ́ʔwʔpał	Lilliwap (place name)[8]
(c)	ƛayʔółał		trawling canoe
	ɬə́bał		wool-dog
	sdxʷɬʷə́ʔcał		squirrel
	łókʷał		moon
	sčɛ́ʔwə ł		black bear
	čeʔáłał		baby[9]
	čsépał		hat

Fig. 45.--Attenuative, with Suffix -ał

[1] 'Ant.' Cp. ʔasƛóč 'tied' (-ap 'end, bottom'), thus probably a reduplicating form. Cp. also ƛáčaptəd 'belt,' almost certainly related, although I do not understand the ó ~ á alternation.

[2] 'Butterfly.' One of a small number of non-monosyllabic forms showing complete reduplication (see Appendix II, The Shapes of Twana Morphemes).

[3] 'Crab.' As explicated in Chap. II, sec. 12, *šəyə́b.

[4] 'Small.' Apparently a reduplicating form of *kə́m. The reduplicating vowel may well be a through the rule for secondary stress (cp. 'ant'); but then why is the reduplicating vowel in

Fig. 45.--cont.

'small cove' not also a ? Since this type of reduplication is not productive in Twana, it is probably best to consider such shapes as dictionary entries in their present forms. Common Puget Sound mem$\acute{ə}$ʔəd is not found in Twana.

[5]'Small.' x^{w}$\acute{e}$lʔ 'lost' may well be unrelated to the Attenuative here. This Diminutive is described by Mrs. Pulsifer as 'a Quilcene word.' (Quilcene is a very (?) closely related dialect of Twana.)

[6]'Good point.' Elmendorf's form shows the option (taken) on the glottal insertion rule -[ʔey$\acute{e}$·ə qsaɬ], with off-glide ə before velar.

[7]'Eels.' The name of a missionary, well loved and hated. The diminutive (he was a small man!) is quite regular, so far as the rules are concerned.

[8]'Cove.' Cp. l$\acute{ə}$wʔ 'go in.' If related, then 'cove' is another reduplicating form, like 'ant.'

[9]'Baby.' The plural čeʔ$\acute{c}$$\acute{á}$yʔləɬ indicates that the underlying form must be *čayal-aɬ.

Figure 45(a) and (b) illustrates the diminutive derivation in -aɬ.[1] This morpheme, the cognates of which are confined in (e.g.) Coeur d'Alene[2] and Upper Chehalis[3] usage to 'animate offspring,' is employed in Twana for

1. Animate offspring - e.g.,'master,' 'horse,' 'silver salmon';
2. Animate/human affective diminutive - e.g., 'shorty, fatty,' 'little Eels';
3. Inanimate/diminutive - e.g., 'pipe,' 'axe';
4. Inanimate place-name diminutive - e.g., 'Little Dəx$\acute{ə}$b.'

A simple description of the morphophonology of what we shall call Nominal -aɬ Attenuative might be: '-aɬ induces length in the stressed

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[1]In complementary distribution with -aɬ is -eɬ. While -aɬ is found only in a Noun Phrase, as above, -eɬ is found only as the pronominalized object (field suffix) of a Verb Phrase, e.g., boƚób-eɬ 'suckle,' from boƚ 'suck'; ʔask^{w}$\acute{ə}$d-eɬ 'hold a child,' from k^{w}$\acute{ə}$d 'hold.'

[2]Reichard par. 502. -ilt (-älṭ, älʔṭ). It is not clear how relevant these forms are to the problem of the alternation l ~ ɬ (Chap. II, sec. 15.9).

[3]Kinkade (1963) par. 2.3.5.1., morpheme 4238, eɬ.

Fig. 44.--cont

with forms of the shape Cé?-stem. The ə in the prefix remains unsolved, despite the discussion there.

4 'Dug-out.' The lack of vowel-loss in the stem of the Attenuative is again linked to the Ce? Attenuatives.

5 'Rice.' Chinook Jargon, like most Salish, has merged l and r in l. Twana commonly transforms loans into Attenuative shape. Here a shape such as *láyVs must be supposed, if we assume Cá(?)- to be the proper structure. Then lá?-layVs gives lá? le?əs by rules already established. For the additional vocalism in the putative stem *láyVs, the form is in all likelihood modelled on Twana forms in -ayas, whose semantics ('round object') exactly match the gloss.

However, two further forms present a serious problem. These are sədo?q^{w}ɔ? ; sədɛ́?do?q^{w}ɔ? 'main river, little main river' and spe?q^{w}ɔ́?ɔc ; spɛ́?pe?q^{w}ɔ?ɔc 'potato; little potato.'

The underlying form for 'main river,' as has been shown, is *s-dəwa-q^{w}ó?. Stress is assigned to this, giving s-dəwa-q^{w}ó? which by laryngeal infection and vowel-loss gives s-dw?-q^{w}ɔ́?, thence sə-do?q^{w}ɔ́? by the rules regularly. We justify the ɛ?ɛ sequence (and thus the ɛ́?) in the prefix of 'little main river' by assuming that, as has been shown, the attenuative does not use the surface but the underlying form of the unmarked stem as its basis. But if this is so, we cannot justify the lowered vowel of the final syllable, since for the 'regular' attenuative the stress is assigned to the prefix.

With 'potato,' the matter is less complex but leaves us with a similar problem. spe?q^{w}ɔ́?ɔc certainly seems like a 'laryngeal-final' stem; we must assume that the stem is in fact *s-pəyq^{w}ó?Vc. This guarantees the ɛ? in the attenuative prefix, and not the Ce of the 'laryngeal-final' stems; but again, although -pəy- gives -pɛ?- regularly, we cannot explain the lowered vowels (-q^{w}ɔ?ɔ-) in the stem for the Attenuative, since the stress is assigned to the prefix s-pɛ́-, from *s-pə-ɬh+stem.

Figure 44 contains forms whose stems cannot be said to contain a laryngeal, and whose Attenuative reduplication contains simply C_1V_1. Note that these forms all contain shwa as initial stem vowel. Like the non-laryngeal Ce-Attenuatives, these forms must be supposed marked in the dictionary. In the present case, however, the morpheme-feature involved must be [not Vh Attenuative]. Thus a typical Attenuative shape will be: bəqsəd; bə-bə́qsəd, with stem stress.

It is clear from the form for 'string things' that, as for the Ce-Attenuative, Attenuative stress-shift does not operate, but that stress is (optionally) shifted by the secondary stress-shift rule. In the present case, however, it is not clear that the feature [not Attenuative stress-shift] is required in the dictionary: if, as we have suggested, it is the laryngeal that attracts the stress to the reduplication, then its absence in these cases is sufficient reason for the shift not to occur.

III.6.2.9. Summary

Laryngeal-final stems are thus seen to possess the following idiosyncracies:

1. The laryngeal attracts the stress to the stem-initial syllable.
2. The characteristic e-vowel in the prefix results from the (re-evaluated) merger rule, here on unstressed vowels abutting h.
3. After vowel-assimilation, the second (unstressed) vowel of the prefix is obligatorily lost, by h-influence.
4. The second (or, analogical) stress shift rule optionally takes the stress to the prefix.

III.7. Infix-Attenuative

III.7.1. 'ał' and Obligatory Infix

III.7.1.1. General

	Non-Attenuative	Attenuative	Gloss
(a)	skʷə́xʷec	skʷɛʔɛ́xʷcał	silver salmon
	ƛ̓aƛ̓óčap	ƛ̓aƛ̓ɔʔɔ́čpał	ant[1]
	kʷopéc	kʷopɛʔcał	master
	steqéw	steqɛ́ʔwał	horse
	hədéqʷ	hədɛ́ʔqʷał	hump-backed salmon
	dəƛ̓éb	dəƛ̓ɛ́ʔbał	Datleb (place name)
	wədáw	wədáʔwał	horn
	qəbə́d	qəbɛ́ʔdał	axe
	wəhə́w ~ wə́haw	wəhɛ́ʔwał ~ wɛhɛ́ʔwał	owl

vowel of the morpheme to which it is suffixed.[1] But such a description is open to the same objections to the cover-term 'length' as were discussed above (Chap. III, sec. 3.1) and it is reasonable to propose the same solution as was adopted for 'Attenuative.'

Nominal -aɬ Attenuative, by whatever syntacto-semantic features it is to be specified in a Deep Structure, is thus to be spelled as 'insert -V́h following the stressed vowel, and add suffix -aɬ,' where V́ is a copy of the stressed vowel. 'Pretty child' thus requires no special explanation.[2]

The formulation adopted in fact asserts the identity of the present -V́h with the Attenuative morpheme already established; however, since we have already developed rules not only for laryngeal-affection but also for h-metathesis, it is reasonable to consider whether the correct constituent structure here might not be as follows: stem-h-aɬ, that is -h- and not -V́h. The following assumptions would now have to be made: (1) that h can be attracted to the stress across as many as (any) two segments, e.g., sk^{w}V́x^{w}c-h-aɬ giving sk^{w}V́-h-x^{w}c-aɬ; (2) most crucial, that h can become a vowel--with the present rules, this can only mean that we have to do with another laryngeal here (h^{2}) and not the present h!

For the moment, we see no supporting evidence elsewhere in the morphophonemics for the existence of a third laryngeal in Twana, and retain our original interpretation. We thus accept that, instead of partaking of a reduplicating prefix, the present attenuative morpheme -V́h is an infix, the relevant environment for infixation being the presence of whatever semantic features are proper to the suffix -aɬ.

The forms of Figure 45(a) illustrate and confirm the rules already developed for Augment and Attenuative. We give a few typical examples only, before passing to some problematic forms.

'Silver salmon' and 'ant' of corpus (a) show the option on affix stress shift not taken.

The rest of the forms of sub-corpus (a) exhibit the option of stress shift, giving, e.g.,

hədé^{ʔ}ɬ q^{w}-aɬ 'hump-backed salmon,' qəbé^{ʔ}ɬ d-aɬ 'axe,' x̣^{w}ə́ʔ x̣^{w}-aɬ 'fat.'

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[1] But 'pretty child' shows -aɬ without infix. The (unanalyzed) forms of sub-corpus (c) show some similar cases; these may well contain an -aɬ not identical with the Attenuative -aɬ.

[2] It is simply a dictionary entry, ʔə́y-aɬ.

The vowel-loss rule, taking the mark [non-truncating][1] into account for -aɬ, then gives:

hədɛ́ʔqʷ-aɬ , qəbɛ́ʔd-aɬ , x̣ʷɔ́ʔx̣ʷ-aɬ.

šeʔɛ́ʔ baɬ 'crab,' shows development of glottal stop (šʔy-) in the base from a lost shwa (*šəyə́b). This glottal stop is then attracted by the stress (šyʔ-), after which the y vocalizes to e (šeʔ-).

III.7.1.2. Problem Forms

Sub-corpus (b) of Figure 45 contains problematic forms, which require comment.

'Small.' If this form is indeed related to x̣ʷélʔ 'lost,' then its morphology is unusual, for it requires prefix-reduplication but infixed -Vh- too. The rules would give us the triple glottal stop in x̣ʷe-x̣ʷɛ́ʔʔʔl-aɬ. Is this then simplified to x̣ʷex̣ʷɛ́ʔlaɬ by geminate simplification?

'Shorty.' Compare ʔasq̓ə́c 'short.' No explanation can at present be offered for the double q̓ in the Attenuative.

'Small pipe.' The stem páʔaqʷ is the only form in the corpus containing stem VʔV for which an '-aɬ Attenuative' occurs. However, it proves to be quite regular, and incidentally provides a crux case for the ordering of the h-deletion rule. Thus: *pa-áh-ʔaqʷ-aɬ by rule 13 has the shape páʔahʔaqʷaɬ. Then rules 14 and 15 (vowel loss; V loss in / -H V) gives páʔhʔqʷ-aɬ.[2] Now we require to eliminate the h and simplify the geminate glottal stop; thus the h-deletion rule must precede geminate simplification, giving páʔʔqʷaɬ by h-deletion, and finally páʔqʷaɬ.

'Good point' (a place-name). The underlying form must be ʔəy-ə́qs-aɬ; but the unmarked form is ʔeʔə́qs, where the pretonic shwa gives a glottal stop which is attracted to the stress, whereupon the y syllabifies (see 'glottal stop in the unaugmented stem,' Chap. II, sec. 12).

'Hawk.' The -h in the unmarked form is not normally present in the output, but supplied by analogy from forms such as (3rd sing. possessive) seʔə́h-as 'his house' which retains the non-final h. We have postulated, on the basis of a number of forms of this kind, that no phonological word

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[1] See Chap. III, sec. 7.1.2 end.

[2] Final a is not lost here, since -aɬ is 'non-truncating' (ibid.: for rules, see Chap. III, sec. 5, Rule Summary 5.

in Twana ends in a shwa; all forms with (phonetic) final shwa are thus transcribed with final -h.

It is, of course, crucial that the sequence -lh- should not arise before h-unvoicing of l; but the vowel-loss rule which creates -lh- is later. The vowel-loss rule takes the shape yəx^{w}ɛ́ʔləh-aɬ; we thus proceed through yəx^{w}ɛ́ʔlhh-aɬ (vowel-loss), yəx^{w}ɛ́ʔlʔh-aɬ (h → ʔ), yəx^{w}ɛ́ʔʔlh-aɬ (ʔ metathesis), yəx^{w}ɛ́ʔ lh-aɬ (ʔ simplification), and finally yəx^{w}ɛ́ʔlaɬ (h-loss).

'Pretty little one.' It will be apparent that the source of the additional glottal stop (ʔɛʔɛ́ʔyaɬ) must again be the Attenuative h itself. This glottal stop survives in such a case as the present, where the affix stress-shift option has not been taken, and the second prefix vowel cannot therefore be lost--with the result that no glottal gemination occurs.

Then for the forms 'Lilliwap,' 'Eels' and 'pretty one,' stress shift does not operate, but the vowel-loss rule of course applies. However, the vowel in -aɬ, although 'counted,' is never truncated by this rule, and the morpheme is hence labelled [non-truncating] (compare Chap. III, sec. 4).

'Lilɨwap' illustrates the optional loss of an unstressed vowel in / - ʔV́, as well as metathesis of a glottal stop generated by vowel loss with intervening w. Thus:

C.S. Rule	lələ́-ə́h-wap-aɬ	
Stress	lələ-ə́h-wap-aɬ	
ʔ-epenthesis, H-affection, & V-assimilation	ləlɛʔɛ́h-wap-aɬ	
Stress-shift--option not taken		option taken, ləlɛ́ʔɛh-wap-aɬ
Vowel-losses → h → ʔ	ləlɛʔɛ́ hwʔp-aɬ	ləlɛ́ʔɛ h-wʔp-aɬ
	ləlʔɛ́ hwʔp-aɬ	ləlɛ́ʔ h-wʔp-aɬ
ʔ metath	ləlʔɛ́hʔwp-aɬ	ləlɛ́ʔ h-ʔwp-aɬ
h-loss	ləlʔɛ́ ʔwp-aɬ	ləlɛʔ-ʔwp-aɬ
Geminate simplification		ləlɛ́ʔ wpaɬ

The alternants with l· in the stem are to be compared to cases such as syələ́b ~ syəl·ə́b 'year' discussed in Chap. II, sec. 12.1 (Fig. 17[b]). If the stem is indeed related to ləẃʔ 'go in,' then clearly no geminate l is involved.

III.7.2. Simple Infix

(a)	yə́ɬ̓ʷ	yɛʔɛ́ɬ̓ʷəb	wash vs. Atten.[1]
	ɬáčšədəb	ɬɛʔɛ́čšədəb	set out vs. Atten.[2]
	kə́sčəd	kɛ́ʔsəčəd	urinate: female urinate
	wəɬə́k̓ʷaqəb	wəɬɛ́ʔɛk̓ʷaqəb	say crazy things vs. Atten.[3]
	qʷə́qʷeʔəs	qʷhqʷɛ́ʔɛs	narrow (plural vs. sg.)[4]
	*	sɛ́ʔxʷšəd	send news
	ʔəsɬ̓ʷsɬ̓ʷə́so(h)	ʔəsɬ̓ʷsɔ́ʔɔdəxʷ	stringing (plural vs. sg.)[5]
	čəbcə́bəqʷ	čabɛ́ʔɛqʷ	grandmother (plural vs. sg.)[6]
	yəlʔyə́leč		
	yəleʔə́leč ~ séleʔə́leč	syəlɛ́ʔɛč ~ syələʔɛ́č	cousin (plural vs. sg.)[7]
	tečə́čašəl	ččɛ́ʔšəl	teen-ager (plural vs. sg.)[8]
(b)	xɛ́č	xɛ́ʔɛc	raw: dyed bark[9]
	sɬ̓ɬ̓ə́le(h)	sɬ̓ɛ́ʔɛɬ̓əle(h)	elk: animal, worm[10]
	sqəlɛ́ʔ	qəlɛ́ʔɛ təbčəd	bogey: I was haunted[11]
	sqʷəlɛ́ʔ	bəsqʷəlɛ́ʔɛ b	backside: greedy[12]
	beʔəbɛ́ʔ	beʔəbɛ́ʔɛtəb	fruit falls: it's snowing[13]
	beɬ̓eʔɛ́d	beɬ̓ɛʔɛ́leqʷbəd	ringing: ring a bell[14]
	ɬ̓ʷélo	ɬ̓ʷéɬəʔɔy ~ ɬ̓ʷeɬə́ʔɔy	cedar bark: leaf[15]
	kʷóṭ	kʷɔ́ʔɔṭ	mat; bedding[16]
	ʔoʔóšəbəc	šɔ́ʔɔʔšəb	please! : merciful to many[17]
	qʷɔ́ʔ	ɬqʷɔ́ʔɔd	water: bailer[18]
(c)	pɛ́ʔɛtəlʔəs		wheat[19]
	ɬ̓ɛ́ʔɛl		perch
	dɛ́ʔɛɬ		still, despite
	xʔɛ́ʔɛč		dentalium[20]
	pəlɛ́ʔɛɬəɬ		lips[21]
	ɬ̓ʷasɛ́ʔɛxʷ		porpoise
	čɔ́ʔɔs		three[22]
	sɬɔ́ʔɔb		dog salmon
	bečɔ́ʔɔdəxʷ		getting cold[23]

Fig. 46.--Attenuative, with Simple Infix

Fig. 46.--<u>cont</u>.

[1]'Wash.' yə́q̓ʷ - b (intransitivizing suffix).

[2]'Set out.' p̓átš̓əd - b. The stem vowel ought to be e/ə to give ɛʔɛ in the diminutive. There may thus be an <u>h</u> present, to account for the <u>a</u> vowel (*p̓ə́ht̓ [?]).

[3]wəɬə́q̓ʷ-V-q- b. Pronominal suffix -q- 'language.'

[4]'Narrow.' For the plural in C<u>ə</u>, see Chap. II, sec. 21.5. It is so far not clear under what conditions h after an unstressed vowel is retained, while after a stressed vowel it is lost. The stem is either *qʷeh or *qʷeʔ .

[5]'Stringing.' Stem probably compound, *qʷəsóh.

[6]'Grandmother.' Stem must be *č̓ab<u>ə́</u>q̓ʷ, to account for the lowering of the second syllable vowels; stress retraction in the augmented form is of course normal. An affective Attenuative.

[7]'Cousin.' Stem *yəléč̓. The augmented form is irregular in that the final vowel does not mutate to <u>a</u>, according to the rule for vowels under secondary stress. The e vowel in one variant of the augmented form obviously derives from vocalization of the y between consonants, remote from the stress.

[8]'Teen-ager.' te-č̓ə́-č̓ašVl. t-ɛ- is a form of the definite article, here probably used to denote the class. The Attenuative ɛ implies a shwa or <u>e</u> in the stem. If this form is at all connected with č̓ə́š 'weak,' then ə is indicated; thus *č̓əš-Vl, with mutation to <u>a</u> under secondary stress. The terminal suffix -Vɬ is to be compared with -aɬ 'offspring.'

[9]'Raw:dyed bark.' Refers to cedar-bark, dyed a deep red for basket-making.

[10]'Elk:animal, worm.' Compared with the bear for so much of the Northern hemisphere, the elk was for the Twana the most important ritual animal. See Elmendorf (1960) for 1st-elk ceremony (p. 117). sq̓q̓ə́l·ɛ(h) seems itself to be a reduplicated stem, possibly related to sqəláʔ 'bogey, monster,' or even to sə́q̓ 'split' (referring to its antlers?).

[11]'Bogey: I was haunted.' *qəléʔ. The vocalism after the stress is the normal 'copy of the stem-vowel' for transitivity. Vowel-assimilation matches this to the (lowered) stem-final éʔ. -təb may for simplicity be designated as 'subject as patient,' corresponding in many glosses to English passive.

[12]'Backside: greedy.' A likely metaphorical extension, based on bəs- 'possessing a - ', with verbalizing -Vb suffix. *qʷəléʔ .

Fig. 46.--cont.

[13] 'Fruit falls: snowing.' For the morphology, cp., 'I was haunted.' *ʔəbéʔ . Compare the suppletive sʔə́q̓ʷaq̓ʷ 'snow,' from s-ʔə́q̓ʷ-aq̓ʷ from a root *ʔə́q̓ʷ . 'Snow' seems to be an inchoative stem, with ⌊aC2.' reduplication.

[14] 'Ringing: ring a bell.' The composition of the stem is unclear; the instrumental suffix -bəd is here used alone (cf. the usual frame dxʷ + stem + bəd).

[15] 'Cedar bark: leaf.' We must suppose a stem *qʷelóh or *q̓ʷeló? , the stress as well as the h /? being necessary to produce the lowered vowel. The suffix is probably identical with -ay(h) 'plant, growing thing,' with vowel assimilation. The stressing of q̓ʷélo is not accounted for: -ay(h) does not elsewhere attract the stress.

[16] 'Mat: bedding.' The relation, within the culture, is clear enough. On the other hand, with the simple view of semantic relations here assumed, 'bedding' ought to be related to 'mat' as an Augmented form.

[17] 'Please! : merciful to many.' Compare ʔesəʔóšəbəc 'thanks!' The semantic relationship is obvious; cf. modern French. A stem *ʔóš-ab from a root *ʔóš is supposed here. The suffix -c is probably identical with -c 'indirect object.' (The prefix e-s- is the 2nd sing. 'possessive,' used with certain verbs) s- is probably s- Nom. 'Merciful to many' is regular as an Augmented form from ʔóšab.

[18] 'Water: bailer.' łqʷɔ́ʔɔd is a compound stem, with prefix ł- 'remote,' as in łeʔéł 'yonder,' łəc 'that one yonder.' -Vd is a Nominalizing suffix, with vowel assimilation.

[19] 'Wheat.' The etymology is unclear. Probably *p̓ét , with -Vlʔəs 'round hard object' pronominal ≺ *elas, eʔlas, or elʔas.

[20] 'Dentalium.' Compare x̓ə́c̓ 'bite' (?). Dentalium was of cultural importance, as one of the media of payment and exchange.

[21] 'Lips.' -aład is the bound pronominal for 'lips.' Compare also (?) p̓əlʔad 'tree bark.' The final ł in 'lips' is puzzling.

[22] 'three.' Perhaps related to tk̓ʷós, 'seven.' č̓ undoubtedly comes from Proto-Salish *k̓, and *č̓ós thus relates to *k̓ʷós. But Twana is the only (?) Salish language having glottalized č̓ in this form. The analysis *tək̓ʷós (see Chap. II, sec. 14) of course militates against the parallel too, since it is probably to be segmented *tək̓ʷ- ós (-os 'face'). Compare Elmendorf (1962) p. 4. Of particular interest from a comparative point of view must be the Sliammon 'three,' čyə́ləs ~ čyáwəs (Suttles' field-notes, cited in Elmendorf, ibid.), which are most suggestive both for the k - č alternation and the archaic source of Twana 'three.'

[23] 'Getting cold.' Two stems for 'cold' occur in Twana, the present *č̓óʔ , and č̓éx̓ (as in pədč̓éx̓ 'winter,' pəd- being a pronominal prefix for 'time').

As was noted above, the co-occurrence of stem-infix -V́h- with -aɬ (Attenuative) is not obligatory, e.g., in the form for 'pretty one,' ʔə́yaɬ. Conversely, it is clear that some of the occurrences of VʔV (where VV are lowered identical vowels) are in fact cases of what we shall call 'Attenuative by stem-infix only.' Since it is not clear how far, if at all, this variant of Attenuative is determined (phonologically or otherwise), we shall for the moment assume that the relevant dictionary entries must be suitably marked.

Figure 46(a) presents forms in which the semantic relation is either unmarked vs. Attenuative, or Augmented vs. unmarked. One example occurs of an affective Attenuative[1] used for feminine, viz., 'urinate.' It is important to note that, since we hold that all lowered vowels are lowered by rule, forms such as that for (unmarked) 'grandmother' must be marked as [oblig. Atten. in sg.] in the dictionary.

Sub-corpus (b) presents forms which seem to be related by the Attenuative structure and rules, but where a semantic shift makes the identification less than certain. Fairly detailed footnotes are given for this corpus, partly in the hope of substantiating the comparisons suggested, but also as a basis for comparative study. Again, to avoid the need to specify lowered vowels in the dictionary, we tentatively mark all these forms as [+Atten] in the dictionary.

Sub-corpus (c) gathers together forms, some of which have been cited before, for which at least two possibilities exist. These may be 'frozen Attenuatives,' the unmarked forms corresponding to which may continue to elude us within Twana, but for which cognates in other Salish languages may be illuminating.[2] On the other hand, it is quite possible that some of

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[1] Compare with this the form qələ́b: qə́ʔɛ qələbčəd 'bad: silly (fem.?) little me,' the latter in an autobiographical tale told by Mrs. Pulsifer concerning her youth.

[2] An example of the examination of cognates in validifying such analyses is the case of Twana yə́ʔyəstəhe 'wild rose.' Gunther (1945) p. 34, gives Snohomish yēstád, from which we see that the Twana form is an Attenuative. For the alternation d~h~Ø / - #, see Chap. II, sec. 8.

these forms have (lowered) V?V sequences as a result of some of the possibilities already surveyed (Chap. III, sec. 1.2). For convenience, we summarize these here:

1. Presence of stem-formative V for 'transitivity,' with CV? root, with vowel assimilation.
2. Vowel-assimilation in a vocalic suffix, following CV? stem.
3. Chance collocation, such as be- prefix with ?eC stem.
4. Intensive reduplication, with ?VC stem, with stress-retraction.

For the forms of the corpus, we suggest the following. 'Wheat' and 'porpoise' are probably frozen Attenuatives. 'dog-salmon,' 'three,' and 'getting cold' probably show vowel-assimilation. The rest of these forms may also arise through vowel-assimilation, although it is not clear how we should deal with such forms as dictionary entries. 'Lips' shows an uncanonical ɛ́'ɛ ; we expect the stem to show e or ə.

III.7.3. Summary

We must thus distinguish two types of Attenuative morpheme: the prefix, and the infix. No conditioning is present, either phonological or semantic, from which we may predict when -aɬ is to be used; but its use is (almost) always accompanied by infixed -Vh-. On the other hand, some forms must be marked (in the dictionary) as taking only the infix. Finally, some 'frozen' Attenuatives must probably be recognized, while some 'pseudo-Attenuatives' arise through chance collocations whose outcome (by rules) resembles the Attenuative formation.

III.8. Rule Summary 6

*1 Constituent Structure for Augment, Attenuative.
*2. Stress assignment for Augment, Attenuative.
*3. Loss of initial laryngeal, in unstressed morpheme.
**4. Loss of initial vowel in (Attenuative) stem.
5. Augment metathesis, for laryngeal stems.
*6. VV merger, stressed vs. unstressed.
*7 Glottal epenthesis (in V-V) (optional)
8. V - a mutation, under secondary stress.
9. Affix truncation.
10. C - h metathesis.
11. Laryngeal affection.
12. H unvoices 1.
13. Vowel assimilation.

Unordered
- **14. Unstressed V assimilates to following h^1 (in Atten. prefix).
- 15. Affix stress-shift (optional)

16. Vowel 'loss' → h (counting rule).
17. V_1 loss in env / - H V_1, and mirror env.
18. h → ? , in / R.
19. Glottal metathesis, towards the stress.
**20. h-loss before a consonant (all cases?)
**21. Laryngeal dissimilation
22. Y-metathesis.
23. Syllabification of semi-vowels.
24. Second (analogical) stress shift.
    - For Augment, shift to Unaugmented stress pattern.
    - For Attenuative, shift stress to stem.
25. Glottal absorption.
26. N-loss.
27. Cluster simplification.
28. s- assimilation.
29. Geminate simplification.
30. Syllabic offglide for ɨ.
31. Shwa insertion.
32. N ----> ^{N}B, with exception env's.
33. ^{N}B ----> B, with exception env's.
34. B -----> B.
35. Loss of remaining h. (Order?)

Note:
H = a laryngeal
R = a voiced consonant
N = a nasal
B = b,d.
* shows rules modified
** shows rules added. Cf. Rule Summary 5 (Chap. III, sec. 5).

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[1] The argument at Chap. III, sec. 6.2.5. 'Loss of prefix vowel' supports the analysis finally preferred (see Chap. IV, sec. 4.4.2.4). Unstressed vowels to be 'lost' will become [-Tense], and merge with h.

CHAPTER IV

THE PHONETIC OUTPUT

IV.1. Introduction

IV 1.1. General Note

In this chapter, we shall re-consider the Distinctive Features to be used in dictionary entries and rules for the phonology of Twana. We shall tentatively adapt the features to be used, to the distinctions and definitions given by Chomsky-Halle (1968), hereafter referred to as SPE, taking as criteria the requirements (a) plausibility of rule-operation, and (b) phonetic reality in Twana outputs. For simplicity of exposition, we shall take the features in order of the major classes in SPE, relating them to relevant rules.

It is important to note that, as pointed out in SPE, the Chomsky-Halle Distinctive Features are defined in terms not of acoustics or perception, but primarily of articulation. An attempt is made below, however, to add relevant acoustic explication, at least so far as the all-important concept 'neutral tract' is concerned.

Although certain disagreements with SPE will become apparent, no systematic critique of the SPE features is attempted; indeed, certain of the SPE features (e.g., the features Distributed and Covered) are omitted altogether from the discussion below, since I do not see their relevance to a discussion of Twana phonology.

Topics of very general importance discussed in this chapter include:

1. The concept of 'spontaneous voice.'
2. The speech-neutral tongue position.
3. Palatalization.
4. Underlying Nasals, and the Obstruent trend.
5. Degrees of glottal constriction.
6. Tense and Lax, especially the status of shwa.

p̓	t̓	c̓	č̓	x̓	k̓	k̓^{w}	q̓	q̓^{w}	ʔ
p	t	c	č	-	k	k^{w}	q	q	-
-	-	s	š	ɬ	[x][1]	x^{w}	x	x^{w}	h
b	d	ʒ	ǰ	-	g	g^{w}	-	-	-
m̓	-	-	y̓	l̓	-	w̓	-	-	-
m	n	-	y	l	-	w	-	-	-

e	ə	o
ɛ	a	ɔ

Fig. 47.--Twana Consonants[1] and Vowels

[1]The grid above gives the surface contrasts of Twana. Cf. Fig. 5, Chap. I, sec. 3.3.3. The segment [x] is in doubt. See Chap. IV, sec. 3.5.

Note: The contrasts supporting the above analysis will be found in Figs. 48, 49 immediately following (Chap. IV, secs. 1.2, 1.3.)

IV.1.2. Consonant Contrasts (Surface)

p-p̓	pésat	big ones	p̓és	all
	ʔast̓áp	thick (soup)	ʔast̓áp̓	asleep
p-b	s-páq̓^{w}	feather (pillow)	báq̓^{w}	shocking hay
	pədqáp	summer	wəq̓áb	box
b-m	báɬ	over-eat	máxʔ	proud
	wəq̓áb	box	x^{w}esqám	few
t-t̓	tálə(h)	dollar	t̓ál	slice meat
	bót	hold up	bót̓	suck
t-d	táb	what?	dábš	give
	sʔobát	name	bád	father
d-n	dadáʔšəd	footprints	s-nənək̓éyəh	diving duck
	bád	father	skʷólman	teacher
t-c	téq^{w}	play	céq^{w}	dig
	čát	elder brother	tocʔác	East wind

IV.1.2 Consonant contrasts (surface)

t-č	táb	what?	čábaš	he gave it him
	ʔwát	someone	ʔwáč	walk
c-c̓	céq	stab	c̓éq	red
	ʔaxéc	go to bed	x̣éc̓	raw
c-č	cábšəd	twice	čábaš	he gave it him
	ʔas-q̓ác	short	xʷác	wake up
c̓-c̓	c̓éx̣	sicken	čéx̣	cold
	ʔóc̓	wring out	ʔéč	pull herbs
č-c̓	čéd	string	čét	near
	ʔáč	belly	łə́č	sharp
k-č	kə́s	urinate	čə́š	elder sister
k-k̓	káwłəb	nourishment	k̓ák̓ə(h)	crow
	mə́lk	milk	saʔ ák̓-ay	brake-fern
k-q	kə́s	urinate	qə́s	scratch
			pə́q	white
k-kʷ	kápo(h)	coat	kʷábələxʷ	cedar-root
			t̓ákʷ	pierce
k̓-k̓ʷ	k̓ák̓ə(h)	crow	k̓ʷáp	correct
	saʔák̓-ay	brake-fern	cacák̓ʷ	lie down
kʷ-k̓ʷ	s-kʷə́xʷec	silver salmon	k̓ʷə́x̣ʷədeh	rock-clam
	psə́kʷ	broken	cə́k̓ʷ	angle-worm
q-q̓	qál	dislike	q̓ál	believe
	x̣áq	have pain, hurt	x̣ə́q̓	to land
q-qʷ	qál	dislike	qʷál	paint
	pə́q	white	pə́qʷ	broken end
q̓-q̓ʷ	q̓ál	believe	q̓ʷál	ripe
	yə́q̓	file	yə́q̓ʷ	wash
qʷ-q̓ʷ	qʷə́ʔ	drop	q̓ʷóʔ	hide
	łə́qʷ	lick up	łə́q̓ʷ	rest
h- ʔ	hohób	power to kill	ʔohób	wish
	bəlálgʷə(h)	navel	ʔə́gʷəʔ	monster
h-s	ʔas-hób	red-painted	ʔas-ób	smelled
	čə́(h)	spouse	čə́š	elder sister
h-x̣	hál	stop from crying	x̣áltəd	cradle
	dəcə́h ~ dəcə́ʔ	I, me	də́x̣	converse
h-xʷ	hóy	then(connective)	xʷóy	sell

x^w-$\dot{x}^w$	ʔas-x^wə́l	picked	$\dot{x}^w$ə́l	nine
	ɬáx^w	long	ƛ̓áẋ^w	old
$\dot{x}$-$\dot{x}^w$	$\dot{x}$əƛ̓	bite	$\dot{x}^w$əƛ̓	catch
	čé$\dot{x}$	cold	čé$\dot{x}^w$	boil
$\dot{x}$-š	$\dot{x}$áq	hurts	šáq^w	smear
	tálax	use	čálaš	hand
č-š	čáq̓^{w}	go through mud	šáq^w	smear
	k̓^{w}əč	wild	k̓^{w}əš	count
š-s	šédaq	fly	sédak^w	sea
	čəʔwáš	wife	yədəʔwás	heart
š-ɬ	šéč̓	pay	ɬéč	scatter
	češ	help	čeɬ	hang
ɬ-ƛ̓	ɬáx^w	long	ƛ̓áx^w	old
	$\dot{x}$əɬ	angry	$\dot{x}$əƛ̓	bite
ɬ-l	ɬéq̓	slip	léq̓	bury, plant
	x^{w}əɬ-	without	x^{w}əl	gather
m-m̓	təmáq^{w}as	motor-car	mə-m̓əs	thin
	x^{w}ésqam	few	-	
n-n̓	s-nənək̓éyəh	diving duck	-	
	skʷ̓ólman	teacher	-	
l-l̓	láb	rum	lʔábdəx^w	look!
	čél	lazy	$\dot{x}^w$élʔ	lose
w-ʔw	wáč	clock	ʔwáčab	walk
w-wʔ	wəháw	owl	wədáwʔ	horn
y-ʔy	yás	aim	ʔyáš	carry on back
y-yʔ	hóy	finish	hóyʔ	goodbye!

Fig. 48.--Consonant Contrasts, Surface[1]

[1] ʔb/bʔ, ʔd/dʔ are rare initially, though common elsewhere: these are everywhere held to be sequences, and not single segments (see 'Glottal attraction,' Chap. II, sec. 3.3, and passim). Examples of the sequences in contrast with the single segments are:

bále(h)	'fish-egg-	-	bʔálaldəx^w	'get busy!'
ʔasɬób	'healed'	-	sɬóbʔ ~ sɬoʔb	'soup'
déč̓	'graze (wound)	-	dʔéš	'came'
č̓əd	'shake'	-	bəšč̓ədʔ	'louse'

IV.1.3. Vowel Contrasts (Surface)

é	á	ó	ə́
ʔpéc̓	ʔpác̓	ʔpóc̓	ʔpə́c̓
to milk	sew	float	excrement
téqʷab	ʔáqʷ	ʔóqʷ	tə́q
play	lick	find	closed
sél	ʔəsáleh	sól ʔ	
cloth	two	go to ...	
wéq̓ʷ	s-ə-wáq̓ʷsəb	dəxʷ-wóq̓ʷad	wə́q̓
kick	lightning	graveyard	open
ʔéx̣	ʔáx̣cəd	ʔóxʷšəb	ʔə́x̣ad
scrape	bed	buy a wife	clear throat

é	é́
séʔsəʔačəb	sé́ʔsəl
work (Atten.)	cloth (Atten.)
qʷéʔqʷay	qʷé́ʔqʷst
beads	cow (Atten.)
spéʔpon	spé́ʔxʷaɬ
spoon (Atten.)	gull (Atten.)
kʷéʔkʷšɔ(h)	kʷé́ʔkʷeʔəčšəd
pig (Atten.)	king salmon (Atten.)
ʔəsʔəléxʷ	həl-é́čəd
hunter	I'm alive

ó	ɔ́
ʔabóṭəbəxʷ	bɔ́t
he sat down	only
beʔohóbčəd	ʔasʔɔhɔ́bčəd
I wish	I'm wishing
x̣ʷóʔbat	sʔɔ́ʔbət
paddle	nickname (Atten.)
heʔódəxʷ	heʔɔ́dəxʷ
he was coming along	come on!
hohóʔbas	hɔhɔ́ʔ
red bluff	many

Fig. 49.--Vowel Contrasts, Surface

IV.2. Major Class Features

IV.2.1. Sonorant, with a Caveat

The concept of 'spontaneous voice' links the sub-classes vowel, glide, liquid and nasal.[1] For Twana, the same concept is crucial to an understanding of the contextual variants of glottalization, as shown below (Chap. IV, sec. 3.9). All non-Sonorants are (by definition) Obstruents.

IV.2.2. Consonant

All non-Sonorants are Consonants, as are also the liquids and nasals. The class of vowels and glides (V, w/y, h/ʔ) is left as non-Consonant.

IV.2.3. Syllabic, and the Semi-Vowel Rule

In SPE, vowels and liquids are Syllabic. On the other hand, the class of Twana 'Resonants' (m,n,l,w,y) would be identical with the class of non-Syllabic Sonorants provided we assumed that liquids are non-Syllabic. Note that the only liquids in Twana are laterals.

The feature Syllabic has already been adopted in Chapter II[2] above. However, it was adopted in addition to, and not instead of Vocalic. With the adoption of Sonorant, as in SPE, Vocalic is now redundant, as is seen from the chart following (Chap. IV, sec. 2.4): those segments which are potential syllable-peaks are Sonorant,[3] and of these the vowels are inherently Syllabic.

The Semi-Vowel Rule must thus be modified slightly, and its left-hand side now reads [+Son,-Con,-Syll,+Voice] (Rule 27, Summary 6, Chap. III, Sec. 8).

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[1] Chomsky-Halle (1968), pp. 300-301; Halle-Stevens (1967). See Chap. IV, sec. 3.7.1.2 for an application. It is important to note that the two pieces of experimental evidence supposedly supporting this concept must be accepted only with reservations. Perkell's (1965) cineradiographic data show that pharynx-width for n is almost as great as that for d, against expectation. In turn, there is disagreement between Halle-Stevens (1967) and Peterson-Lehiste (1960) in the matter of increased vowel-length before d as against n. But these are matters that must be taken up in another place.

[2] See Chap. II, sec. 18.2.

[3] h/ʔ never become syllable-peaks in Twana, although they may derive from them. The Feature Sonorant in effect replaces the cover term 'resonant' (of Chap. II), although Sonorant also includes the laryngeals h, ʔ. The development of 'secondary ʔ' from h is thus to be viewed as a dissimilation of [Continuous], for a voiceless Sonorant abutting the voiced Sonorant.

IV.2.4. Twana Distribution of Major Class Features

	Son	Cons	Syll
Vowels	+	-	+
wy, h?	+	-	-
l, N	+	+	-
Rest	-	+	-

Fig. 50.--Major Class Features (Matrix)

IV.3. Cavity Features

'Cavity' corresponds to 'position of articulation.' (Cf. SPE 7, par. 4.)

IV.3.1. Anterior and the Need for Oral

Anterior includes articulations anterior to those made with the body of the tongue, i.e., labial and dental. Noting that the feature of Gravity has been abandoned in SPE, we see that a rule requiring the unique specification of labials (such as our third rule for cluster-simplification in the Augment) ought now to become more complex. However, provided we retain the feature Labiality discussed in the text (Chap. II, sec. 7.5), the loss of Gravity as a feature affects the first cluster-simplification rule (Chap. II, sec. 7.2) for Augment only formally.

The Conditions on cluster-resolution now read:

[1] is [+voice]

[1] is [+Cor] , [2] is [-Cor]

[1] is [$^{-Cor}_{+Cont}$] , [2] is [-Lab].

IV.3.2. Coronal

This feature refers to the raising of the tongue blade from the speech-ready position.[1] It thus distinguishes dental, alveolar, and alveo-palatal articulations, as a class. The rule (Rule 28) for assimilation of s to a

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[1] Chomsky-Halle (1968), p. 300, refer to the 'neutral position.' This is the characteristic attitude in which the subject positions h?

following $\overset{\vee}{s}$ or $\overset{\vee}{c}$[1] might be simply written in terms of Anterior and Coronal.[2] Thus:

$$[^{+Cor}_{+Cont}]^{3} \longrightarrow [-Ant] \text{ in env. } / - [^{+Cor}_{-Ant}] .$$

IV.3.3. High, Low, and Back

IV.3.3.1. The Support for 'Mid-Front' as the Speech-Neutral Vowel--a Formal and Substantive Universal

These features refer to both consonants and vowels, since they indicate the position of the body of the tongue relative to that for 'speech-neutral.'

It is important to note that the basis for the choice of the features High, Low and Back[4] is the claim that the speech-neutral position of the tongue-body is 'about the level that it occupies in the articulation of the English vowel [e] in the word "bed."'[5] SPE later adds[6] 'in characterizing these features [i.e., High, Low, Back] we shall be concerned with the various displacements of the tongue from the neutral position.[7]

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tract just prior to speaking. While the concept is explored so far as the vowel-features and Coronal are concerned, no further use is made of it in SPE. See also fn. 7 below and Chap. IV, sec. 3.7.1.Nasals.

[1] See Chap. II, sec. 7.6.

[2] But see 'Coronal and High' (Chap. IV, Sec. 3.4).

[3] It is unnecessary to indicate [+cons]: y is (vacuously) included.

[4] Most particularly, Back, without a corresponding Front. 'Central' vowels are thus to be considered [+Back, -Round], and not [-Front, -Back].

[5] Chomsky-Halle (1968), p. 300. The example shows that a lax non-high vowel is concerned

[6] Ibid., p. 304.

[7] Chomsky-Halle stop short having defined 'speech-neutral' for the tongue, and 'spontaneous voice.' But there is evidence that this priming for speech (1) involves global re-programming in the cooperation of all the members of the vocal tract, (2) comes into play measurably before the commands for individual segments, (3) is perhaps carried out in a sequence showing hierarchical characteristics, and (4) may well prove to be (at least in part) language-particular. The search for empirical support (or rebuttal) for such a sub-stratum

Any attempt to utilize for Twana the same features as those in SPE must, therefore, be made with the explicit understanding that the speech-neutral position for the tongue body as defined in SPE is not merely a formal universal but also a substantive one. In particular, it is implied that Twana (e.g.) employs the same speech-neutral tongue-body position.

Is there any evidence to suggest that we have here to do with a substantive universal? Put another way, is there any special reason why the tongue-body position should be near [ɛ] and not, for example, near [ə], which is traditionally the neutral vowel?

As has been pointed out by Chiba and Kajiyama,[1] the vowel in which the vocal cavity comes nearest to uniformity in sectional area is lax[ɛ]. For a 17cm length uniform tract, Chiba and Kajiyama calculate that the first three formants should have the frequencies 515,1540, and 2570 Hz. If we compare these with figures for American English ɛ , æ , and ɝ ,[2] we find the following:

	F1	F2	F3	
ɛ	550	1800	2450	Hz.
æ	625	1525	2500	
ɝ	525	1375	1675	

from which it may be seen that ɛ is indeed closest to the 'uniform tract' condition for which the above calculations hold.

Note that the uniform tract configuration is of course the one in which the partial tones will be best distributed, both for range and for intensity, since it shows least over-all constriction and (by definition) no localized constrictions.

Thus, there seems to be an <u>acoustic</u> basis for the notion 'universal neutral vowel,' implicating the <u>most uniform cross-sectional area of the tract</u>, which in turn correspond to a mid-front lax vowel.[3] The hypothesis of SPE

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to Phonology is of course still in its infancy. The corresponding notion in traditional treatments of phonetics is <u>The Basis of Articulation</u>.

[1] Chiba and Kajiyama (1958).

[2] Lehiste (1964). I cite typical figures (see List 1, Table 2-VIII, p. 25).

[3] The significance of <u>shwa</u> as so-called 'neutral' vowel must, of course, be sought elsewhere if the above argument proves to be valid.

seems thus to be confirmed as a substantive universal, and we shall (at least tentatively) assume the use of High, Back and Low to be justified for Twana too.

IV.3.3.2. Tongue-Body Features and Twana Vowels

Leaving aside for the moment the problem of shwa (see Tense, Chap. IV, sec. 4.4) the Twana vowels to be accounted for are [e, ɛ , a, ɔ , o] of which *e, *a, *o may be held to be the only vowels required in dictionary representations.[1] Clearly, these latter may be uniquely defined as, respectively, $[^{+High}_{-Back}]$, [+Low], and $[^{+High}_{+Back}]$: the precise degree of each feature may then be specified as an integer-value of the feature for Twana, in very 'late' rules.

Consider, however, a rule such as that for laryngeal affection. The influence of h is one of lowering, and h is properly specified as [+Low]: but in that case we should prefer to say (what is in the end phonetically true) that the vowel becomes [+Low] too. Thus e, o are better specified as [-High] in dictionary entries,[2] while we prefer to continue labelling them e, o[3].

The specification of the Twana vowels in terms of 'tongue body' features is thus:

	e	(ɛ)[4]	a	(ɔ)	o
High	-	-	-	-	-
Low	-	+	+	+	-
Back	-	-	+	+	+

Fig. 51.--Vowel Features (Tongue-body) (Matrix)

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[1]The so-called 'alternation condition' (Kiparsky [1968]) has, we recall, been circumvented by the analysis of non-alternating cases of [-High] vowels as derivative, even in the absence of the putative base forms (Chap. III, sec. 7.2).

[2]The 'oddness' of Twana (and other languages in the area) is thus deeper than we otherwise implied--there is non-maximal use of the phonological space (see Chap. IV, sec. 4.4.2.2)

[3]Cf. the more common (phonemic) usage i,u for 'the high vowels,' adopted in part in the Appendices for the convenience of Salishans.

[4]Segments not occurring in dictionary entries are bracketed.

It is at once seen that a is not distinct from ɔ, both [+Low,+Back]. We assign [-Round] and [+Round] to these segments respectively, and shall justify the distinction below (Chap. IV, sec. 3.6).

IV.3.4. Coronal and High. The Misleadingness of Old Diffuse

Despite the characterization of Twana o as [-High], there are two forms in the corpora in which underlying ó has the phonetic shape [ú]. These forms are *nók^{w}imaɬ [dúk^{w}ebaɬ], 'Duk^{w}ibaɬ' (the mythical hero--see the Tale, Appendix I, note 29) and *noxóyay [dusúyay], 'wolf.'

The form 'Duk^{w}ibaɬ' is in all likelihood an unassimilated loan; on the other hand, the stressed ó in 'wolf' may well represent a rare double environment $\left[\begin{smallmatrix}+\text{High}\\-\text{Back}\end{smallmatrix}\right]$ - $\left[\begin{smallmatrix}+\text{High}\\-\text{Back}\end{smallmatrix}\right]$ to which the vowel o assimilates.

Assuming the reasonableness of the foregoing, it is in order to re-evaluate the rule (Chap. IV, sec. 3.2) for assimilation of s to following š/č. The s-assimilation rule is thus to be re-written:

$$\begin{bmatrix}+\text{Cons}\\+\text{Cont}\\+\text{Cor}\end{bmatrix} \longrightarrow [+\text{High}] \text{ in env } / - \begin{bmatrix}+\text{Cons}\\+\text{Cor}\\+\text{High}\end{bmatrix}$$

The use of High instead of Diffuse is again vindicated in the re-appraisal of the case of the high front allophone of unstressed shwa after š, č and y. Instead of a dissimilation from Diffuseness, we obviously have here to do with assimilation of High and Back. The relevant rule[1] will be:

$$\begin{bmatrix}+\text{Syll}\\-\text{Tense}\\-\text{Stress}\end{bmatrix} \longrightarrow \begin{bmatrix}+\text{High}\\-\text{Back}\end{bmatrix} \text{ in env. } / \begin{bmatrix}-\text{Syll}\\+\text{High}\\-\text{Back}\end{bmatrix} -$$

IV.3.5. 'k -č́- č' and the 'Alternation Condition'

	Unaugmented	Augmented	Gloss
(a)	šáw^{ʔ} ~ šáw^{ʔ}	šoʔšáw^{ʔ}	bond
	šáx^{w}ab ~ šəx^{w}ab	x^{w}šáx^{w}ab	wind[1]
	čálaš ~ čálaš	čəlʔčálaš	hand[2]
	čáp	pčáp ~ pčáp	aunt
(b)	šəʔwaɬ ~ šəʔwaɬ		mole[3]
	šəʔwəs ~ šəʔwəs		hill

[1] See Chap. IV, sec. 4.4.2.2. on co-articulation.

	Unaugmented	Augmented	Gloss
	bəšaqʷáʔč́əd	bəš́aqʷáʔčəd	I'm smearing it
	šč́átqɬəb	š́č́átqɬəb	bear
(c)	yəš́əd	šeʔə́šad ~ šeʔə́š́ad	foot
	spə́čo	spə́č́o	root-basket[4]
	ʔasx̣čád	ʔasx̣č́ád	how[5]

Fig. 52.--č / č́ and š / š́[6]

1 'Wind ' The Augmented form shows cluster-simplification.

2 'Hand.' Cf. čaláš, with the same meaning. One of a number of forms showing free(?) stress alternation (Chap. II, sec. 21), and compare 'mole' below (fn. 3).

3 'Mole.' Cf. šəʔwáɬ, 'road, door.' One of the very few pairs of lexical items illustrating stress-position contrast. Compare ʔélal, 'sing' with ʔelál, 'weep.' But Elmendorf (1954) glosses 'mountain beaver.' His [š́ʌwʔaɬ] shows lack of glottal attraction for informant HA. Cf., Puget Sound šáwʔɬ.

4 'Root-basket.' I did not elicit a reduplicating plural: it is thus not clear whether the root shape is *səpə́- or *pə́- with *s Nominal.

5 'How?' Cf. beʔɛʔɛ́x̣čədəbč 'whatever are you doing?' in the text of the Tale (note 85, Appendix I, sec. 5).

6 The solitary example śédakʷ alternating with sédakʷ 'Canal, sea,' shows the palatalization alternation may also apply to some *s forms. The etymology of 'sea' is obscure (see Tale, note 60, for comment).

kə́ʔs	urinate (child)[1]
kə́s	urinate (female)
kə́ʔə(h)	mummy
kə́yə(h)	granny
káwɬəb	nourishment[2]
kápo	cat-tail coat[3]
kás	railway-carriage[4]
kɛ́ʔɛ	shut-up[5]

kcə́p	dark
dáktə(h)	doctor[6]
stáhkəd	stocking[6]
ˀtkə́x^w	spank
ˀtkáyas	bear-grass basket
ˀtkə́cab	get soaked
mɛ́ˑlk	milk[6]

Fig. 53.--k - Forms

[1]'Urinate' is clearly an affective Attenuative formation. kə́s is the non-Male root, suppletive to the (male) *sə́x^w.

[2]'Nourishment.' Cf. text of Tale (Appendix I, sec. 5, note 56).

[3]'Cat-tail coat.' French loan, through Chinook (?).

[4]'Railway carriage.' English loan, 'car.' Borrowed from plural 'cars.'

[5]'Shut up!'. Source unclear, but putatively from a shape like *kéʔV(h). If Attenuative in formation, then perhaps from *kə́h.

[6]'Doctor, stocking, milk.' Loans from English. 'Stocking' is probably to be rendered *s-tə́khən, since the Augmented form is s-k-táhkəd. 'Milk' shows a lax vowel, corresponding to the English lax /ɪ/, and <u>not</u> identical with Twana (Tense) /ɛ/.

ǩáǩə(h)	crow[1]
ǩaǩɛ́ʔmaɬ	small[2]
ɬə́ǩače(h)	white pine[3]
ˀtálˀǩə(h)	fawn[4]
snənəǩéyə(h)	horned grebe[5]
saʔáǩay	brake fern[6]
cə́ǩcəǩəde(h)	humming-bird[7]

Fig. 54.--ǩ - Forms

[1]'Crow.' Seemingly pan-Salish. Probably reduplicating. *ǩə́h.

[2]'Small.' Cf. ǩɛ́ʔǩəm 'small.' Asserted by informant, Mrs. Pulsifer to be a Quilcene form. Quilcene is at the northern extremity of pre-Reservation Twana territory (see Fig. 1, Chap. I, sec. 2.1). This suggests a root *kə́hm. The Skokomish-

Fig. 54.--cont.

proper 'small' clearly shows *aɬ 'Attenuative,' which induces the Attenuative-type vocalism by infixing -Vh (Chap. III, sec. 7). The stem is, of course, to be marked [not k→č, not m→Obstruent]. This accords with the observation that morphemes, not segments, are exceptions to P-rules. But see Kiparsky (1968) for reservations on this score. The stem here is, of course, *kəh+káhm.

[3]'White pine.' The form seems to contain suffix *aki(h), bound pronominal for 'hand' (Semantics?).

[4]'Fawn.' The only suppletive Attenuative in the Corpus for Twana. Cf. Suppletive stems for Augment (Chap. II, sec. 2).

[5]'Horned grebe.' Alternatively stressed snənəkeyəh. The form snənəkéyəh shows the underlying vowel é: snənəkeyəh could not otherwise have e (because of vowel-loss), which shows that the latter stressing arises by secondary shift (Chap. II, sec. 21.4) (cf. fn. 7 below).

[6]'Brake fern.' Clearly, *saʔák-ay(h), with 'plant' suffix (see Chap. II, sec. 12.3).

[7]'Humming-bird.' Clearly reduplicating, from *cák-ane(h) (bound pronominal, 'ear'(?)). The surviving shwa in the stem suggests that the stress falls on the reduplicating syllable as a result of the secondary stress shift rule, and not by CS rule (cf. fn. 5 above).

	Colville[1]		Twana	Gloss
k.	kílx	c.	čálaš	hand
	kelálx^{w}		čálax^{w}	evening; morning
	tx^{w}ck		sədax^{w}cáč	tongue[2]
	ʼúpənkst		ʔópədəčs	ten[3]
	sənkəmíkən		səx^{w}tálʔčəd ~ cəléčad	back[4]
x.	kílx	š.	čálaš	hand
	scuxáen		yəšəd	foot[5]
	su·míx		səʔwádaš	spirit power[6]

Fig. 55.--Salish k - č, x - š

[1]The Colville forms are from Vogt (1940). The point at issue being clear enough, I have not presumed to normalize Vogt's

Fig. 55.--cont.

transcription. As I have already noted, Salish comparative studies are in their infancy, and the vowel equivalences are unclear, as are also the conditions for vowel-loss (but see Chap. II, sec. 11,(Summary),for vowel-loss in Twana).

[2] s- in the Twana form is obviously *s Nominal. *tx^{w} for other Salish often corresponds to prefix dəx^{w}- in Twana.

[3] *ʔópan or *ʔópən is the probable stem here. The suffixes vary across Salish.

[4] Here, only the bound pronominal suffix *ékan, 'back' is common.

[5] Again, the bound pronominal suffix *xVn, 'foot' is common.

[6] Perhaps not cognates at all. Certainly the alternation m∼(*n)d is a problem. Cf. also Flathead su·méš, sumés (Krueger): perhaps the (long?) u has rounded the [+Nasal] segment following (Hamp, personal communication). This would have occurred in certain (marked) lexical items only, for no such regular alternation has so far been noted.

Figure 52 presents forms in which č and š are in free variation with ć and ś, the latter never appearing without the former also occurring, although many forms show only (plain) š and č. So far as the dictionary representation of these forms is concerned, sub-corpus (c) shows the relevant consonants in positions where no morphological alternations occur, and a synchronic grammar could do no more than add a remark to the entries themselves. A form like 'bone' would carry the morpheme-feature [optionally insert y-glide].[1]

However, the occurrence of forms such as those under (a) and (b), together with the forms of Figures 53, 54 (the k(ˀ)-forms of Twana) raises an interesting problem. Comparative studies (illustrated all too briefly by Figure 55) have shown that Proto-Twana non-rounded k and x shifted to palatal č and š respectively, quite possibly as an unconditioned sound-change.[2] Clearly, however, whether by re-borrowing or by 'exception,' some

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[1] That is, such a form is subject to a minor rule of the Phonological Component.

[2] If a conditioned change, then one quite beyond reconstruction, at least within Twana; not only have extensive vowel-shifts obscured the

$k^{(y)}$-forms remain in Twana.[1] It is plausible to hold, then, that the problem-forms of Figure 52 (the $\check{c}', \check{s}'$ alternants) represent a relic medial stage of the original sound-shift, and the question is, whether the grammar ought not in some manner to recapture this notion.

The simplest manner in which the notion outlined might be recaptured in the grammar would be to represent <u>all</u> (historically) originally k/x forms with k/x, in the dictionary. Those segments which are to become $\check{c}$ and $\check{s}$ must then pass through the following three rules.

1. $\emptyset \longrightarrow$ y in env. / $\begin{bmatrix} +\text{Cons} \\ +\text{Back} \\ +\text{High} \\ -\text{Round} \end{bmatrix}$ -

2. $[+\text{Cons}] \longrightarrow \begin{bmatrix} -\text{Back} \\ +\text{Coronal} \end{bmatrix}$ in env. / - y

3. y $\longrightarrow \emptyset$ in env. / [+Cons] -

The first inserts a palatal glide after non-rounded velars.[2] The second palatalizes k,x with following y: note that the only clusters of <u>consonant + y</u> at this stage are the ones newly created, which simplifies the specification in the left hand side of the rule. The third rule deletes the y, following palatalization.

However, to the first and third of these rules there is a class of exceptions or optional exceptions. To the first rule the exceptions must be all those forms which show $k^{(y)}$ or x in Twana. We shall take here only the k forms, as typical of the problem.

Some fourteen Twana forms containing k occur in the total corpora. Of these (as the footnotes to the corpus indicate), four are obvious English loans, perhaps mediated by Chinook Jargon, while four others ('urinate,' 'mummy,' 'granny,' and 'shut up!') are characterizable as affective. All of these, whether by direct or indirect[3] marking of dictionary entries, must be made exceptions to the rule for development of y-glide.

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original 'environments,' but many finally-occurring $\check{c}/\check{s}$ give us no following environment at all. In what follows, I assume an unconditioned change, but also discuss alternatives for Twana.

[1] For the status of <u>x</u> as a possibly 'relic,' see Chap. II, sec. 15.2, and the argument below (p. 193).

[2] The rounded (and glottalized rounded) front velars survive, as do all the back velars.

[3] 'Direct' marking involves the use of a direct instruction, such

There are no exceptions to the second (palatalization) rule.[1] So far as the (optional) exceptions to the third (glide-loss) rule are concerned,[2] only direct dictionary marking is open to us. Thus, a form like 'bone' will be marked [Optionally not glide-loss rule]. However, we note that the alternants $\check{s}/\check{c}$ never occur in the reduplicating syllable of the Augment, nor in the stem except in the segment adjacent to a stressed vowel. The constraint is simply one of proximity to stress; it is not clear, however, where this constraint is to be noted, in view of the fact that the option on glide-loss seems only to obtain with a small number of lexical items. Perhaps we may mark the rule [optional for marked forms, when adjacent vowel is stressed].

It remains to order these rules with respect to the rules already given.[3]

Taking	s-tə́čəd :	s-tčtə́čəd	slave: Augment
	s-tə́q :	s-qtə́q	log jam: Augment
and	ʔas-q̓áxʷ :	ʔəs-q̓xʷq̓áxʷ	frozen: Augment
	šə́xʷab :	xʷšə́xʷab	wind: Augment

We see that the present rules must operate before those for cluster-simplification:[4] t is not lost before $\check{c}$, while it is before q; similarly, $q̓$ is not lost before x^w, while $\check{s}$ is so lost. It is not clear whether any earlier rule must similarly be preceded by the present rules: they are thus operable at any point before cluster-simplification except that, to avoid complicating the constituent structure rules, they cannot operate immediately post-dictionary.[5]

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as [not rule X]. 'Indirect' marking involves a feature (such as [Foreign]) which in turn correlates with a condition (such as 'Not in [+Foreign] words') attached to a rule.

[1] But compare the $[x^y]$ allophone of /x/ in Quinault (Gibson, 1964), and the $[k^y]$ allophone of /k/ in Chilliwack Halkomelem (Harris, 1966).

[2] We note that only plain (not glottalized) k is involved.

[3] I am not aware of the need to intercalate any other rules among these, and thus suppose them to be passed in a block.

[4] See Chap. II, sec.7.

[5] They are tentatively placed immediately after the rules for constituent structure.

Some support for the above analysis comes from the discussion of Affix-truncation (Chap II, sec. 15.2). Forms such as sp̓éx^{w} 'gull' giving sp̓éx^{w}-s. (which apparently contradicts the 'remoteness of stress' condition on the truncation rule), led us to adopt the view that we have to do with xw clusters. This, of course, is to say that (perhaps only in certain marked items) the environment / -w is a possible relic environment for proto-Twana x.[1]

The above solution, while interesting in its implications for Proto-Twana,[2] nevertheless fails to meet the criterion of recoverability by alternation (Kiparsky's 'alternation principle'), by virtue of which it is more reasonable to assume that forms always heard as (e.g.) č are to be so represented in the dictionary. In this case, k$^{(ʔ)}$ forms are represented as k$^{(ʔ)}$, and the alternating forms also simply marked as alternating.

However, there is yet a third possibility, one which avoids both extremes--that of over-abstractness (the 'underlying k' solution), as well as that of over-concreteness (the 'write it as it is' solution). It is possible to re-interpret the form (e.g.) šáw^{ʔ} as underlyingly *šɛáw^{ʔ},[3] provided that it can be shown (a) that the cluster is not anti-canonical, at least for underlying shapes, and (b) that the reduplication rules for both Augment and Attenuative can be simply modified to handle the complication.

There is no synchronic evidence that vowel clusters occur within morphemes in Twana,[4] and it is certainly most unlikely that the present cases of initial čɛ- and šɛ- constitute separate morphemes. On the other hand, the constituent structure rule for Attenuative has been allowed to create

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[1] Compare the 'relic' environments for underlying Nasals (Chap. II, sec. 8). In both cases, the notion 'relic' is captured by the condition-features in the rules by which the rest of the occurrences are transformed into segments of different feature composition.

[2] I have in fact hazarded this solution so far as the representations of underlying forms in the text of the Tale are concerned.

[3] Or even *šyáw^{ʔ}. Compare, for example, Pentlatc (sic) ciā́ō 'bone' (Boas [1888]).

[4] The only forms I have in which a surface cluster cannot be attributed to an option on the -insertion rule are those in which lenis articulation of y in unstressed syllables (pre-tonic) occurs, giving (e.g.) bɛopétəʾwəl 'fighting,' from *bɛ-√yopé- (?).

geminate vowels, although these are always later resolved by the insertion of glottal stop. It has also been suggested that the only initial clusters in Twana morphemes are those including h/ʔ; here it is possible that we must extend this characterization to include clusters containing y[1] as second element.

Suppose we insist that, as a result of whatever complex restructuring, clusters such as čeV (or, čyV) survive in the forms we are handling. Can the rules so far established handle the complications? For the Augment, note that the optional palatalization never appears in the reduplication. We thus need only amend the constituent structure rule to allow an e plus dissimilar vowel (or yV) cluster between C_1 and C_2 of the reduplication, provided the following two rules are added. First, an optional rule will then assimilate the e (or y) to the č /š segment. Second, for the cases where the option is not taken, the first of two dissimilar vowels (or, y in / C - V) is simply deleted. Thus:

1. $\check{s}/\check{c}\ \begin{Bmatrix} e \\ y \end{Bmatrix} \longrightarrow$ (opt) $\acute{\check{s}}/\acute{\check{c}}$ in env. / - Dissimilar Vowel.

2. $\begin{Bmatrix} \text{Vowel} \\ y \end{Bmatrix}_2^1 \longrightarrow \emptyset$ in env. / $\begin{Bmatrix} \text{- Dissimilar Vowel} \\ C - V \end{Bmatrix}_2^1$

Rule 1 above was framed using the environment 'dissimilar vowel' to ensure that the geminate vowel created by the Attenuative constituent structure rule is not assimilated or deleted, as in a form such as (Attenuative) *šeéh-šeč (from *séč, 'pay'). But clearly, the Attenuative form of *čiálaš would be **če-éh-čalaš, which would result in **čɛ́ʔɛ́čələš instead of the correct čáʔačələš by the rule for Laryngeal affection.

We must thus amend the constituent structure rule. If reduplication of CVV (or, CyV) is allowed, the two new rules would apply to the reduplicating syllable as well as to the stem.[2]

Alternatively, since the palatalized $\acute{\check{c}}/\acute{\check{s}}$ never appear in the reduplication, we may avoid the need to mark the assimilation rule as 'obligatory in reduplicating syllable' by slightly complicating the constituent-structure rule. Thus:

Attenuative Reduplication = $C_1V_1\acute{V}_1h$; for Stem C_1(V or y) V_1.

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[1] In SPE features, simply segments [+Son, -Syll, -Round].

[2] The ordering of the new rules is straightforward: if they both apply before the ʔ-insertion rule, the latter may refer simply to 'vowel sequence.'

IV.3.6. Rounding

(a)	šóšok^{w}əle(h)	Jesus Christ[1]
	bók^{w}	book
	q^{w}éšɔ(h)	pig
	k^{w}ót	cape
	k^{w}e^{ʔ}k^{w}ót	cape (Attenuative)
(b)	sók^{w}a^{ʔ}	sugar
	sx^{w}ɔ́p	hoop

Fig. 56.--Rounding Assimilation

[1] 'Jesus Christ.' We must suppose a re-evaluation of [žésju] as *ǰéšo, then a re-interpretation of the first syllable as a reduplication šé-šo - , with a stress-shift to the 'stem,' giving še-šó- . Vowel assimilation (uncanonical) would then make the unstressed reduplication vowel into o, whereupon a further rule (optionally?) gives the stress to the 'prefix' again.

Note: The k ⟶ k^{w} shift is not considered as rule-produced for forms such as these: rather, it is a condition on the shapes of Twana dictionary entries--that is, a morpheme-structure condition. See p. 196.

Rounding in consonants is confined to segments which are [+Back, -Low], i.e., velar and post-velar k/x and q/χ.[1] The analysis of reduplication already given shows clearly that no question of re-analysis of segments such as k^{w} as clusters (kw) arises generally, although there may be such clusters in Twana--one such case was discussed earlier.

Two constraints on the contrast [+Round] vs. [-Round] must be re-

[1] See (Chap. IV, sec. 3.5) back for the question of the possible survival of *x in certain rare environments in Twana. The morpheme-structure constraint on Roundness to Back consonants is probably pan-Salish: the so-called /t^{w}/ of Snoqualmie-Duwamish (Tweddell, 1950) is almost certainly to be re-analyzed as /tx^{w}/; with very light friction, as in Twana, S-D /x^{w}/ probably merges with /hw/, and the [h] element may then be lost. Cf. Tale, note 5(d), Appendix I, sec. 5.1.

ferred to. The first concerns dictionary entries, and the second the rules of the grammar.

The Corpus contains no instances of either of the sequences Rounded Vowel plus Non-Rounded Velar Consonant or the 'mirror' sequence within a morpheme. There is thus a morpheme-condition to be added to the Phonological description, excluding such sequences (see Fig. 56).

However, a question arises concerning the dictionary entries for morphemes with initial velars followed by a Rounded vowel. It might be argued that these velars should be represented as [-Round], to be adjusted by the Rounding neutralization rule. However, the 'alternation' principle militates against this suggestion, while the reduplication of the Augment (with its accompanying vowel-loss) in fact recovers all cases of velar plus rounded vowel unambiguously as [+Round]. Thus k^{w}óy 'bend,' gives k^{w}e'k^{w}óy, while ʔasq̓^{w}óx̌', 'hidden' gives ʔəsq̓^{w}ʔóq̓^{w}óx̌'.

In addition, the (for Twana, at least[1]) automatic labiality associated with Rounding is very strong in both consonants and vowels.[2] In k^{w}, x^{w}, etc., the co-articulation is simultaneous with, or even anterior to the closure or constriction of the consonant. On the other hand, co-articulation with following Rounded vowels is so strong that the contrast (e.g.) q̓ vs. q̓^{w} is neutralized in these cases. Thus, *yəq̓-ós- 'file something' and *yəq̓^{w}-ós- 'wash face' are both heard as [yəq̓^{w}ós-].[3]

The writing of a suitable rule to convey the facts of Twana Rounding neutralization is a simple matter. Thus:

$$\begin{bmatrix}+\text{Cons}\\+\text{Back}\\-\text{Low}\end{bmatrix} \longrightarrow [+\text{Round}] \text{ in env. } / - \begin{bmatrix}+\text{Syll}\\+\text{Round}\end{bmatrix}$$

Notice that the facts concerning the degree of Labiality and co-articulation are not, however, conveyed by such a rule: as matters of theory stand today, they are to be added, if at all, as very low-level rules concerning fine details of articulation.[4]

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[1] Cf. the description of Rounding in Tillamook as 'cupping of the tongue,' without rounding of the lips (Thompson [1966]).

[2] Cf. the discussion on shwa in co-articulation (Chap. IV, sec. 4.4.2.2).

[3] Cf. ʔas-yə́q̓ 'filed'; ʔas-yə́q̓^{w} 'washed.'

[4] For example, the exact degree to which a is optionally raised and rounded when abutting a rounded consonant, without ever merging with the corresponding (+round] vowel, ɔ. I discuss elsewhere the possibility that a 'superordinate' definition of tract-configuration (the 'Basis of Articulation') will handle such details.

IV.3.7. Secondary Aperture

IV.3.7.1. Nasals, Loans, and the Nasal Sound-Shift

IV.3.7.1.1. General

m	méri	Mary[1]
	mélk	milk[2,9]
	máynərɬlz	Myron Eels[1,9]
	skʷólman	teacher[2]
	mólə(h)	mill[3]
	malɬyéčəd	I marry[3]
	məmʔás	thin
	məlʔáχəlʔeč	tin can[4]
	ʔas-máχʔ	proud
	máʔəh	daddy
	méʔš	defecate[5]
	ʔtamʔéɬəd	rope
	čəmáqʷap	short-tail
	čəmáxʷqs	sharp-nose
	čəmʔáteʔəps	spine[6]
	š-čəmʔáp	backside
	ƛakéʔmaɬ	small[7]
	xʷésqam	few[8]

Fig. 57.--Nasals - m

[1] 'Mary' and 'Myron Eels' occur in Tales. The importance of the metathesis of 'Myron' cannot be assessed from Twana data alone. The only productive metatheses I have found concern š&y and Ch. But metathesis is held to be a grammatical process in Clallam, one of the languages spoken by Mrs. Pulsifer. See Thompson (1968). Compare also Mrs. Pulsifer's rendering of the name 'Gabriel' as [gréibiuɬ].

[2] 'Milk, teacher' are most likely to be direct English loans. Note that they lack the plural or diminutive shaping often found in Chinook Jargon loans.

Fig. 57.--cont.

[3]'Mill' and 'marry' are from French, although possibly not directly from Canadian French but rather through Chinook Jargon. 'mill' gains a final h (automatic to a final vowel?); 'marry' must also be assumed to carry final h (čəd, 1st pers. sing.), which lowers the original é-vocalism (laryngeal affection).

[4]'Tin can.' -Vleč-ad, bound pronominal, 'container.'

[5]'Defecate' must be marked [not laryngeal affection], since it retains é ʔ : but this form may be *méx ʔ .

[6]'Rope,' 'spine.' These forms show a glottal stop after m not matched in the corresponding Puget Sound forms, which show plain b. The form for 'rope' is especially interesting, since the glottal stop seems not to have arisen from a lost vowel: if this is indeed the underlying shape, then we probably have here further confirmation for the notion that glottal stop is absorbed by, then lost in association with a voiced stop.

[7]'Small' is commented on in fn. 2 to Fig. 54, so far as it shape is concerned. Its proveniance is unknown; certainly it is not a loan from the Puget Sound dialects, which uniformly (?) have mem ɔ́ ʔ ə d for 'small.'

[8]'Few.' Cf. x ʷ ésay, 'bad,' (with ʔáy 'good'?) Is x ʷ és a negative particle, to be compared to x ʷ á ʔ , 'not'?

[9]In 'Mary' and 'milk,' [ɛ] is [-High,-Tense]: Cf. ɛ denoting [ɛ ˅] elsewhere in this thesis, defined as [-High,+Tense]. In 'Myron Eels,' [ɪ] is [+High,-Tense]; cf. [ɪ] as an allophone of /ə/ (Fig. 65(c), Chap. IV, sec. 4.4.2.2).

		Gloss
n	s-nənəǩéyə(h)	diving duck[1]
	čənós	Chinoos[2]
	ʔólɛnǰos	orange[3]
	ténten	bell[4]
	wášəntən	President
	skʷ̌ólman	teacher
	s-pɔ́pən	spoon[5]
	s-pé ʔ pon	tea-spoon
	ʔépən	apron[6]
ŋ	x ʷ ə́x ʷ əŋ	cry-baby[7]

Fig. 58.--Nasals - n, ŋ

Fig. 58.--cont.

[1]'Diving duck.' Appears to be reduplicating, from a root (?) *nəkéyəh(?) Provenience unknown.

[2]'Chinoos.' A place-name.

[3]'Orange.' A common characteristic of loans through Chinook Jargon is the plural formation used as a singular (see also 'priest' in fn. 6 below).

[4]'Bell.' From Chinook Jargon. Twana also derives the form dəx^{w}téleq^{w}əbəd, 'bell,' from *téleq^{w}, with Nominalizing prefix-suffix complex dəx^{w}-bd.

[5]'Spoon.' An Attenuative formation, but irregular: we would expect spʔ̱pən, were this a Twana formation, from *s-pón. An alternative Attenuative formation for 'spoon' is based on a putative *s-pó̱hn (see 'Laryngeal-final Attenuative,' Chap. III, sec. 6.2).

[6]'Apron.' Proto-Salish r merged with l in most Salish languages. No trace of original r remains in Twana. Cf. the (French-origin) loan lepléd, 'priest'--with the plural French Article as part of the stem for the singular (see also 'orange' above).

[7]'Cry-baby.' This was Mrs. Pulsifer's Clallam childhood nickname. Clallam has ŋ for proto-*m, which makes this form similar to Twana **x̣^{w}óx̣^{w}-ab, from x̣^{w}óx̣^{w}, 'fat.'

There are eighteen m-forms, of which four are from English (two being proper names) and two from French (possibly through Chinook Jargon). Of the remaining twelve, six ('thin,' 'daddy,' 'defecate,' 'backside,' 'small,' and 'few') may be considered as affective. This leaves six forms to be accounted for only as loans,[1] possibly from neighboring Puget Sound dialects.[2]

On the other hand, of the nine n-forms, six are English loans and one is a place-name; this leaves only 'bell,' which is clearly an onomatopoetic

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[1]'Corpus m/b, n/d in parallel environments' suggests we discount the likelihood of any of these constituting 'relic' nasals in rare environments. While n only occurs once initially, m only occurs once finally; I have no comment on the possible significance of these distribution-limitations.

[2]Except 'small'--see notes on m-corpus (Fig. 57).

formation borrowed from Chinook Jargon, and the form for 'diving duck.' The solitary -form, in turn, is a palpable Clallam loan.

	m	Gloss	b	Gloss
Initial	ʾasmə́x̌	proud	ʾasbə́ɬ	sated
	mólə(h)	mill	bóle(h)	spring (water)
Medial	skʷólman	teacher	séɬl̓bad	half-brother
	t̓amʔéɬəd	rope	t̓abéʔdəbəc	hair (on body)
Final	xʷesqám	few	stáb	what?

	n		d	
Initial	snənə́kéyə(h)	diving duck	sədadášəd	footprints
Medial	skʷólman	teacher	séɬl̓bad	half-brother
Final	ʾépən	apron	pəd	time
	spʕpən	spoon	t̓áʾtəd	cedar-bark skirt

Fig. 59.--m/b and n/d, in Parallel Environments

	Twana	Upper Chehalis[1]	Gloss
*/m/	bʕ́sas	mús	four
	báqʷab	máqʷm	field
	-bš̌	-mš̌	people (pronom.)
	t̓abéd	t̓amén	hair
	dawdʔábac	náwnamc	tree-trunk
	spq̓á́b	spáq̓m	flower
	k̓ʷəléb	k̓ʷə́lm	drying rack
	-b	-m	[verbalizer]
*/n/	dəʔwə́h	nə́we	you (sing.)
	dəcə́h	ʔə́ncə	I
	cədéɬ	cə́ne	he, she, it
	ʔédəʔwət	(e)nówt	heart
	ʔópədəč̓s	pánač̓s	ten
	wədáwʔ	wnáw	horn
	-pəd	-pə́n	time
	bəšč̓ə́dʔ	mə́šč̓nʔ	head-louse

Fig. 60.--Comparison of Twana b/d, Upper Chehalis m/n

[1]Kinkade (1963).

As will be seen from the corpora, Twana possesses both the nasals m, n and the voiced obstruents b,d (Fig. 59). Superficially, no special problem is presented by such a situation. However, the total corpus of forms containing nasals is extremely limited. What is more, as has been shown (Chap. II, sec. 8), the contextual variants of b,d are such that we must suppose these to be the output of underlying nasals m and n, quite apart from the comparative evidence showing conclusively that such is their historical source (see Fig. 60 for a small sample of such evidence).

Since the substitution of voiced stops for nasals[1] is extremely rare as a sound change,[2] it seems worthwhile to attempt some explanation of what may have occurred, at least in the case of Twana. However, the proposed explanation concerns the micro-timing of the muscle-commands for nasalization and voicing; thus, rather more details concerning physiology will be presented than are perhaps normal in discussion of phonology.

IV 3.7.1.2. Physiological Considerations

Nasals have already been characterized as [+Sonorant, +Consonant, -Syllabic]. We may illustrate the speech-ready (or, 'Neutral position') adjustment of the velo-pharyngeal port by contrast with its action in quiet breathing and swallowing.

In quiet breathing, the velum is lowered, thereby allowing air to pass through the nose. In swallowing, a strong sphincter-like contraction of the palato-pharyngeal valve is observed, which completely disappears between swallows.[3] Before and between swallows, the muscles concerned show no 'tonus,' as monitored by EMG . On the other hand, it has been shown that

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[1] In virtually all instances (see Figs. 57, 58 and footnotes there for exceptions).

[2] Apparently occurring only in this one area, the northern part of the Olympic Peninsula: the languages concerned are the Puget Sound dialects and Twana (both Salish), as well as Quileute and Nitinat (both Wakashan). Since these languages are all members of the Mosan phylum, and thus genetically as well as areally related, it should be pointed out that the sound change is areal and not genetic in origin: although it occurs in all three branches of Mosan, it is confined to two sets of geographically contiguous languages.

[3] Bloomer (1953).

while the sphincter action (which involves the pharyngeal constrictors, as well as the velum-raising levator and tensor palatini muscles) is in speech small or nil,[1] the velum-raising muscles themselves are active as much as 600 msecs before audio onset,[2] often continuing active throughout the utterance.

This speech-general tonus is shown by x-ray cinematography[3] to raise the velum and hold it somewhat half-closed.[4] Then, for non-Nasal consonants, the velum is further raised, closing the port more or less tightly; while for vowels, the port is nearly (but not quite) closed, remaining proportionately less closed for the lower (especially front) vowels. However, for Resonant consonants, as of course for vowels, the over-all tract stance remains such that voicing will be 'spontaneous': most particularly, Nasals are therefore 'unmarked' for voicing.

The problem of the sound-change 'Nasal to voiced stop' may thus be usefully re-phrased as an attempt to explain how a stop unmarked for voicing is replaced by one marked for voicing, for this is the essence of the rarity of the change.

Let us assume that the completion of a nasal includes at least the following events in sequence. The velum, which is somewhat half-down (as suggested above), is lowered further;[5] the tongue (or lip) contact is made. If the following segment is a vowel (e.g.), a 'raising' command must reach the palate sufficiently early to ensure no perceptual nasalization of that vowel. The crucial parameter to be examined is that of timing. Let us suppose that the command to raise the palate (in anticipation of the following segment) is advanced; or, conversely, that the oral (or labial) release is delayed. In either case, an oral occlusion will obtain; however, with the nasal-bleed pathway severely constricted, the supra-glottal pressure increase will very quickly cut the Bernoulli effect across the glottis to a point at which spontaneous voicing can no longer be sustained.

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[1] Bloomer (1953). [2] Fritzel (1963). [3] Björk (1961)

[4] But cf. Chomsky-Halle (1968): 'in the neutral position, the velum is raised, and the air-flow through the nose is shut off' (p. 316). In either case, we are saved from the absurdity of having to 'mark' [-Nasal], a logical necessity if we held that the velum moved from the rest (i.e., breathing) position for every non-nasal segment.

[5] Probably by a positive command to (at least) the palatoglossus muscle, implicated by Fritzel (1968).

Two possibilities are presented. The stop tail-off of the originally nasal segment may simply unvoice, giving [nt̄]. On the other hand (and this seems to be the case for Twana), voicing may be maintained, probably by the adjustment of the stance of the glottis.[1]

(a)	^{m}bósas	~	bósas	four
	^{m}bə́čay	~	bə́čay	snake
	^{m}bə́leʔəs	~	bə́leʔəs	racoon
	^{n}dáqas	~	dáqas	one
	^{n}dəčošəd	~	dáčošəd	once
	^{n}dəsxáɬ̓	~	dəsxáɬ̓	I like it
(b)	tqáʔmdəx^{w}	~	tqáʔbdəx^{w}	make bread
	səʔwésamdəx^{w}	~	səʔwésabdəx^{w}	flooding
	xə́qənbəd	~	xə́qədbəd	a landing
(c)	yabéd	:	sɬqét	fruit : day
	yabéɬ	:	sɬqétɬ	our fruit : our day
	lékʷad	:	čəʔwát	he says : he's fine
	lékʷačəd	:	čəʔwátčəd	I say : I'm fine
	səxʷtálʔqʷəd	:	sʔóbat ~ sʔobát	back of head : name
	səxʷtálʔqʷəs	:	sʔóbats	back of his head : his name

Fig. 61.--Contextual Variants of Twana Nasals

IV.3.7.1.3. Allophones of N, Allophones of B

Within the framework suggested, it is now possible to explain the source of two of the contextual allophones of *m,n in Twana, viz.,

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[1] Perhaps aided by the laxing of the pharynx, to assist 'containment' of the over-pressure in the oral chamber. For the original report, see Halle-Stevens (1967). Ohala's EMG tests implicate the inter-arytenoid muscles (personal communication), which tends to support the Halle-Stevens hypothesis.

Note that a lowering of the larynx would also subserve the maintenance of voicing; but no suspicion of the resultant implosive character of such a stop appears in Twana.

(a) initially, b,d have optionally a nasal onset (Fig. 61[a]), (b) stem-morpheme finally, the nasal optionally survives as such before a dissimilar nasal (Fig. 61[b]).

From the work of Björk already referred to, we note two trends: first, that initial closure to the speech-ready position takes place even when the first segment of the utterance is a nasal; and second, that the closure-time within an utterance is shorter than that for the speech-ready adjustment (approximately 150 msecs vs. 260 msecs). It follows that, if post-nasal raising is advanced in time, the shorter (speech-medial) open time will be sharply curtailed, while the longer (speech-initial) open time will be only slightly curtailed.

Thus an utterance-initial nasal will become in effect a pre-nasalized stop, but a medial nasal will become a simple voiced stop. It also follows that while the second of two nasals will have its open time curtailed, the first will retain its full 'length' since it is not followed by a 'raising' command:[1] this would account for the morpheme-final allophones.[2]

An important consequence of assuming the mechanism outlined above is that the rules representing these processes must not assume that all segments go through two stages, viz., N to pre-N, pre-N to non-N. Rather, the speech-initial and non speech-initial positions have their independent developments.[3] Moreover, clarity of exposition (if not additional explanatory power) is probably to be gained by incorporating the timing factor in the rules--one simple way of doing which is to represent nasals as two-part segments. Thus, taking utterance-initial as an example:

$$\begin{bmatrix} +N & +\text{Sonorant} \\ & +N \\ & -\text{Cont} \end{bmatrix} \longrightarrow \quad [\ (+N) \quad \begin{matrix} -\text{Sonorant} \\ -N \end{matrix}\ ] \quad \text{in env./ \$ -}$$

The argument for the two-part representation of a segment here concerns the nature of the segment-onset: this has a direct parallel in the case of

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[1] Note that this provides a physiological basis for the classical notion of 'protection,' at least for the case in question.

[2] We recall that the rule for geminate simplification will by this stage of the rules have dealt with the clusters m&m and n&n, so that only dissimilar nasal clusters remain.

[3] The requirement for 'option' in these rules seems to result from the pressure of analogy: all *N tend to become B.

SPE's analysis of affrication[1] as demanding a feature of release. There may well be a case for a three-part segmentation into Onset, Steady-state, and Release, at least for certain types of segment.

IV.3.7.2. Laterals

There are three laterals in Twana: ƛ̓ , ɬ, and l. ƛ̓ is distinguished from the other two laterals in two ways; it is glottalized, and it is (heavily) affricated. Since Stridency (Chap. IV, sec. 5.3) plays a very minor role in Twana, whereas glottalization is a dominant feature, we choose to assign glottalization as the minimally distinguishing feature of ƛ̓; thus, for example, the rule defining the conditions for development of a syllabic offglide of ɬ (Chap. II, sec. 20.3) need specify ɬ in terms of [-Glottal Constr] rather than [-Strident].

In turn, voice need play no part in the distinction between laterals. To distinguish ɬ from l (in the same rule, for instance), [+Continuant] might be used, provided l is at the same time defined as a 'stop,' i.e. [-Cont]. As will be shown below, however (Chap. IV, sec. 4.1.), l is best considered the Sonorant Lateral, as against non-Sonorant ɬ and ƛ̓.

IV.3.8. Other Voiced Obstruents

IV.3.8.1. General

	Twana	Nisqually[1]	Gloss
(a)	yədés	ʒə́des	tooth[2]
	syəl.ə́b	ʒáləd͡ʒb	year[3]
	yəpáče(h)	ʒəláče?	five[4]
	yəšə́d	jə́šəd	foot[5]
(b)	ʔwə́d	gʷə́delәxʷ	down; sit down
	wədə́baxʷ	gʷə́dbexʷ	blackberry[6]
	dəʔwə́h	də́gʷe?	thou[4,7]
	šəʔwáɬ	šə́gʷəɬ	door, road
	wədáwʔ	gʷə́dək	horn[8,9]
	sɬəʔwə́dx̣əd	səgə́dək	armpit[9]

[1] See Chap. IV, sec. 4, 'Manner Features.'

	Twana	Nisqually	Gloss
(c)	bəlálg^{w}ə(h)	bəlálgəʔ	navel[4]
	wəɬə́b	wəɬə́b	box[6]
	g^{w}édəq	g^{w}édəq	gweduck (clam)[10]
	hódolg^{w}eɬ	hódalg^{w}eɬ	steamer[10]

Fig. 62.--Comparison of Twana y/w, Puget Sound ɣ~y̌, g ~g^{w}

[1]Nisqually forms are taken from A. Malikouti-Drachman (1964, 1965).

[2]Generally, an alternation of stress is seen between the Nisqually (Nis.) and Twana (Tw.) forms. From the study of the Augment, it is reasonable to suppose that, if the shift is by rule, Twana shows the earlier (underlying?) stress pattern in such forms as 'tooth'; for Twana, the V-a alternation would not operate were the stress **yə́des.

[3]'Year.' Twana offers several examples of *l+ stop where either the stop or the l is lost. Cf. 'five,' where Nisqually has lost the p.

[4]'Five,' 'thou,' and 'navel' show an alternation between ʔ and h for Nisqually and Twana.

[5]'Foot.' The usual Puget Sound (Pg.S.) reflex of *y is ɣ. If y̌ is contextually determined, the present data does not show how.

[6]In general, Pg.S. g^{w} corresponds to (and derives from) Tw. ʔw. Cf. 'box,' which illustrates w=w-. But 'blackberry' shows no ʔw: here ʔ has been lost remote from the stress, as also in 'horn.'

[7]'Thou' illustrates the rule for laryngeal affection in Twana: Nisqually shows the underlying é-.

[8]'Horn' Here the final g^{w} has lost labiality as well as voice in Nisqually.

[9]'Armpit.' Here compare only the morpheme Tw.-ˈwə́d- with Nis. -gə́d-. As with 'horn,' Nisqually shows loss of labialization, as also in 'navel.'

[10]'gweduck' and 'steamer' are thus supposed to be loans in Twana from Puget Sound.

		Gloss
	ʒəʒəlá?leč	Seattle[1]
	ʒə́g^{w}ə?	bogey,monster[1]
y	?ólenyos	orange[2]
	?ə́yənz	onion[2]
	só?sɔ?lyos	soldier[2]
g	šagə́q	carrot[3]
g^{w}	g^{w}édəq	gweduck
	hódolg^{w}eɬ	steamer[4]
	ʒə́g^{w}ə?	bogey, monster[1]
	bəlálg^{w}ə(h)	navel[5]
	čə́xəg^{w}as	half-breed[6]

Fig. 63.--Twana Voiced Obstruents, non- b/d

[1] 'Seattle,' 'monster.' These forms are identical with Puget Sound forms. If 'Seattle' is to be glossed as 'cousins,' then this form is to be added to the list of forms showing Twana y = Puget Sound ʒ , as in Fig. 62.

[2] 'Orange,' 'onion,' and 'soldier' show the common plural borrowing-shape Compare French loan lépəwəh from 'les pois.'

[3] 'Carrot.' I do not know the cognates, but the g could come from (1) ( )w → g^{w} → g, or (2) k^{w} → g^{w} → g. The form is certainly not from Chinook Jargon, which has the expected (French-loan) kalat.

[4] 'Steamer.' In all likelihood from Puget Sound, although the vocalism in Nisqually (e.g.) shows a (hódalg^{w}eɬ). Twana does not possess hód 'burn' (cf. Twana ?asq^{w}ə́t, 'fire'), and shows -?wéɬ as bound pronominal for 'vehicle, canoe.' (See Fig. 62, correspondences ?w =g^{w}).

[5] 'Navel.' Twana here shows g^{w} against Nisqually g. But there is other evidence for a g^{w}~g alternation in Nisqually: in any case, I do not doubt that 'navel' is borrowed from some Puget Sound dialect.

[6] I am unable to account for 'half-breed.'

Besides forms with m,n Twana also contains forms with the voiced obstruents ʒ, ǰ, g, g^w. It will be clear (from Fig. 62 and 63, with their footnotes) that many such forms are in all probability loans from the Puget Sound dialects, which will be seen to possess a full set of voiced obstruents (b, d; ʒ, ǰ; g^w--though not g, except contextually-determined). The remaining forms are obviously loans, originally from English or French, though often through the Chinook Jargon.

When we see such loans in parallel with the existence of b,d forms, it is tempting to suggest that their acceptance depends on what amounts to phonological analogy; that is, that the presence of b,d allows for the acceptance of ǰ, g, and the presence of k^w in turn allows for the acceptance of g^w. Support for this view might be offered by citing the case of forms like English 'coffee,' 'thousand,' borrowed as kápeh, táwsəd. Twana has no continuant f or θ, and loans like this are adapted.

On the other hand, if we examine languages like Coeur d'Alene (an 'Inland' Salish language), we note the development of d, g^w in native forms (this time with supporting loans in b). In turn, 'Coastal' Comox has ǰ, g^w, but without b,d, while Quinault has contextually-determined ǰ, g^w (related to y,w) again without b,d.

IV.3.8.2. The Trend to Obstruence

It is thus suggested that the development of voiced obstruents in Salish represents but a single trend,[1] that of change of non-syllabic sonorants to obstruents, with a concurrent switch of voicing from 'spontaneous' to 'non-spontaneous.' In Coeur d'Alene, this trend has been confined to the voiced non-consonantal non-vocalic sonorants (w,y,--for here d is from y, not from a nasal), with covert support for foreign loans in b. In the Puget Sound dialects, the trend has gone furthest, with overt development of a full set of voiced obstruents. On the other hand, Twana has so far confined its overt development to the sonorant nasals, with covert support for the small number of ʒ/ǰ and g^w loans given.

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[1] 'Trend,' not 'Drift': no Sapirean 'drift' is implied in the sense of functional connection; rather, an articulatory tendency.

IV.3.9. Glottal Constriction

IV.3.9.1. Degrees of Glottal Constriction

'Glottal constriction' obtains when the glottal aperture is narrowed beyond its speech-ready stance.[1] In Twana, two degrees of glottal constriction must be recognized in the output, although it will be suggested that the second (partial constriction) is contextually determined.

As is clear from the corpus of surface contrasts (Fig. 48), the glottalized voiceless non-continuants[2] are in contrast with their non-glottalized counterparts, except that no plain counterpart to *x̓* occurs. For this set, glottalization consists of total constriction of the glottis.[3] But glottalization also occurs with non-syllabic sonorants,[4] although never with voiced non-sonorants: the nature of this glottalization on the one hand, and this exclusion on the other, are of considerable interest for an understanding of Twana.

It is assumed (Chap. II, sec. 9) that glottalization with sonorants derived from absorption of an abutting glottal stop, whether underlying or arising from a lost vowel (through h, as shown). But it is clear that, once absorption has occurred, a directly physiological constraint is faced: voicing would obviously be lost in the presence of total glottal constriction, and it is suggested that the laryngealization found in these cases is the contextually-determined output for (absorbed) glottalization.[5]

It is interesting to note that an alternative development could have arisen in the case of glottalized w,y; a change of sonorance to obstruence could have resulted (compare 'The Trend to Obstruence,' Chap. IV, sec. 3.8.2),

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[1] Cf. Chomsky-Halle (1968), p. 315.

[2] See 'Manner,' for the distinction between stops and affricates (Chap. IV, sec. 4.2).

[3] For release characteristics, see 'Manner' (Chap. IV, sec. 4.2).

[4] As indicated above (Chap. IV, sec. 2.3), I include l among the non-syllabics.

[5] Thus the statement 'in sounds produced with glottal constriction voicing can occur only after the glottal constriction has been released' (SPE, p. 315) must be modified to 'in sounds produced with total glottal constriction . . .'

with g^{w} and $\check{j}$ as output. Instead, allophony of glottalization occurs.

IV.3.9.2. $\dot{l}$, $\dot{w}$, $\dot{y}$: but b, d

It is also feasible to extend the account given for the variants of glottalization, to cover the problem of the loss of (absorbed) glottalization in the case of b,d discussed in the text (Chap. II, sec. 9). With the change of obstruence, accompanied as it is by a switch to non-spontaneous voicing, the vocal cords are probably more open than they are in the speech-ready stance. Assume that the (primary) command for glottalization in (e.g.) *$\dot{m}$ is switched to laryngealization (i.e., partial constriction); then, with the change to $\dot{b}$, it is clear that a further modification must occur, for the fresh command (for non-spontaneous voice-adjustment) is now contradicted by that of laryngealization. For Twana this incompatibility is resolved in favor of continued voicing,[1] and the glottal constriction is eliminated altogether.[2]

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[1] This has protected the contrast with the voiceless (glottalized) stops, with which such segments would otherwise have fallen together. I do not know whether the other alternative (unvoicing) has occurred in any Salish language.

[2] The assumption here, that laryngealization and non-spontaneous voice are incompatible, of course rests entirely on the assumption that non-spontaneous voice requires the cord-adjustment mentioned. If non-spontaneous voice is maintained without cord-adjustment (e.g., by larynx-lowering), no incompatibility arises; such may be the case for (some African and Californian) languages showing laryngealized b and d, often in free variation with (or accompanied by) the implosion we should then expect. Cf. Ladefoged (1968), p. 16.

IV.3.10. Twana Distribution of Cavity Features[1]

	p	t̰	c̰	x̰	č̰	k̰	q̰	ʔ
	p	t	c	-	č	k	q	-
	-	-	s	ɬ	š	(x)	x̣	h
	b	d	ʒ	-	ǰ	g	-	-
	m	n						
	w	-	-	l	y			
Anterior	+	+	+	+	-	-	-	-
Coronal	-	+	+	+	-	-	-	-
High	-	-	-	-	+	+	-	-
Low	-	-	-	-	-	-	-	+
Back	-	-	-	-	-	+	+	+
Round	+	-	-	-	-	±	±	-
Secondary Apert.	m	n	-	+	-	-	-	-
ʔ constriction: voiceless obstruents	= ± 'Full' (ʔ = +)							
ʔ constriction: Non-syllabic sonorants[2]	= ± 'half' [→ Laryngealization]							
ʔ constriction: voiced obstruents	= ∅							

Fig. 64.--Cavity Features (matrix)

[1] For Vowels, see Chap. IV, sec. 3.3.2 (p. 185).

[2] Glottalized non-syllabic sonorants (perhaps only) arise through glottal absorption, hence not in dictionary entries.

IV.4. Manner Features

The manner features of relevance to Twana phonology are those labelled Continuant, Release, Supplementary Movement, and Tense in SPE.

IV 4.1. Continuant

Of the non-Sonorant Consonants, those articulated with constricted but not blocked air-flow are characterized as Continuant. In Twana, Continuants contrast with stops at all stop-articulation positions, except that there are no Continuants matching either p, t, or non-Rounded k.[1] Thus, s, ɬ, š, x^w, $\underset{\cdot}{x}$, and $\underset{\cdot}{x}^w$.

Degrees of frication must be assigned to the output for (e.g.) $\underset{\cdot}{x}^w$ as against x^w. The post-velar continuant $\underset{\cdot}{x}^{(w)}$ is heavily fricated, while the velar continuant x^w is very frequently hardly to be distinguished perceptually from hw: in fast speech (see text and notes to Tale), the continuant element here behaves like the (weak) h, and is lost, leaving w.

One problem arises concerning ɬ. While the medial cluster l + Nasal[2] is what we have called (see Chap. II, sec. 20) a 'compatible' cluster, medial ɬ + Nasal develops a linking (syllabic) $\underset{\cdot}{l}$. Compare ɬáwalbəš 'Indian' with séɬlbad 'half brother.' It is not quite clear how one ought to motivate the rule for syllabic $\underset{\cdot}{l}$: no other non-Sonorant Continuant shows such behavior, although the voiced Sonorants show a parallel characteristic in the insertion of shwa (Chap. II, sec. 20).

There are four alternations involving continuants. First, the suggested (and problematic) rule for development of palatal š from *x, beside č from *k (Chap. IV, sec. 3.5). Second, the positional assimilation of s to following š/č (Chap. IV, sec. 3.4). Third, the alternation š~ ś in certain forms (Chap. IV, sec. 3.5).

The fourth, the development of ɬ from plain l (Chap. II, sec. 15.9) presents a different kind of problem. It would be possible to hold that the l ⟶ ɬ rule constitutes evidence that l is itself to be characterized as a Continuant. The facts of articulation are not, however, decisive: if l is looked on as showing a stoppage at the primary constriction,[3] then it is a stop, whereas if the incomplete nature of the blockage is emphasized, then it is a continuant.

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[1] The segment x remains problematic. [2] See fn. 1, p. 213.

[3] That is, total oral median constriction. It is not clear by what criterion of hierarchy SPE makes 'Secondary aperture' a Cavity, rather than a Manner feature. If Manner, the feature might well be a feature of Release.

The treatment of l so far in this thesis has concerned its behavior under glottalization, viz., that it behaves in parallel fashion to the rest of the sonorants. The motivation in the l → ɬ rule for calling it a continuant lies largely in the difficulty we should otherwise have in specifying the strongly fricative nature of the output ɬ. On the other hand, the degree of friction could perhaps as easily be specified in terms of the following h which is the direct cause of the loss of voice. It is thus quite feasible to maintain the Sonorant nature of l, providing for the fricative nature of the non-Sonorant (so-called 'h-unvoicing') by rule.

Conversely, the non-Sonorant ɬ will acquire its off-glide l̥ before a nasal in two stages:

1. $\emptyset \longrightarrow [^{+Lat}_{+Son}]$ in env. / # [ ] ɬ - N [ ] #[1]

2. ɬ l N ⟶ [1] $[^{2}_{+Syll}]$ [3]
   1 2 3

IV.4.2. Instantaneous Release and Twana Affricates

Since affricates may contrast for stridency,[2] a further feature is clearly required to distinguish plain from affricated stops: SPE suggests that the release characteristic[3] [+Instantaneous] be used to characterize plain stops. For Twana, distinctive affrication is found only in c(ʔ)/ʒ contrasting with t(ʔ)/d, both being otherwise [+ Cor, +Ant] so far as articulation-position (Cavity) features are concerned.

However, several Twana segment-types are non-distinctively affricated,

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[1] At Chap. II, sec. 20.3 it was assumed that voiced stops were involved: but it was then shown (Chap. II, sec. 20.5) that the relevant segments were still Nasals at the point of application of this rule.

[2] Chomsky-Halle (1968), p. 329.

[3] It is quite unclear what importance is to be attached to the taxonomy of the features under cover terms such as 'Manner,' as here, as against 'Source' as with Stridency. This being so, it is not considered worthwhile at this point to seek implications of the removal of the present phenomena from the 'Source' to the 'Manner' features.

either always or in free variation with non-affrication. The segment types ǰ and č/ǰ are always affricated,[1] although neither contrasts with a non-affricated stop at the same position of articulation. Likewise, affrication is often found with the glottalized varieties of the post-velar q, i.e., q̓ and $q̓^{w}$: it is often the case, particularly with Labialized $q̓^{w}$, that the perceptual distinction between $k̓^{(w)}$ and $q̓^{(w)}$ leans heavily on the affrication of $q̓^{w}$.[2]

I have not seriously considered the possibility of assuming that the release feature [Instantaneous] might in fact constitute the distinguishing difference between k (etc.) and q (etc); for the non-glottalized $k^{(w)}$-$q^{(w)}$, distinction is never carried perceptually by affrication.[3]

The time-lapse between release of the oral closure and the occurrence of voice-onset in a following vowel depends on a number of interlocking parameters, e.g., position of vocal-cords, tenseness of tract, $P_{s.g.}$[4] This time-lapse is often called aspiration. For non-glottalized segments with [+Instantaneous release], the times for Twana correspond roughly to those given for American English,[5] ranging from 30-100 msecs over p to q,[6] the value increasing with distance from the lips. Final stops are optionally unreleased.

In sum, Twana plain stops are moderately aspirated initially and medially, and optionally unreleased finally.

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[1] The lateral very heavily so.

[2] Of course, this is at least in part a criticism of the field-worker's ear. Without synthesis experiments, it is impossible to be clear on the role played by affrication in such a case, so far as the native speaker is concerned. It is nevertheless evident to me that glottalization often masks the degree of the feature [High].

[3] An alternative explanation of 'intrusive h' (see pp. 26,98,99 and fn.2,p.99) is that it is precisely this affrication which has been (historically) re-evaluated as h, with resultant metathesis (see C-h metathesis, Chap. II, sec. 15.7).

[4] But see also 'Supplementary Movement,' Chap. IV, sec. 4.4.3; see Kim (1967).

[5] Peterson and Lehiste (1960) give a range from 58-75 msecs for initial stops, and point out (although they do not explain) the almost elementary relationship with 'place of articulation.'

[6] Initial or intervocalic. No aspiration is found in the environment /#s-.

IV.4.3.--Supplementary Movements: Oral Pressure and Twana Glottalization

Were it the case that the onset-timing of voicing in a vowel depended solely on the position of the cords at the time of release, then the voicing delay after glottalized stops would remain unexplained, for the cords are in fact tightly adducted for such stops.

However, as was pointed out above, other factors are also in play. The relaxation of the cords after tight adduction is one factor, although not commented upon in the literature. A second is the relative timing of the oral and glottal releases; in Twana, the glottal release is only very slightly delayed after the oral release.

The most important factor, widely commented upon,[1] is the raising of the glottis (probably, of the whole larynx) during the oral closure of a glottalized stop, which increases the pressure in the oral chamber. The time taken for the pressure in the oral chamber to fall sufficiently for the Bernoulli effect to obtain across the relaxing glottis, is at least equal to (and may even exceed) the parallel time taken for the cords to approximate in the case of plain stops.

For Twana, preliminary indications are that voice-onset time is indeed (on the whole) longer[2] for the glottalized stops than for their plain counterparts. However, place of articulation seems to introduce complications,[3] for there is inconsistency among the velar and post-velar stops.

Since force of release is dependent on oral pressure at the time of release, we must also postulate degrees of raising of the larynx, since we find positional variations in this parameter. Initial and intervocalic glottalized stops are usually fortis. Finally, they are weaker however, a fact that may be related to the distribution of stress over the phonological word.

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[1] E.g., in Ladefoged (1964), Kim (1967), Chomsky-Halle (1968), p. 323.

[2] An expected result, insofar as the relative masses of the larynx and the vocal cords are concerned.

[3] Compare the k-allophones, and the apparent contradiction of the 'place of articulation' explanation of aspiration-time in Peterson-Lehiste (1960). It may be that the larynx does not need to travel so far to create the excess pressure required, in the case of velar articulations.

Glottalized stops are weak in force of release when non-final in a cluster, with following non-glottalized consonant.

Thus, three degrees of larynx-raising are probably required for Twana, although all are contextually determined. It is also clear from the above discussion that an automatic rule must apply, at the point of the glottal-stop allophony rules for resonants, to reverse the sign of the [larynx raised] feature (normally 'plus' for segments [+Glottal constriction]) to 'minus.'[1]

IV.4.4. Tense-Lax

IV.4.4.1. Introduction

Despite rebuttals, doubts and reservations,[2] there seems to be strong empirical, as well as theoretical support for the feature Tense. Since we have accepted the notion that segments are to be fully specified as they enter the phonological component of the grammar, we must assign a value to this feature too, for each segment: more interesting, however, is the question whether this feature is used distinctively in Twana, i.e., whether any of the rule-dictated behavior of segments requires (or is made more plausible by)

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[1] Larynx-raising and larynx-lowering are not the two poles of a single feature, but rather quite separate Features; the minus value for both corresponds to the neutral tract position of the larynx (i.e., slightly raised).

Note: It may well be the case that it is not always necessary to specify values for all the (Universal) Features in each dictionary segment: some features apply to whole words, or even utterances, and the value of others is automatically subsumed under the definition of the speech-neutral tract stance. The present feature [Larynx raised], seems to fall into both these categories.

[2] A typical rebuttal is that of Lisker-Abramson (1964). For sample doubts, see Jones (1959); while for reservations, see Ladefoged (1964). For theoretical justification, see (e.g.) Jakobson-Halle (1963), and Chomsky-Halle (1968). Kim (1965) has a good survey, and offers confirmation from energy-distribution, wave-form, oral-pressure and air-flow measurements, palatography and electromyography, using Korean data. For x-ray cinematographic support see Perkell (1965).

the use of Tenseness. For Twana stop consonants and vowels, there does seem some justification for the use of this feature.

Physiologically, [Tense] corresponds to an over-all tension in the larynx (extrinsic as well as intrinsic musculature?), vocal-tract walls, and tongue.[1] The results of this tension are said to be seen in consonants as quicker closure and release, longer closure, greater area of closure-contact, and greater intensity of plosion on release.[2] For vowels, the concomittants of tenseness are supposedly greater divergence from the speech-ready position of the tongue, greater precision of tongue position and correspondingly lesser co-articulation with abutting consonants, as well as greater duration.

IV.4.4.2. Tense-Lax in Twana Vowels

IV.4.4.2.1. Gross Considerations

It is of interest that Twana, like many Salish languages, makes a somewhat irregular use of the articulatory space available.[3] Thus, its high vowels are in detail higher-mid,[4] the highest allophones of any vowel are two allophones of shwa which are lower-high, the low front and low back rounded vowels are in detail lower-mid, while only the low unrounded back vowel is truly low.

However, gross considerations of 'most common allophones' in an articulatory space-pattern are quite insufficient as a basis for deciding whether

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[1] There seems no experimental evidence to decide whether this is a single phenomenon or not: assuming that it is, is its status merely that of Manner?

[2] It is not clear just how Tense is related to 'Heightened sub-glottal pressure,' so far as voiceless obstruents are concerned.

[3] Compare the unusually 'crowded' articulatory spacing of consonants at the back of the oral chamber, as against the lack of a spirant at the labial or dental positions. Compare the even more extreme case of some Inland Salish languages in Kinkade (1967). For Nootkta, see Jacobsen (1968).

[4] The phonetic descriptions here accord with Smith-Trager (1957).

there is a Tense-Lax distinction present. Consideration must also be given to the possibility that the vowel most closely approaching the articulatory position of the speech-ready tongue is Lax, in rule-behavior and/or phonetic realization.

But we are not in a position to label the relevant vowel, ɛ[1] (or any Twana vowel, for that matter) as Lax before considering the details of co-articulation.

IV.4.4.2.2. Co-articulation

(a) e, a, o, Stressed and Unstressed

e Stressed

Initial(?)[1]

[e·]		ˀéɬad	ˀébəc	ˀéwad	ˀéspxʷəb
		eat	grandchild	invite	smoking(of tobacco)

Medial

[e·]	a)	p̓éstab	č̓ét	yabéd	šédəlˀče	
		everything	near	fruit	woman-chaser	
[e·ᵊ]	b)	təbéᵊxʷ		ˀasč̓č̓éᵊx̣	ˀabéᵊlˀ	séᵊl
		earth		cold	if	cloth

Final (?)[1]

e Unstressed

Initial(?)

[e]	ˀesədə́ˀ	ˀeɬsə́q̣	ˀesḱʷáš	ˀelál
	your	split	throw	weep

Medial

[e]	a)	ɬeˀéɬ	bəheˀɔ́ čəd	ˀəteč́ɛ́	qʷɔ́ˀqʷʊ belˀə čs
		yonder	I'm coming	now	egg
[eᵊ]	b)	čeᵊx̣-ócad	beᵊqʷɔ́ˀ		
		it's cold	drink		

Final(?)

[ɨ]	a)	ˀəsále	q̣ʷəl·áde	cə́qpe	tqáče	sqʷəbáˀe[~ sqʷəbáyˀ]
		two	ear	fir tree	eight	dog
[eᵊ]	b)	ˀəsáleᵊqʷést				
		two cows				

[1]The possible relevance of the notion of speech-ready tongue stance to the behavior of ɛ is considered later (see treatment of h, in 'Tense-Lax in consonants'). Shwa is the vowel implicated as Lax, as is shown in later sections.

a Stressed

Initial(?)

[a·]	ʔáṗ	ʔáɬ	ʔáχcəd	
	wipe	fast	bed	

Medial

[a·]	sq̓áʔ	ɬáwalbəš̌	páʔaqʷ	stáb	
	ice	Indian	pipe	what ?	
[a·]~[å·]	q̓ʷáʔ	xʷáltəb	kʷábəlaxʷ	ʔesk̓ʷáš̌	
	far	Causasian	cedar-root	throw	

Final

---

a Unstressed

Initial(?)

[a]	ʔastáb	ʔabélʔ	ʔaχéc	ʔaṗóstəd
	blunt	if	go to bed	towel

Medial

[a]	č̓čáʔəyac	č̓eəχócad	ʔasc̓épalč̓əd	ʔélalč̓əd
	boy	cold weather	I'm afraid	I'm singing
[a]~[å]	ɬáwalbəš̌	šáxʷab	sʔáq̓ʷaq̓ʷ	
	person	wind	snow	

Final (?)

baq̓áʔa

Makah

---

o Stressed

Initial(?)

[o·]	ʔópədəč̌s	ʔóbatəbəš̌	ʔólaχ	ʔóqʷst	
	ten	bumming for food	gather	beat	

Medial

[o·]	š̌óʔ	bósas	ʔasṗóc	ʔas-sótč̓əd	ʔashóy
	grind	four	float	I know	done
[u·]	dosš̌óyay	dókʷebaɬ			
	wolf	Duk̓webaɬ			

Final(?)

---

o Unstressed

Initial(?)

[o]	ʔoʔóšəbəc	ʔopáɬ	ʔocáwal	ʔosél
	please	eat	embark	dive

Medial

[o]	qʷoχʔód	χʔočód	dəsʔ obát	čádošəd
	hide it!	knot it!	my name	three times
[ɯ]	došóyay	ɬoʔɬáwalbəš		
	wolf	Indians		

Final(?)

[o]	qáqto	qʷélo	shábo	spəčo
	cradle	inner bark	story	berry-basket

(b) ə Stressed

1. With preceding non-labialized stop

Pre-stress	Stressed [ʌ] ~ [ə]	Post-stress	Gloss
p,ṗ	sɔ də xʷ-pə́t	t	shirt (wrap)
	ṗə́c	c	defecate
	pə́q	q	white
	pə́ɬ	ɬ	thick
	ṗəlʔ-ṗə́lač	l	capsize (Augmented)
t,ṫ	ʔas-tə́b	b	blunt
	s-tə́čəd	č	slave
	s-tə́q	q	log jam
	tə́sad	s	hit him
	tə́lʔbəs	lʔ	take off
ʔc,ʔč	ʔčə́ṗ	ṗ	ambush
	ʔčə́d	d	shake
	cə́q̇	q̇	drip
	čə́š	š	elder sister
	čə́lab	l	lungs

	Stressed [ʌ] ~ [ə]		
χʔ	s-χʔə́q̇ɬ	q̇	wing
	χʔə́x̣	x̣	be midwife
	χʔəlʔ-χʔə́lay	l	shovel-nose canoes (Augment)

Pre-stress (ʔ) (ʔ)	Stressed [ʌ]~[ə]	Post-stress	Gloss
k, q	qə́b	b	smooth
	qə́c̓	c̓	weave
	kə́s	s	urinate
	qə́s	s	scratch
	qə́ɬ	ɬ	possible
	qə́x̣	x̣	do something taboo
	qəlʔ-qə́lab	l	bad (Augment)
ʔ	ʔə́bətəbèd	b	seat
	be-ʔə́x̣ad	x̣	clear the throat

2. With preceding labialized stop or spirant

	Stressed [ɔʷ]		
kʷ	ʔas-kʷə́dad	d	hold
	kʷt-kʷə́təbəc	t	husbands (Augmented)
k̓ʷ	k̓ʷə́čəde(h)	č	rabbit
	ʔas-k̓ʷə́š	š	count
	s-k̓ʷə́spɬ	s	trout
qʷ	s-qʷə́š.əb	š	fog
q̓ʷ	ʔəs-q̓ʷt-q̓ʷə́taxʷ	t	thin (Augmented)
	ʔas-q̓ʷə́t̓	t̓	fire
	ʔəs-q̓ʷs-q̓ʷə́so	s	strung (Augmented)
	q̓ʷə́x̣ʷče(h)	x̣ʷ	finger-nail
	q̓ʷəlʔ-q̓ʷə́lde(h)	l	ears (Augmented)
	q̓ʷə́l	l	cooked
xʷ	s-pxʷə́b	b	smoke
	ʔas-xʷə́d	d	tired
	c̓xʷə́s	s	five
	xʷə́ɬ	ɬ	hard
	xʷə́ltəb	l	Caucasian
x̣ʷ	x̣ʷə́l	l	nine
	s-x̣ʷə́de	d	bull-head

3. With preceding voiced stop or nasal

	Stressed [á]~[ʌ́]~[ə́]			
b	bə́dəh	[á]~[ʌ́]	d	child
	bə́təb	"	t	murdered

Pre-stress	Stressed [á]~[ʌ́]~[ə́]	Post-stress	Gloss
b	bə́c̓ay [á]~[ʌ]	c̓	snake
	ʔas-bə́ɬ "	ɬ	sated
	bə́leʔəs [ə́]	l	racoon
	bə́yaɬ [á]~[ʌ́]	y	start
	bə́yac "	y	meat
bʔ	ʔəsəbʔə́s [ə́]	s	cave
d	ʔas-də́č̓ [á]~[ʌ́]	č̓	pressed
	sə-də́ẋ "	ẋ	conversation
	də́lal "	l	stopped
	sə-də́ʔwat "	ʔw	surf
m	ʔas-mə́ƛ̓ "	ƛ̓	proud
	təmə́qʷas "	qʷ	motor-car
	mə́ʔə(h) "	ʔ	dad
m	c̓əmʔə́ẋʷ-qs "	ẋʷ	pointed-nose
	məmʔə́s [ə́]	s	thin
n	---		

---

4. With preceding continuant

	Stressed [ʌ́]~[á]		
s,š	sə́ṗ-qʷəd	ṗ	beat
	ʔas-sə́tad	t	standing
	ʔas-sə́q̓	q̓	split
ɬ	ɬə́ṗ-ap	ṗ	fall
	ɬə́č̓	č̓	sharp
	ɬə́q̓	q̓	wide
ẋ,h	ẋəd-ẋə́daqʷ	d	lame
	ẋə́c̓	c̓	measure
	ẋə́ƛ̓	ƛ̓	bite
	ẋə́q̓	q̓	land
	ẋə́ɬ	ɬ	angry
	ẋə́lʔ	lʔ	mark
	ʔəs-lə-hə́leɬ	ɬ	we're alive (Augmented)

Pre-stress	Stressed [ʌ́] ~ [á]	Post-stress	Gloss
l, ʔl	lə́c̓	c̓	bundle, tie up
	lə́q̓	q̓	feel over
	ʔlə́x̣	x̣	light
	lə́wʔ	wʔ	go into (non-animate)
	ʔas-lə́wado	w	baked
y, ʔy	yəb-ʔyə́bat̓	b	tied round (Augmented)
	yəd-ʔyə́das	d	teeth (Augmented)
	yə́t̓	t̓	roll
	ʔyə́x̌ʔ	x̌ʔ	scrounge, bum
	yə́q̓ʷ	q̓ʷ	wash
	yə́q̓	q̓	file
	še-ʔyə́šad	š	legs (Augmented)
	yə́x̣	x̣	sort out
	yə́x̣ʷax̣ʷ	x̣ʷ	disappear
	yəlʔ-yə́lax̣	l	gather (Augmented)
w, ʔw	ʔwə́d	d	down
	wədʔwə́daw	d	horns (Augmented)
	ʔwə́cal	c	swim
	q̓ə-wə́q̓ab	q̓	boxes (Augmented)
	ʔəs-əʔwə́x̣	x̣	dry
	ɬə-ʔwə́ɬak̓ʷ	ɬ	crazy (Augmented)
	wəlʔ-wə́lap	l	you all (Augmented)

5. With following w, or labialized obstruent

	Stressed [ʌ́] ~ [á]		
l	ʔas-lə́w	w	baked
p̓	ʔas-pə́k̓ʷ	k̓ʷ	spotted
t̓	ʔas-t̓ə́k̓ʷ		pierced
s	ʔəs-psə́k̓ʷ		broken
t	pt̓ə́q̓ʷ-qʷəd	qʷ	bandana
ɬ	ɬə́qʷ		lap, lick
lʔ	p̓əlʔə́qʷ		gravel-cook
t	xʷ-t̓ə́x̣ʷʔwəs	xʷ	enemies (Augmented)
k	t̓kə́xʷ		slap
s	sə́xʷ-təd		grease

Pre-Stress	Stressed [ʌ́]~[á]	Post-stress	Gloss
š	šə́x̣ʷab	xʷ	wind
bʔ	təbʔə́x̣ʷ	x̣ʷ	gooseberry
t	ʔəs-q̓ʷtə́x̣ʷ		thin
l	q̓ʷalə́x̣ʷ		cliff
ɬ	ʔəs-ɬə́wʔ	wʔ	shelled clams
l	ʔəs-lə́wʔ		put in
y	yə́wʔ		cure
b	ʔəs-x̣əbə́k̓ʷ	k̓ʷ	tight
c	cə́k̓ʷ		angle-worm
ɬ	ʔəsə-wəɬə́k̓ʷ		crazy
y	yə́k̓ʷ		pull out
b	bə́q̓ʷab	q̓ʷ	hay
č	čə́q̓ʷ-šəd		sawbill
ɬ	s-ɬə́q̓ʷ-qs		nostril
l	x̣ʷələ́q̓ʷ		hot
y	ʔəs-yə́q̓ʷ		washed
w	q̓ʷə-wə́q̓ʷatəb		drifted (Augment)

(c) ə Unstressed

1. In unaugmented forms

Unstressed [V]:	in Unaugmented	Cf. Augmented /á/	Gloss
[ʊ]	wəq̓əb	q̓əwə́q̓ab	box
	wədáw	wədʔwə́daw	horn
	wələp	wəlʔwə́lap	you
	q̓ʷəl.áde(h)	q̓ʷəlʔq̓ʷə́lde(h)	ear
	q̓ʷəl.əb	q̓ʷəlʔq̓ʷəlab	sink
	ʔəš-čəʔwəx̣	ʔəščoʔčə́wax̣	dry
	s-yəʔwés	syoʔyə́was	wood
[ɪ]	s-yələb	s-yəlʔyə́lab	year
	s-yələʔə́č	s-yəlʔyə́leč s-yəleʔə́leč	cousin
	yədés	yədʔyə́das	tooth
	yətáʔwəde	yəʔyə́tawde	salmon-berry bush
	yəšəd	šeʔə́šad ~ šəʔyə́šad ~ šəʔyə́šad	leg

Unstressed [V]:	in Unaugmented	Cf. Augmented /ə́/	Gloss
[ʌ]~[ə]	ʔəs-qəbəc	ʔəs-qəbqə́bac	shrunk
	q̓əwəʔáčʷe	q̓oʔq̓ə́ʔwəčʷe	cane
	ʔəs-xəd́əq̓ʷčʷe(h)	ʔəs-x̣ədx̣ə́daqʷčʷe(h) ~ʔəs-x̣ətx̣ə́daqʷčʷe(h)	hurt hand
[ə]	təbéxʷ	təbtə́baxʷ	earth, land
	cədéɬ	cədcə́daɬ	he, she
	ʔəs-cəlʔə́s	ʔəs-cəlʔcə́ʔlas	rattled
	bəqsə́d	qəbə́qsəd	nose
	ʔəs-əwəɬə́k̓ʷ	ʔəs-ɬəʔwə́ɬak̓ʷ	crazy
	yəq̓ʷósadəxʷ	q̓ʷəyə́q̓ʷsədəxʷ	wash his face
	ʔəs-ələ́xʷ	ʔəs-ɬəʔə́laxʷ	hunter

2. Replacing unstressed prefix (with corresponding CV́- stem)

	Augmented	Unaugmented	Gloss
[ʊ]	wəc-ʔwə́cal	ʔwə́cal	swim
	kʷəb-kʷábələxʷ	kʷábələxʷ	root
	ʔəs-xʷəd-xʷə́d	ʔas-xʷə́d	tired
[ɪ]	šəd -šédaq	šédaq	fly
	čəlʔ-čálaš	čálaš	hand
	čəd-čə́d	čə́d	shake
	yəlʔ-yálaqʷ	yálaqʷ	return
[ə]	bəd-bə́dəh	bə́dəh	child
	s-qəb-qə́boɬ	s-qabóɬ	dug-out canoe
	qəlʔ-qə́lway	qəlwáyʔ	crippled
	bəl-bóleh	bóleh	spring (water)
	səlʔ-sél	sél	cloth
	x̣əb-x̣éb	x̣éb	wrinkled

3. Replacing originally-stressed stem vowel, in presence of stressed (Atten.) prefix

	Attenuative	Stem	Stressed Vowel replaced	Gloss
[ʊ]	s-kʷɛ́ʔɛ-kʷədəb	s-kʷédəb	e	chicken
	saʔá-sxʷəb-čəd	sáxʷab-čəd	a	I'm jumping
	x̣ʷɔ́ʔɔ-x̣ʷəbat	x̣ʷóʔbat	o	paddle
	s-x̣ʷɛ́ʔɛ-x̣ʷədeh	s-x̣ʷə́deh	ə	bull-head

	Attenuative	Stem	Stressed Vowel Replaced	Gloss
[ɔ]	kʷáʔ-kʷəbələxʷ	kʷábələxʷ	a	root
[ɪ]	šɛ́ʔɛ-šədəq	šedáq	e	fly
	čáʔa-čələš	čálaš	a	hand
[ʌ]~[ə]	lɛ́ʔ-ləq̓	léq̓	e	dig
	xʷɔ́ʔɔ-xʷəyəb	xʷoyób	o	sell
	dɛ́ʔ-dəx̣	dəx̣	ə	converse
[ə]	sɛ́ʔ-səl	sél	e	cloth
	báʔa-bəle(h)	bále(h)	a	fish-roe
	šɔ́ʔɔ-šʔəb	šoʔób	o	grind
	be-p̓ɛ́ʔ-p̓əlʔče-čəd	be-p̓álʔče-čəd	ə	overturn

4. Replacing unstressed stem-vowel, in presence of stressed (Atten.) prefix

[ʊ]	ɬɛ́ʔɛ-səʔwəc	ʔesáwac	a	chew
	wɛ́ʔɛʔ- wəq̓əb	wəq̓áb	ə	box
	wɛ́ʔɛʔ-wəłəkʼʷ	wəłákʼʷ	ə	crazy
	s-tɛ́ʔɛ -tqʷəb	s-téqʷab	a	toy
	s-qʷɛ́ʔɛ -qʷəbe	s-qʷəbáyʔ	ə	dog
	saʔá-sxʷəb	sáxʷab	a	jump
	łaʔá-łəwəlbəš	łáwalbəš	a	Indian
[ɔ]	lɛ́ʔɛ -lʔkʷəd	lékʷad	a	speak
[ɪ]	šɛ́ʔɛ-šədəq	šedáq	e	fly
	ƛ̓ɛ́ʔɛ -ƛ̓keʔəs	ƛ̓káyas	a	basket
[ʌ]~[ə]	qɛ́ʔɛ -qələb	qəláb	ə	bad
[ə]	x̣ʷɔ́ʔɔ -x̣ʷəbət	x̣ʷóʔbat	a	paddle
	s-kʼʷaʔá-kʼʷtəd	s-kʼʷáƛ̓ad	a	rat
	sɛ́ʔɛ-sɬəd	séɬad	a	food
	s-ʔɛ́ʔ-lətxʷ	s-ʔélatxʷ	a	timber
	čáʔa-čələš	čálaš	a	hand

(d) **ə Unstressed, with Prefixes**

1. With S-Nominal prefix

	Nominalization	Gloss
[ə] -b	sə-báded	mountain
	sə-báχ sx^{w}éχay	mountain-goat
[ə] -d	sə-də́ʔwat	surf
	sə-dábapacqəd	hip
[ʊ]~[ə] -w	sə-wáʔweʔəct	news
	sə-wáq̓^{w}səb	lightning
[ʊ] -ʔw	sə-ʔwésab	flood
	sə-ʔwát	someone
[ə] -l	sə-bə́ṗ	blanket
	sə-léχʔ lʔk^{w}əd	talk, language
[ɸ] -y	s-yə́cəb	sermon
[ə] -b	sə-bolóq̓^{w}	ball
	sə-bəʔóbat	names (Augment.)
[ə] -d	sə-debáɬ	we two
	sə-doʔqə́ʔ	river
[ɸ] -n	s-nənə́kéyə(h)	diving duck
[ʊ]~[ə] -w	sə-waq̓éq̓	frog
	sə-wəɬáɬq^{w}ot	broad-leaf cat-tail
[ə] -l	sə-ləʔélal	songs (Augment.)
	sə-ləʔólaxeʔəd	dishes (Augment.)
[ɪ]~[ø] -y	sə-yəʔwés ~ s-eʔwés ~ s-ewʔés ~ s-ɪʊʔwés	wood
	sə-yələ́b ~ s-yələ́b	year

2. With ʔas- Stative prefix

	Stative	
[ə]~[ø]-b	ʔasə-béx^{w}səb ~ʔas-béx^{w}səb	smiling
	ʔas-bə́ɬ	sated
[ɸ] -m	ʔas-mə́χʔ	proud

	Stative	Gloss
[ə] -d	ʔasə-dɔ́ʔ	rotten
	ʔasə-déc̓	grazed (bruised)
[ə] -w	ʾasə-wáq̓	hurt
[ʊ] ʔw	ʔəsə-ʔwáx̣	clear (weather)
[Ø] -l	ʔas-láw	bright
	ʔas-ləq́	bought
[Ø] -ʔy	ʔas-ʔyə́x̣	sorted
	ʔas-ʔyáx̣	melted
[ə] -b	ʔəsə-bolʔóq̓ʷ	tangled
	ʔəsə-bətə́b	warm (weather)
[ə] -d	ʔəsə-dɔʔáɬqxʷ	rotten-smelling
	ʔəsə-dəčə́qs	flat-nosed
[ə] -w	ʔəsə-wəɬə́k̓ʷ	crazy
	ʔəsə-wəʔéwad	invited (Augment.)
[Ø] -l	ʔəs-ləʔélal	sung (Augment.)
	ʔəs-ləhə́leɬ	we're alive (Augment.)
[Ø] -y	ʔəs-yəbə́q	caught
	ʔəs-yəlʔə́x̣	gathered

3. With single-segment prefix (Augment. or Atten.) after cluster-simplification for stems--Voiced C+V+Voiceless C

	Augmented	Unaugmented	Gloss
[ʌ]~[a]	qə-bə́qsəd	bəqsə́d	nose
	q̓o-báqʷab²	báqʷab	field
	q̓o-bə́q̓ʷabʔ	bə́q̓ʷab	shocked (hay)
	qə-lə́q	lə́q	bought
	q̓ə-wə́q̓ab	wəq̓ə́b	box
	q̓ʷə-wəq̓ʷə́təb	wəq̓ʷə́təb	drifted
	q̓ə-yə́q̓səd əxʷ	yəq̓ósad əxʷ	file
	q̓ʷə-yə́q̓ʷčə	yəq̓ʷáčə	wash hand
	q̓ʷə-yóq̓ʷəyəb	yóq̓ʷayʔd əxʷ	rotten
	ʔəs-x̣ə-báx̣	ʔas-báx̣	worn out
	x̣ə-lʔə́x̣	lʔə́x̣	lamp
	x̣ə-ʔyáx̣	ʔyáx̣	melt
	ʔəs-xʷə-ʔyə́xʷ	ʔas-ʔyə́xʷ	disappear

	Augmented	Unaugmented	Gloss
[ɪ]	ʔəš-ša-ʔyáš̌ədəb ~ʔəš-še-ʔáš̌ədəb	ʔasə-ʔyáš̌ədəb	carry on back
[ə]	ʔəs-ɬə-ʔwáɬakʷ	ʔəsə-wəɬáḱʷ	crazy
	dəxʷ-ɬə-bóɬəbəd	dəxʷ-bóɬəbəd	breast
	ʔas-mə́x̌ʔ	ʔəs-x̌ə-mə́x̌ʔ	proud
	ʔəš̌-čə-déč̌	ʔasə-déč̌	grazed
	ʔəs-pə-lépač̌	ʔəs-lepéč̌	covered

Fig. 65.--Co-articulation of Vowels

[1]It is unlikely that vowels occur either initially or finally in dictionary entries (i.e., underlying forms). 'Initially' thus corresponds to 'after initial?' 'Finally,' on the other hand, as shown in Chap. II above, a variety of origins are possible. Thus (e.g.) q̓ʷəláde could come from *q̓ʷəl·ádeh, *q̓ʷəl·ádey, or even *q̓ʷəl·ádeyh (ignoring here the problem of [-l·-] Parallel sources for 'final' [o] would be *-oh, w, or wh.

[2]Perhaps an option in the semi-vowel rule.

The contextual (co-articulation) variants of vowels may be considered as the products of target-seeking commands and the constraints imposed by prior and/or future target-seeking commands. Depending on the particular set of commands used in the rules and the segments, certain command parameters (integer-values of Distinctive Features) may for a particular segment be free to assimilate, partly or entirely, to those of a neighboring segment.

For Twana, the following co-articulations occur in stressed vowels.[1]

1. e optionally develops a shwa offglide before [+back] consonants. Final before h, e has an allophone between lower-high [ɪ] and high [i].
2. o co-articulates for [+High] in the double environment š̌ - y, giving [u].
3. a co-articulates slightly and only for rounding, and only with a preceding consonant.
4. ə co-articulates strongly for rounding, again only with a preceding consonant. The 'remainder' allophone of ə́ is [á] while the (rare) allophone [ə́] is not well understood.

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[1]Consult Fig. 65 (a) and (b) for examples.

5. As is shown above, co-articulation concerns the features Round, High (and perhaps Low/Back); moreover, rounding affects only [+Back] vowels, and palatalization only $\begin{bmatrix}-\text{Back}\\-\text{Low}\end{bmatrix}$ vowels. The [+Low] vowel ɔ̰ is thus affected only vacuously by the rounding rule, while the [+Low] vowel ɛ̯ is not affected by either rounding or palatalization.

The following co-articulations occur in unstressed vowels.[1]

1. e has an optional ə-like offglide before [+Back] consonants, as when stressed.
2. o again co-articulates for [+High], in the rare double environment d-š.[2]
3. a again co-articulates for Rounding, again only with a preceding consonant.
4. ə co-articulates strongly for preceding rounding and palatality (High).[3] The 'remainder' allophone is [ə]~[a].[4]

Note that the rounded and palatalized variants of shwa have higher points of articulation than the 'main' allophones of o and e, respectively. This is an interesting aspect, so far as the Twana vowels are concerned, of the 'use of the articulatory space' commented upon above (Chap. IV, secs. 3.3.2 and 4.4.2.1).

5. ɛ̯ and ɔ̰ are, again, not affected by either rounding or palatality.

From the point of view of co-articulation, Twana shwa certainly behaves as if it were inherently more vulnerable to the influence of neighboring segments than the other vowels. This accords well with the converse notion that shwa is minimally precise and distinct, i.e., may be tentatively characterized as Lax.

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[1] See Fig. 65 (a), (b), (c).

[2] But not t-š. The case is excessively rare; were it supported by other examples, it would constitute evidence for an allophony rule for shwa to be passed through before the change of obstruency, for the case of t-š suggests that the d concerned is (at the point of operation of the rule) still a nasal (n).

[3] See Chap. IV, sec. 3.4 for rule-shape.

[4] Which seems (though not consistently) to be due to the influence of a velar, giving a 'lowering' effect.

IV.4.4.2.3. Length

Although individual factors making for differences in vowel-length have been widely discussed in descriptions of particular languages,[1] there is as yet little consensus concerning the exact inter-relations of these factors in a general theoretical framework. There is, in particular, no fundamental experimental evidence on which to base the notion of 'basic' length, an essential starting point in the process of calculating the quantative effect of one factor or another.

There are at least two different possibilities for choosing the 'basic' length: we may assume that there is a basic shortest (or longest) length, with various lengthening (or shortening) factors; or, we may assume that there is a (median) basic length which is shortened by some factors but lengthened by others.

Two kinds of influence on such a 'basic' length (of whichever kind), must be recognized. There are segment-internal ('intrinsic') factors such as Tense-Lax, Height, and Backness; and there are contextual ('extrinsic') factors such as stress, type and position of syllable, and nature of abutting segments. Note that for each factor, the ambiguity remains that we are unsure whether to assign a lengthening or a shortening rule or both.[2]

Assuming that the basic length is the shortest vowel, then lengthening rules (and combinations of them) would apply to stressed, open, or final syllables; to Low, Back, or Tense vowels; and to vowels before voiced obstruents, nasals, and spirants.

For Twana, a small sampling[3] has been made, from which the following findings are tentatively offered (Fig. 66).

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[1] E.g., Peterson-Lehiste (1960) for English, Elert (1964) for Swedish, Delattre (1939) for French.

[2] While the work of Kozhevnikov-Chistovich (1965) (e.g.) suggests a lengthening rule for V before voiced stops and nasals, Kim (1966) implies that both lengthening and shortening rules must apply, for voiced consonants and voiceless respectively. It is highly questionable whether this strategy should apply to such a factor as Tense-Lax, however; the 'basic' length should presumably be that of the Lax vowel.

[3] To be fully reported upon elsewhere.

	Duration in msecs (averaged, all environments)				
	ə	e	a	ɔ̰	o
Stressed	145	235	250	260	275
Unstressed	70	170	240	-	230
Proportion, stressed/ unstressed	2:1	4:3	20:19	-	9:7

Fig. 66.--Twana Vowel Duration

With results averaged over all environments, it is clear that the lengths of e-a-ɔ̰-o cluster as a group, as against the lower figure for shwa, for both stressed and unstressed vowels.[1] It is noteworthy that, however tentatively we must state this, the low vowel a is not longer than the vowels ɔ̰, o, as one might have expected on universal grounds:[2] this irregularity may well be attributable to the very strong degree of rounding in the Rounded vowels Most marked, however, is the difference in the loss of length for unstressed shwa, as seen from the figures giving proportions.

These data,especially when taken together with those for co-articulation strongly suggest that shwa behaves differently from the rest of the Twana vowels in a manner characteristic of a Lax vowel.

IV 4.4.2.4. Rule Correlation

From considerations of the canonical shape of stems, constituent structure, and surface contrast, there is little doubt that, granted its Lax nature, shwa has equal status in underlying shapes with the other Twana vowels. Thus,

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[1] The divergence is much greater than that for English

	ə́	éɪ	á	ɔ́	óu	
Cf. English,	181	200	265	250	222	} Peterson-Lehiste(1960) Table 1, p. 702.

[2] We expect that, for a given degree of Backness, lower vowels will be longer; for Twana, length seems to correlate better with Roundness. Cf. the neutralization of k-k^{w} (etc.) before Rounded vowels (see Chap. IV, sec. 3.6).

those aspects of the behavior of shwa which distinguish it from the other vowels are likely to be explicable in terms of the same Laxness.[1]

The rules which concern shwa primarily are those by which unstressed vowels are lost.[2] We may suppose that the process of vowel-loss proceeds in three stages:[3] unstressed vowels revert to shwa, and shwa gives h, which in turn either alternates with ? or is lost, in particular environments. Note that the motivation of an intermediate 'V to shwa' rule need not imply a reversion to some kind of 'neutral' vowel, a notion that becomes in any case difficult to maintain in the face of definitions of the speech-neutral tract such as that in SPE.

We may avoid the neutral-tract hypothesis and the difficulty attending it by assuming that certain unstressed vowels simply become [-Tense]. This is entirely consistent with the notion of a merger with shwa, since it is then only necessary to add a rule asserting that unstressed [-Tense] vowels lose voice, and thus also position of articulation.

A further indication of the weak (now, Lax) nature of shwa is that it is the only vowel to be lost in the immediately pretonic syllable of the stem.[4] No special rule or condition in a rule need be employed to guarantee this, however; the major vowel-loss rule deals only with post-tonic vowels, and will make certain of these [-Tense]: <u>all</u> unstressed [-Tense] vowels will then lose voice, a rule that will also of course affect those (underlying) shwas in pretonic position. All voiceless syllabics will then lose Position.[5]

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[1] Implicit here is the assertion that all unstressed shwas of whatever source have the same allophones.

[2] Those rules connecting shwa with h, and where h is an environmental segment, are discussed under 'Tense-Lax in consonants,' in the following section (Chap. IV, sec. 4.4.3).

[3] And not <u>two</u>, as supposed in the Summaries of Rules so far.

[4] See Chap. II, sec. 3.3 for the motivation for losing <u>all</u> underlying shwas when unstressed, and replacing certain of them through the general shwa-insertion rule. See also Chap. II, sec. 11.

[5] It is not clear what status to assign to the cover-symbol [Position] (position of articulation), although its use seems clearly justified here.

The rules concerned (without their environments) are

1. $\begin{bmatrix}+\text{Syllabic}\\-\text{Stress}\end{bmatrix} \longrightarrow [-\text{Tense}]$

2. $\begin{bmatrix}+\text{Syllabic}\\-\text{Tense}\\-\text{Stress}\end{bmatrix} \longrightarrow [-\text{Voice}]$

3. $\begin{bmatrix}+\text{Syllabic}\\-\text{Voice}\end{bmatrix} \longrightarrow \begin{bmatrix}-\text{Syll.}\\-\text{Pos.}\end{bmatrix}$

IV.4.4.3. In Consonants

IV.4.4.3.1. General

As has been shown, Twana b,d derive from nasals, with the concomitant specification [-Tense] automatic to segments which are spontaneously voiced. The change of obstruency can by no means be accompanied by a change of tenseness, since voice (which is precluded by tenseness) is retained. Output b,d are thus [-Tense].

So far as the voiceless stops are concerned, it is obvious that complete closure of the glottis requires tenseness[1] for the ṗ series. On the other hand, it seems we must also postulate tenseness[2] for the plain p series, which shows moderate to strong aspiration, with neither allophonic voicing[3] between vowels nor voice-assimilation.

IV.4.4.3.2. The Behavior of h/ʔ

A number of the rules concerning h/ʔ suggest that they are inherently weak consonants. They are lost in Attenuative reduplication,[4] they allow

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[1] At least at the vocalis muscle. Cf. fn. 1 of Introduction to Tense-Lax, p. 217.

[2] As well as [-voice]. The dual criterion is: plausible rules, plus plausible output specification.

[3] Cf. Tillamook, as described in Thompson (1966). 'Plain obstruents t,c,c̆,k,q,k^w,q^w are regularly partially or fully voiced in position before vowels.' For Tillamook, then, one might assume [-tense] stops. However, the fact that these stops are aspirated when voiceless obscures matters. The question will be taken up in another place.

[4] The loss of h, whether in reduplication or before a consonant, is

vowel-assimilation across them, and they metathesize towards the stress. We note particularly the relation between shwa and h as products of stresslessness in vowels, and that between h and ? both in their relation to stress and in their alternation in the neighborhood of non-syllabic sonorants.

The loss of h/? as first element in reduplication parallels the loss of voiced ([-Tense]) consonants as first element in cluster-resolution.[1] The possibility of vowel-assimilation across h/? , on the other hand, is to be attributed to the lack of an oral articulation for the latter, with the result that total co-articulation may occur, dominated of course by the stressed vowel. Note that vowel-assimilation does not occur across b,d, which are assumed to be [-Tense]: in turn, it is difficult to correlate glottal-metathesis (stress-attracted) with the feature Tense-Lax at all.

The hypothesis (Chap. IV, sec. 4.4.2.4) that h derives from unvoiced stressless Lax vowels which have lost 'position' is, however, altogether consistent with the characterization of h[2] as [-Tense].

It remains to reconcile this view of h as a Lax Sonorant with the functioning of certain other rules of Twana phonology. The rules concerned are those for laryngeal affection and those for the treatment of geminate vowels in the reduplication for the Attenuative.

So far as the rule for laryngeal affection of e,o is concerned, no special problem arises; these vowels simply assimilate in height to the [+Low] features of the laryngeal. However, the effect of h on shwa involves in addition a change of tenseness, for shwa becomes a.

Similarly, taking the rules for the behavior of geminate vowels before

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in no way parallel to the sporadic loss of the spirant element of x^w in fast speech. Whether or not x^w is in any way to be considered as alternating with some kind of velarised labial, Tense does not seem to be implicated for the non-Low continuants.

[1] It is thus worth considering whether the cluster-simplification referred to might not be better motivated by the use of [-Tense] in specifying the first segment. On the other hand, it does not seem feasible to collapse the rule for loss of initial h/? with that for cluster-resolution with initial b,d, since the former rule is much earlier than the latter.

[2] h → ? in /R' is a Dissimilation--of [Tense], or [Cont]?

h, we see that while stressed shwa and geminate unstressed vowels (including shwa) behave in the same fashion before h, viz., they dissimilate to e, shwa must simultaneously become [+Tense].

At least two solutions are possible, for the motivation of the reversal of tenseness in shwa in these rules. We might allow the rules to generate [-Tense] segments corresponding to a and e (for the əhC and geminate-shwa situations respectively), adding a merger rule at a very late stage of the grammar; such a rule must precede the rules for assigning length to Tense and Lax vowels.[1] Alternatively, a re-examination of the rules themselves discloses the motivation required.

For the shwa-a rule, it is admittedly ad hoc to attribute the change of tenseness to the environment -hC. On the other hand, the behavior of geminate vowels before h may well be looked upon as a complete dissimilation. The vowels all give geminate /ee/; thus, the affected vowels are all [+Back], o is also [+Round], a is also [+Low], while shwa is also [-Tense]. Now where h is [+Low], [+Back], and [-Tense], all geminates may be said to undergo maximal dissimilation from h: thus, o,a, and shwa lose backness, o loses roundness, a gains height, while only shwa changes tenseness.

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[1] Equally ad hoc would be the device of assuming that geminate vowels are automatically [+Tense]. This, requiring an extra rule, is not only ad hoc but also less economical than the 'dissimilation' rule I at length assume. Any attempt to connect this shift to e for geminate vowels with the notion that e is the nearest Twana vowel to the speech-ready tongue stance seems foolhardy: not only is e not implicated in the general loss of vowels in any special way, but it is by no means established that the tongue position for 'speech-ready' is substantively a universal (but compare Chap. IV, sec. 3.3.1).

IV.4.5. Twana Distribution of Manner Features

	p̓	p	-	b	m	w	e	a	o	ə
	t̓	t	-	d	n					
	c̓	c	s	ʒ	-					
	ƛ̓	-	ɬ	-	-	l				
	č̓	č	š	ǰ	-	y				
	k̓(w)	k(w)	x(w)	g(w)	-					
	q̓(w)	q(w)	x̣(w)	-	-					
	ʔ	-	h	-	-					
Continuant	-	-	+	-	-	+	+	+	+	+
Inst. Release	[c, ƛ', č = -] +	+		[ʒ, ǰ = -] +	+	+				
Raised larynx	+	-	-	-	*[1]	*[1]		-	-	-
Tense	+	+	? [h = -]	-	-	-	+	+	+	-

Fig. 67.--Manner Features (matrix)

[1]Redundancy rule: 'If [+Glottal constriction], then [-Raised Larynx].' For segments m n w l y, [+Glottal Constriction] (probably) only occurs as result of glottal absorption, hence not in dictionary entries.

IV.5. Source Features

IV.5.1. Heightened Sub-Glottal Pressure

It is clear from the discussion in SPE referring to the voiced aspirated stops of languages like Hindi, that 'Heightened sub-glottal pressure' is to be considered a feature independent of Tense. It is not clear, on the other hand, whether Twana voiceless stops are to be considered to employ the former feature as well as the latter, even if redundantly.

Comparing degrees of aspiration for Twana voiceless stops and Korean

aspirated stops, for instance, there seems no reason to postulate [+Heightened s-g pressure] for Twana. Since there are no rules in the phonology of Twana that could conceivably employ this feature, it is difficult to see what further kinds of evidence could be brought to bear on the problem.

IV.5.2. Voice

The Twana segments for whose output specification it will be necessary to include [+Voice] are the voiced Sonorants (V,l,N) and the voiced obstruents b,d. As was pointed out in Chapter I, section 3, Voice is not distinctive in dictionary entries but must nevertheless be specified for all segments entering the grammar, for reasons rehearsed. Use was, moreover, made of this requirement: the environment "Resonant" in the rule for h $\longrightarrow$? was to be simply specified, since the segments concerned are in fact the class of voiced consonants.

However, as was pointed out above (Tense-Lax and h/? , Chap. IV, sec.4.4.3.2) it is feasible to motivate the cluster-resolution rule (involving voiced consonants) as a parallel to the rule for h/? - deletion in reduplication, by specifying the voiced consonants as [-Tense] rather than as [+Voice].

It is obvious that the h $\longrightarrow$? rule might equally well employ [-Tense] in the specification of the "Resonants," with the apparent result that Voice plays but a minor role in Twana phonology.

IV.5.3. Stridency

As has been discussed above (Instantaneous Release, Chap. IV, sec. 4.2), stridency is to be equated not simply with 'non-instantaneous release', which pertains to both continuants and affricates, but rather with greater noisiness on the part of one member of a pair of otherwise identical continuants or affricates.

Thus the contrast between Twana t vs. c is conveyed by the value of the feature [Instantaneous Release] and not by [Strident]. On the other hand, non-distinctive Stridency must be marked for all segments not covered in this respect by redundancy rules.[1] It is thus necessary to note that Twana s,c,č,š,ǰ are redundantly [+Strident].

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[1] For instance, Vowels are [-Strident] by a redundancy rule.

The pair x^{w} -$\underset{\cdot}{x}^{w}$ differ by stridency, but since they are phonetically parallel to the [+Back] pair $(\overset{\cdot}{k})(w)$ - $(\underset{\cdot}{q})(w)$ already distinguished by [High], this difference must be considered non-distinctive.

Thus stridency, like voice, plays no significant role in Twana phonology.

		p̀			t̀				ć		x́		č̀				k̀	k̀ʷ			q̀	q̀ʷ									
		p	b	m	t	d	n	s	c	ǯ	-	ɬ	č	j	š	k	kʷ	g	gʷ	q	qʷ	(x)	xʷ	ẋ	ẋʷ	w	l	y	ʔ	h
Major	Sonorant	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+
	Consonant	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	+	-	-	-
	Syllabic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cavity	Labial	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
	Anterior	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-
	Coronal	-	-	-	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-
	High	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	-	-	+	+	-	-	-	-	+	-	-
	Low	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+
	Back	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	-	-	-	+	+
	Round	+	+	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-	+	-	+	-	+	+	-	-	-	-
	2nd'y Ap.	-	-	+	-	-	+	-	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-
	ʔ-constric.	±	-	(±)	±	-	(±)	-	±	-	+	-	±	-	-	±	±	-	-	±	±	-	-	-	-	(±)	(±)	(±)	+	-
Manner	Continuant	-	-	-	-	-	-	+	-	-	-	+	-	-	+	-	-	-	-	-	-	+	+	+	+	+	+	+	-	+
	Inst. Rel.	+	+		+	+			-	-	-		-	-		+	+	+	+	+	+								+	
	Raised lar.	±	-	-	±	-	-	-	±	-	+	-	±	-	-	±	±	-	-	±	±	-	-	-	-	-	-	-	+	-
	Tense	+	-	-	+	-	-		+	-	+		+	-		+	+	-	-	+	+					-	-	-	+	-
Source	Voice	-	+	+	-	+	+	-	-	+	-	-	-	+	-	-	-	+	+	-	-	-	-	-	-	+	+	+	-	-

Fig. 68.--Distinctive Features of the Twana Consonants[1]

[1]For vowels, see Chap. IV, secs. 3.3.2 and 4.4.2.4.
± = A segment occurs for each value in the dictionary, and the output.
(+)=Probably only as result of glottal absorption; hence only in output segments.

IV.6.1. The Distinctive Features of the Twana Consonants

APPENDIX I

TWANA TEXT

I.1. A Note on the Transcriptions

The Text of the Tale is given in three parallel transcriptions.[1]

1. Modified IPA. I employ, largely for typographical convenience, $\check{s}$, $\check{c}$, $x^{(w)}$, ɬ, $l_{\bullet}$ for ʃ, tʃ, $\chi^{(w)}$, ɬ and 'syllabic l,' for the consonants. So far as the vowels are concerned, I use [ae] in the Tale (as against the more convenient single symbol [ɛ] in the main text of the thesis) for the slightly lowered mid-front vowel; and [ɔ^] for the slightly raised mid-back rounded vowel. Rounded shwa is [ɔ$^{\vee}$].[2]

2. Approximately phonemic. This transcription corresponds to a representation of surface contrasts (presented in Corpora Figs. 48-49 in Section 1 of Chapter IV, Phonetic Output); note that I also represent the syllabic-offglide allophone of ɬ, thus $ɬl_{\bullet}$.

3. Systematic phonemic. This transcription gives the morphemes their dictionary representation, i.e., the representation which is submitted to the Phonological rules of the grammar.[3]

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[1] This unusual step was dictated by a concern to meet the need of Salishans as well as general linguists. Since it is the 'broad' (surface contrast) transcription that will meet the criticism of many general linguists, it must be noted that some kind of 'phonemicization' is required if texts are to be printed. An IPA representation is much too cluttered on the one hand, while morphophonemic contractions obscure important points of interest. On the other hand, texts can hardly be 'read' if they are to be transcribed in Systematic Phonemes, for many shapes must be submitted to large numbers of rules if they are to be pronounceable.

[2] For the Appendices, [ɔ$^{\vee}$] is used only in the 'phonetic' transcription of the Text of the Tale, as is [a] for *a = /a/.

[3] √ indicates a putative root, wherever this is clear to me.
- indicates a morpheme-boundary. Always given for underlying forms; given for surface representations only when necessary for the argument.

Note: *e, o, a, ə : but / i, e; u, o; a; ə /

I nowhere represent either speed of utterance or intonation, although the Commentary (sec. 5, passim) mentions further P-processes due to extra (undefined) speed of utterance.

I.2. A Note on the Tale

Although I have given the Tale a neutral title, it is really part of a corpus of Twana tales[1] concerning the 'transforming' functions of the world-changer and culture-giver Duk^{w}ibaɬ, chosen as supplementing the two tales concerning Duk^{w}ibaɬ given by Elmendorf (1961, Myths 2 and 3).

The present tale links Duk^{w}ibaɬ to both the myth-world and the present-day world.[2] In it, the Duk^{w}ibaɬ is seen in two episodes of his journey, a journey whose purpose is the preparation of the environment and the people for each other. The two episodes here presented are unusual in having no specific location,[3] although the Twana culture-area (Hood's Canal and its environs) is clearly implied: Loon goes 'down to the bay' (informant's translation); the Twana sə́dak^{w}, 'sea, big water';[4] and Duk^{w}ibaɬ proceeds 'along the beach,' i.e., the Canal itself.

It is important that the behavior of Duk^{w}ibaɬ is in no way to be interpreted as punitive or merely spiteful in his treatment of the three 'people' in the tale. Although arbitrary in his choice of transformations, Duk^{w}ibaɬ is in fact performing part of the essential task of providing 'food for the future generations.' It is not without interest that whereas the provision of animals as food for mankind is fundamental to all creation myths, their creation out of men is an uncommon variant.

A few points in the text require explication in terms of the general

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[1] I do not know just how widespread the Duk^{w}ibaɬ tales are over the Salish, or perhaps even neighboring language-speaking areas.

[2] For the cosmological beliefs of the Twana, see Elmendorf (1960), pp. 535-537.

[3] Compare Elmendorf (1961). The episodes of the 'Journey of the Transformer' (No. 12 in my own unpublished text collection) are attached to quite specific place-names.

[4] 'The Bay' seems to refer to Annas Bay, where the Skokomish River empties into Hood's Canal.

cultural background. For ease of reference, these are here given sentence (S) by sentence.

S.1. 'They heard about it.' The reference is to the coming of Dukʷibał.

S.2. 'Shag marked Loon.' The characters are two people, although given their later, non-human names. These two have decided to 'dress up' for the imminent visit of Dukʷibał.

S.4 and S.23. 'There was Dukʷibał, watching.' It is perhaps implied that Dukʷibał approached invisibly: on the other hand, the power to render himself invisible is, to my knowledge, nowhere explicitly attributed to Dukʷibał.

S.17 and S.34. The new, non-human identities of Shag, Loon and Filer are not made explicit in Dukʷibał's speech. For Shag and Filer, Dukʷibał performs an act symbolic of the transformation; for Loon, on the other hand, only the characteristic 'hollering' is presented. In each case the story-teller, chorus-like, supplies the explicit identity. To the listener, the added dimension of anticipation is given by the names of the characters involved.

S.22. 'It's my gift for Dukʷibał.' Although unclear from the immediate context, it was explained by my informant that Filer's intention is to murder Dukʷibał. If 'gift' is the correct gloss (see Note 80, Appendix I, sec. 5), Filer's comment is ironically evasive, as compared with the naive lie of Shag and Loon (S.9). In both cases covert, if not overt recognition of Dukʷibał is implied.

I.3. Text and Interlinear Translation

S.1.

[tólastəbduxʷ ʔo q̓oʔóla wɨł báčad .]

/ túlastəbdəxʷ ʔu q̓uʔúlə wəł báčad /

\$ √tól-a-st-m-nəxʷ # ʔo # √q̓oʔóləh # wəł # √mákan \$

1 2 3 4 5 6 7 8 9

They heard about it, Loon and Shag.

S.2.

[ˀədˀóy   x̣alˀátəbduxʷ   q̓oˀóla   ˀo bə́čad   ˀədə   ˀasx̣̌ół .]

/ ˀədˀúy   x̣əlˀə́təbdəxʷ   q̓ʷuˀúlə   ˀu báčad   ˀədə   ˀasx̣̌úł . /

$ ˀən #√hóy # √x̣álˀ - ə́-t-m-nəxʷ # √q̓oˀóləh # ˀu # √mákan # ˀə-t-ə- ˀas-√x̣̌ół $

10 11 12 13 14 4 5 7 6 9 15 16 17

and then Shag marked Loon with black.

S.3.

[ṗkʷə́duxʷ   təsuxʷtálˀčəs   ˀəté   páq .]

/ṗkʷə́dəxʷ   təsəxʷtálˀčəs   ˀətí   pə́q ./

$ √ṗə́kʷ-ə́-nəxʷ # t-ə-s-əxʷ- √tálékan-as # ˀə -t-é - √páq $

18 13 5 15 19 20 21 22 15 23

He spotted his back with white.

S.4.

[qə́ˀwe bˀas.ə́tədbətəb dúkʷebəł   ˀəslalˀə́bətəbˀəł]

/qáˀwi bˀassə́tadbətəb dúkʷibał   ˀəslalˀábatəbˀəł /

$qə́-ˀweh # ˀəm # ˀas- √sə́t-a-n-mt-m # √nókʷemał # ˀas-la-√lə́ˀm-a-t-m-ləł $

24 25 26 16 27 28 4 29 16 30 31 2 14 4 32

There was Dukʷibał, too, standing watching them.

S.5.

[xʷpósəbduxʷut x̣éˀduxʷuduxʷ dúkʷebəł, ˀət   łəwáq̓ədəxʷ]

/xʷpúsabdəxʷət x̣éˀdəxʷdəxʷ   dúkʷibał ˀət   łəwáq̓ədəxʷ /

$√xʷə́p-ós-a-m-nəxʷ#ət #√x̣éˀ-nəxʷ-nəxʷ #√nókʷemał #ˀən # √łəwə́q̓-nəxʷ $

33 2 4 5 34 35 5 5 29 10 37 5

Looked up and saw him, Dukʷibał, and it frightened them

S.6.,S.7.

[ˀəd hóy , bə́łəcəb beˀæˀáe x̣č̓ədubčqəˀwi .]

/ ˀəd húy báłəcəb biˀeˀéx̣čədəbč qaˀwi /

$ ˀən #√hóy #√máł-n-s-m # me-ˀe√ˀə́x̣kn-m-k # qə́-ˀweh $

10 11 38 39 40 4 41 42 4 43 24 25

And then, he asks them: 'What are you doing?'

S.8., S.9.

[ʔó . dáɬq̓ʷbetéqʷab . kʷɔʸdátəbdux̌ʷ ʔo dúkʷebaɬ teč̓éʔwi]

/ ʔú . dáɬq̓ʷbitíqʷab . /kʷədátəbdəxʷ ʔu dúkʷibaɬ tič̓íʔwi /

$ ʔó $ ʔəná-ɬ # q̓ʷ # me-√téqʷ-a-m $√kʷə́n-á-t-m-nxʷ#ʔo#√nókʷemaɬ # t-e-ké-ʔweh #

44 45 46 47 41 48 2 4 49 2 14 4 5 6 29 50

'oh. We're just playing.' Dukʷibaɬ took that,

S.9.

[tədəwbəšqqʷéčqtəwulbəsʔəɬ]

/ tədəw bəšaqʷíčatəwəlbəsʔəɬ /

tə-nxʷ-me-√xáqʷ-ékan-t-wl-mn-as-wəɬ $

15 5 41 51 21 14 52 53 22 32

what they were staining each other's backs with.

S.10, S.11.

[šaqʷáʔtəbdux̌ʷ báčad . ʔasx̌óɬ .]

/saqʷáʔtəbdəxʷ báčad . ʔasx̌úɬ . /

$√xáqʷ-á-ʔ-t-m-nxʷ # √mákan $ ʔas-√x̌óɬ $

51 13 54 14 4 5 9 16 17

He stained him, Shag: he was black.

S.12.

[cɔ́ ʔədáduxʷčq̓ʷskáwɬəbs ɬaxʷáʔwat .]

/có ʔədádəx̌ʷčq̓ʷskáwɬəbs ɬaxʷáʔwat ./

$√cóh # ʔəná-nxʷ-k # q̓ʷ # s-√káwɬəm-as # ɬ-axʷ-á-ʔwát $

55 45 5 43 47 19 56 22 57

'Now you'll just be food for the future generations.'

S.13, S.14.

[hédɑbdux^{w} qo̯ʔóla ʔəx^{w}o tesédɑk^{w} . ʔəq^{w}státɑłqab.]

/ hídabdəx^{w} qu̯ʔúlə ʔəx^{w}u tisídak^{w} . ʔəq^{w}státałqəb. /

$∫hén-a-m-nx^{w} # ∫qo̯ʔóləh # ʔəx^{w}o # t-e- ∫sén-ak^{w} $ ʔəq^{w} # s-tá-∫táł-q-m $

58 3 4 5 7 59 15 68 61 19 30 62 63 4

Loon went to the bay. He went along hollering.

S.15.

[hédɑbdux^{w} suʔwut báčɑd ʔəx^{w}o]

/hídabdəx^{w} səʔwət báčad ʾəx^{w}u /

$∫hén-a-m-nx^{w} # s-∫ʔwát # ∫mákan # ʔəx^{w}o #

58 3 4 5 64 9 59

He went along, what's-his-name, Shag, to

S.15, S.16.

[tesɑdux^{w}łáq^{w}ɑq^{w}ɑłcáʔidux^{w}təłsʔɑs.átɑdəbəc]

/tisədəx^{w}łáq^{w}aq^{w}əłcáʔidəx^{w}təłsʔassátadbəts /

#t-e - s- nx^{w}-∫łáq^{w}-éq^{w}an $ ł-cáʔy-nx^{w} # tə-ł-s-ʔas-∫sát-a-n-mt-as $

15 19 5 65 66 67 5 15 68 19 16 27 28 22

the 'wind-fall' . There's where he'll be standing.

S.17.

[hóydux^{w}ubǰ́q^{w}obɬš]

/ húydəx^{w} bóq̓^{w}ubəš /

$∫hóy-nx^{w} # ∫bóʔq-omx $

11 5 69 70

He became 'Duck.'

S.18, S.19.

[ɬáɬšɪdubdux^{w} dúk^{w}eba ł , he$^{?}$ɔ́$^{\wedge}$ $^{?}$ač təsɬáčɪ .]

/ ɬáɬšədəbdəx^{w} dúk^{w}ibał , hi$^{?}$ó $^{?}$ač təsɬáči ./

$∫ɬáɬ-xn-m-nx^{w} # ∫nók^{w}emał $ ∫he$^{?}$ó-h # $^{?}$ák # tə - s-∫ɬáɬáke $

71 72 45 29 73 74 85 15 19 76

Duk^{w}ibał set off again. He was coming along, up the beach.

S.20, S.21, S.22.

[déšacədux^{w} tečé$^{?}$wi beyəqáb . yáqəyáq, dəsadábš

/díšacədəx^{w} tičí$^{?}$wi beyəqáb . yáq yáq . dəsədábš

$∫néx-a-n-s-nx^{w} # t-e-ké$^{?}$weh#me-∫yáq-á-m $∫yáq #∫yáq $ n-s-∫nám-x #

77 2 39 40 5 50 41 78 13 4 78 78 79 19 80 81

He got to that one filing 'Yáq Yáq' '(It's) my gift for

S.22, S.23.

[łecədúk^{w}eba ł . dáx^{w}ub $^{?}$as.átadbədux^{w} dúk^{w}eba ł $^{?}$əsla l$^{?}$ábad .]

/łicədúk^{w}ibał . dáx^{w}əb $^{?}$assátadbədəx^{w} dúk^{w}ibał $^{?}$əslal$^{?}$ábad ./

ł-e-t-s-∫nók^{w}emał $ ∫náx^{w}-m # $^{?}$as∫sát-a-n-m-nx^{w} # ∫nók^{w}emał # $^{?}$as-la-∫lá$^{?}$m-a-n $

82 40 29 83 4 16 27 4 5 29 16 30 2 39

Duk^{w}ibał There stood Duk^{w}ibał, watching him.

S.24, S.25, S.26.

[báłəcəbdux^{w}, be$^{?}$e$^{?}$édu$^{?}$wutč qa$^{?}$wi , be$^{?}$æ$^{?}$éxčɪdubčqa$^{?}$wi .]

/báłəcəbdəx^{w}, bi$^{?}$i$^{?}$íde$^{?}$wətč qa$^{?}$wi , bi$^{?}$e$^{?}$éxčədəbč qa$^{?}$wi ./

$∫máł-n-s-m-nx^{w}$ me$^{?}$e∫$^{?}$ éna$^{?}$wət-k # qá-$^{?}$weh$ me-$^{?}$e∫$^{?}$éxək-a-n-m-k # qá-$^{?}$weh $

38 39 40 4 5 41 84 43 24 25 41 85 4 43 24 25

He asks of him: 'Whatever are you saying? Whatever are you doing?'

S.27, S.28, S.29, S.30.

[ʔó . ʾədačəq̓ʷbeyəq̓ád teš́áwʔ . háyʔ heʔáx̣ʷaɬ . č́ábaš .]

/ ʔú . ʾədáčəq̓ʷbiyəq̓əd tišáwʔ . háyʔ hiʔə́x̣ʷaɬ . čábaš /

$ ʔó $ ʔəná-kn # q̓ʷ # me-∫yə́q-ə́-n # t-e-∫xáwʔ $ háyʔ # ∫héʔə́x̣ʷaɬ $∫kám-a-x $

44 45 86 47 41 51 13 16 15 87 88 89 90 2 8

'Oh, I'm just filing this bone.' 'Give it to me.' He gives it to him.

S.3, S.32.

[ƛ̓cátəbdux̣ʷ ʔəxʷo təšč́ɪlʔášɪs . có^ ʔəsóɬldux̣ʷ .]

/ ƛ̓cə́təbdəxʷ ʔəxʷu təščəlʔášəs . có ʔəsúɬdəxʷ . /

$∫ƛ̓ə́k-ə́-t-m-nxʷ #ʔəxʷo # tə-s-∫kə́ləh-xn-as $ ∫cóh #∫ʔəsól-h-nxʷ $

91 13 14 4 5 59 15 19 91 72 22 55 93 74 5

Puts it on him, on his front leg. 'Now go along!'

S.33, S.34.

[ʾədáčq̓ʷɬskáwɬəbs ɬaxʷáʔwət . hédəbdux̣ʷ sx̣ʷéšɪdux̣ʷ .]

/ ʾədačq̓ʷɬskáwɬəbs ɬaxʷáʔwat . hídabdəxʷ sx̣ʷíššədəxʷ ./

$ ʔəná-k # q̓ʷ # ɬ-s-∫káwɬ-m-as # ɬ-axʷ-á-ʔwát $∫hén-a-m-nxʷ # s-∫x̣ʷés-xn-nxʷ $

45 43 47 68 19 56 22 57 58 2 3 5 19 94 72 5

You'll just be food for the future generations.' Off he went, got to be Deer.

I.4. Literary Translation

Loon and Shag heard that Dukʷibaɬ was coming, so they decided to dress up. Then Shag painted Loon black, but spotted him with white on his back. But there was Dukʷibaɬ, standing watching them.

They looked up and saw him, and they were frightened. Then he asked them: 'What on earth are you doing?' 'Oh, we're just playing,' they reply.

Then Dukʷibaɬ took the stuff they were painting each other's backs with, and stained Shag so that he was black all over. 'Now you'll just be food for the future generations,' he tells them. So Loon went down to the Bay, hollering as he went. And What's-his-name, Shag, he went along to

a wind-fallen tree, and there's where he'll be standing generally. He became 'Duck.'

Then Duk^{w}ibaɬ set off again, and came along the beach. He came to the one who was filing. 'Yə́ɋ, yə́ɋ' went the file. 'This is my gift for Duk^{w}ibaɬ,' said Filer.

But there stood Duk^{w}ibaɬ, watching him. He asks him: 'What's that you were saying? And what on earth are you doing?' 'Oh, I'm just filing this bone,' is the answer. 'Give it to me!' says Duk^{w}ibaɬ. He gives it to him. Then Duk^{w}ibaɬ claps it on Filer's arm, saying: 'Off you go now! You'll just be food for the future generations!'

Off went Filer, and now he'd become 'Deer.'

I.5. Commentary on the Text

I.5.1. Notes on the Text[1]

S.1. 1. *tól Root(?), 'find out.'

But possibly *√tó-1, with 1-directional. Cf. / tulúcad / 'North wind,' with *ócan, bound pronominal for 'mouth' and /tusəbádid/ , 'West wind,' i.e., 'from the mountain' (*s-mánen).

2. *a Transitive stem-formative.

Cf. S. 4, 5, 8, 20, 33

Contrast Note 13, on stem-formative for transitive.

3. *st Causative(?). Probably *s,'causative,' plus *t, 'transitive (general).'

4. *m (a) Pronominal is recipient of action (cf. Hess [1967] 'specific goal'). Cf. S.4, 5, etc.

(b) Action is for the interest or benefit of pronominal, as in S. 9 /k^{w}ədátəbdəx^{w}/, 'he took it' (see Note 49).

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[1] I am indebted to L. C. Thompson for much valuable criticism of an early draft of this Commentary.

Note: * indicates underlying representations.
// indicate surface contrasts (roughly, phonemic transcription).

5. *nəx^{w} (a) Probably *n "intentional' 'responsible' transitive (Hess 1967) *əx^{w} (or simply *x^{w}, with 'inserted shwa'), 'change of state.' (Cp. Dative [note 40] and General transitive [note 14] Cf. S. 2, 3, 5, 9, 10, etc. S. 32 /ʾəsúɬ̓ldəx^{w}/, 'go.' shows the same output for semantic imperative.

(b) Nominalizing prefix *n(ə)x^{w}.

S. 9 shows *n(ə)x^{w} - m(ə)n, as Instrumental frame.

S. 15 shows *n(ə)x^{w}-, in suffixless Nominalization.

S. 3 *s & (ə)x^{w}- treated in notes 19, 20.

(c) The apparently reduplicating /-dəx^{w}-dəx^{w}/, at S. 5 is treated in note 35.

(d) N.B. In fast speech /-dəx^{w}/ becomes /-dəw/. See S. 9 in text /tə-dəx^{w}-/ ⟶ [tədəw-].

N.B. It is aspect and not tense that dominates the Twana verb system. For some of the various verb affixes, see Fig. 69. Also the following notes. Cf. Progressive (note 41), Stative (note 16), Expective (note 68) (Fig. 72), Intensive (note 30), derived Incompletive (?) (note 74), əx^{w} change of state (note 5).

6. *ʔó Obviative article,[1] for use with Agent noun (not pronoun). Cf. S. 2, 9.

7. *qʷóʔóləh Noun stem only. Possibly contains * qʷóʔ , 'water.'

8. *w(ə)ɬ Conjunctive particle (NP + NP).

Compare * w(ə)ɬ, 3rd plural pronominal suffix (note 32).

9. *mákan Root(?), 'shag.' Possibly complex i.e., * mak-a-n, with *n Nominalizer suffix. For *ʀ Nominalizer, cf. S.3. *ék-a-n 'back' (note 21), S. 15 *éq^{w}-a-n 'head' (note 66).

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[1] But possibly to be compared with /-u/ in /ʾəx^{w}u/. See note 59.

S.2. 10. *ʔ(ə)n Conjunctive particle (S + S)

Cf. S.5 /ʔət~ət/ (notes 34, 36), S.6 /ʔəd/

11. *hóy (a) makes (S + S) Conjunctive phrase, in env *ʔ(ə)n& -

Cf. also S. 6.

(b) as root, 'become.' Cf. S. 17.

(c) elsewhere, also 'make, complete.'

(d) cf. also /húyʔ/, 'goodbye.'

12. *xə́lʔ Root, 'stain, smear, paint.'

Elsewhere, 'write, draw '

13. *ə́ Transitive stem formative; for a large class of roots, as in S. 9, 19, 27, 30, a copy of the root vowel. Contrast note 2.

14. t General transitive marker, as in S. 4, 7, 9, 10, 31 (see Fig.69). Compare 'intentional' (note 5), 'dative' (note 40).

15. *ʔ(ə)tə Complex Determiner (see Fig. 74[d]).

(a) *ʔə- 'by means of,' in env/ - & Article, as here.

Compare the usage in/biʔíɬastəb ʾətə q̆ubq̆ubə́xʷ/ ,

'he fed her on bones.'

*t- 'Definite' marker. Cf. *t, 'Completive,' with which 'Definite' is probably historically identical (cf. now parallel for *ɬ in notes 68, 82).

*e- Immediate interest (compare note 82 for morpheme-order in the environment / ɬ -)

*ə- Non-marked interest.

N.B. Compare 2nd person singular possessive *ʔe(s), as in /tiʔiskʷtábac/ (*t-e-ʔe-s-ʃkʷətábac) 'your husband '

(b) /ʔəte/ in S. 3.

/te / in S. 13, 15, 28.

/tə / in S. 9, 16, 19, 31.

/t/ in S. 22 (note 82).

(c) Compare also /tiči?wih/ of S. 9 (note 50), a Demonstrative.

16. *ʔas Stative prefix.

Cf. /ʔas- / in S. 4, 11, 16, 23.

/ʔəs- / in S. 4.

See footnote to note 5, for aspects.

17. ʔóɬ Root, 'black.' As in citation, so in running speech, most color words are Statives. Compare /ʔasc'íq /, 'red,' and /ʔasq̓ʷíx̣ /, 'green.' But contrast /pə́q/, 'white,' in S. 3 (note 23).

S. 3. 18. *p̓ə́kʷ Root, 'spot.' See Chap. II for the shwa root vocalism, and Fig. 75 for the shapes of roots.

19. *s Nominalizing prefix.

(a) Before root in S. 15, 19, 22, 31, 33, 34.

(b) Before further prefixes: Nominalizing S. 3 (note 19), S. 15; Stative S. 16; Intensive S. 14.

*(ə)xʷ Derivational prefix.

(a) In the present instance, the semantics of the derivation is unclear (see below note 21).

(b) Agent prefix, as in/s-(ə)xʷ-xə́lʔ-ə-b/ 'writer,' cf. x̣əlʔ

N.B. For function of -(ə)xʷ, 'change of state,' see note 5.

21. *tálekan Probably *√tál-ékan, 'back.' Citation form is /səxʷtálʔčəd/, showing *s-(ə)xʷ- prefix complex (see notes 19, 20, also 5). The bound pronominal for 'back' is /-íčad/(as in S. 9). In

the alternant /cəlíčad/,[1] it is difficult to account for the initial /c/-: a wholly unproductive metathesis must be supposed, from *s-t- to /ts/, with loss of morpheme-boundary. If we assume such a process to have occurred, then stress-alternation of a kind fairly common in Twana (see Chap. II, sec. 21) gives the alternants

(1) *s-(ə)x^{w}- tál-ekan gives /səx^{w}tál^{ʔ}čəd/, while

(2) *s- tal-ékan gives / cəlíčad/, assuming metathesis.

N.B. For loss of final *-n, see Chap. II, sec. 19.

22. *as Possessive 3rd singular suffix. /-as ~ -s /, by stress rule.

23. *pə́q Root, 'white.' But contrast other color words appearing as Statives, e.g., 'black' (note 17).

S.4. 24. *qə́h Particle partaking in a number of constructions.

(a) Here, exclamatory, in env/ *-^{ʔ}weh + S. 'my goodness!'

(b) In S. 25, 26, exclamatory, in env/ S + ^{ʔ}weh 'what on earth?'

(c) Elsewhere i) As Aux, as in /qá^{ʔ}wičəd qə^{ʔ}áhtəbəd / 'May I die'

ii) Negative, as in /x^{w}á^{ʔ}qəh, 'no''

and in /qəkʷɬəsəsq̓á^{ʔ}aɬəd/ 'There'll be no fish-run.'

iii) Possibility, as in /su^{ʔ}úcədəbčəqəɬ/ 'I can cook,' probably *qəh-ɬ, with *ɬ, 'expective, unrealized' (cf. note 68).

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[1] But *tál must also be glossed 'back,' as in /səx^{w}tál^{ʔ}q^{w}əd/, 'back of head,' where the bound pronominal for 'head' is *éq^{w}an, /-iq^{w}ad/.

*ékan for Twana, despite *ek for other Salish languages. Of course, *ekan can be considered complex, e.g., *ik-a-n, where n is a Nominalizing suffix (cf. a similar treatment for *éq^{w}an (note 66) as *éq^{w}-a-n is possible).

25. *ʔweh Particle(?), 'existence.'

(a) Cf. here, in env/ *qəh - , see note 24. Also in S. 24, 25.

(b) Question Yes-No) particle, as in /pə́qəʔwi/, 'is it white?'; cf. pə́q 'white.'

(c) In /ʔwát/, 'who,' 'person,' as in (S. 15) /səʔwət/, 'what's his-name' (note 64), and /łaxʷáʔwat/ 'future persons,'(note

(d) In /tičíʔwi/, 'that one,' S. 9 (note 50)

24/25. N.B. /qaʔwi/ → /qaʔwə, qaʔw / in fast speech (cf./tičíʔwi/ note 5(

26. *ʔ(ə)m Particle, 'in addition, renewed activity' (Fig. 72).

Cf. /ʔəb cədíɬ/ 'he too';

/ʔəb ʔílal cə(h)/ 'he sang again.' *cəh here is optional.

27. *sə́t-a-n Stem, 'stand,' = *sət, root; *a , stem-formative (cf. transitive stem-formative as copy of root vowel, note 2); *n, 'transitive intentional' (note 39).

28. *m(ə)t Reflexive is possibly *t , or *m(ə)t. If *t, then *m is unidentified, since *m, 'specific goal' (note 4) is also present, finally. Cf. S. 16 for the same verb without final *m.

Cf. /biqə́sčəd/, 'I scratch it,' (with /qə́s/ 'scratch') vs.

/bəqsə́dəbətčəd/, 'I scratch myself' (with /bəqsə́d/, 'nose').

29. *nókʷemaɬ Proper name, 'Dukʷibaɬ.' The shape as well as the etymon is common to Puget Sound Salish and Twana.[1] No satisfactory etymology has so far been offered. If the underlying shape is indeed *nókʷimaɬ, then we must consider it an unassimilated loan-word in Twana, to be marked accordingly in the dictionary, for its shape contradicts Twana rules for vowel loss: it

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[1] I do not know how widespread this name is among Salish tribes.

should be **[dúk^{w}əbəɬ] (see Chap. II, sec. 11). A second ground on which this is an unassimilated loan lies in the allophony of the stressed vowel, for we hear [dúk^{w}eba ɬ],[1] with a [+High] vowel. Cf. /dók^{w}/, [dók^{w}], 'change.'

30. *la Durative/Intensive reduplication, C_1V_1 as prefix. Here, *lʔám (note 31). Cf. note 84. But Intensive is usually C_1V_1. Cf. S. 14 /tátaɬqəb/, 'holler,' from /táɬqəb/, 'shout' (note 62,63).

31. *lʔám(~ láʔm) Root, 'look.' Elmendorf's /láʔb/ makes the reduplicating more straightforwardly C_1V_1.

32. *ʔw(ə)ɬ Plural (3rd person only), Agent or Object (optional). Probably identical with *w(ə)ɬ, 'conjunction' for NP + NP (note 8).

S.5. 33. *x^{w}əp-ós Root *x^{w}əp, 'raise'(?). *ós, bound pronominal, 'face.' Cf. /x^{w}ácačəbčəd/, 'I raise (my) hand,' with bound pronominal *áki(h), 'hand.' The difference between *∫x^{w}əp and *∫x^{w}ác is not clear, but possibly the sub-analysis should be *x^{w}-p, *x^{w}-a-c.

34. *əɬ A variant of * ʔən, Conjunction (note 10).

35. *xéʔ Root, 'see.'

Apparently-reduplicating /-d x^{w}/ is a problem.

(a) It may be that /-dəx^{w}/ makes a derived stem /xéʔ-dəx^{w}/, in which case the second occurrence of /dəx^{w}/ = *n-(ə)x^{w} (note 5).

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[1] An allophony of stressed *ó heard again only in [dušúyay] 'wolf.' But see Chap. IV, sec. 4.4.2.

(b) These may be the exponents of a 'double object,' glossable as 'they saw him at it.'

36. * (ə)n See note 10.

37. *łəwə́ɬ̓ Root, 'afraid,' Cf. /ʔasčíɬ̓alčəd/, 'I'm afraid,' vs. /ʔəsłəwə́ɬ̓čəd/, with semantic distinction unclear. Whether we gloss 'it frightened them' or simply 'they were afraid,' 3rd person marker is optional, and here absent.

S.6/7. 38. *máɬ Root, 'ask.'

39. *t General transitive (note 14). Here, with Dative (note 40).

40. *s Transitive Dative (purpose, or even causative [?]). Cf., similarly, /ʔíwad/, 'invite, call': /ʔíwacədəxʷ/, 'call to him,' = * ʔéw-a-t-s-n-(ə)xʷ .

41. *mə Aspectual prefix, Progressive (cf. N.B. to note 5).

42. *ʔe-ʔéx̣kn Stem, reduplicating (intensive?). Probably *ʔéx̣k-n, Root *ʔéx̣, 'scrape' (here?). *k = ? . If the root (or, of course, complex stem) is *ʔéx̣(V)k, then the meaning of this element is unclear, owing to the idiomatic usage here. For *n, see note 5.

43. *k Second singular pronom. particle. From theTwana shapes (see Fig. 74[a]) there seems little point in paralleling Hess' (1967) (360.01) analysis, and taking /č/ (*k) as 'independent predication marker.'

S.8. 44. *ʔó Exclamatory particle, 'oh!'

45. *ʔ(ə)ná Auxiliary[1] 'just.' Cf. S.12, 28. Requires connective

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[1]Typically, the Auxiliary takes person markers, but not aspectual prefixes. This is a characteristic Salish syntactical usage (see note to Chap. I, sec. 1). For other adverbs in Auxiliary use requiring *q̓ʷ, cf. /hə́čq̓ʷ ʔasʔálah/, 'you look sick' (*hə́[?] 'seem') /cóq̓ʷ bót sɬ.áday təbəqʷíc/ 'there were only women dancing' (*cóh , 'only')

particle *ɫ̓^{w} (note 47), with ensuing surface strings of the shape *ʔ(ə)ná+person suffix +ɫ̓^{w} + Aspect prefix+root. For the shape /dá/ in fast speech, cf. S. 23 (note 83).

46. *ɬ Pronom. particle, 1st person plural, 'we, us.' Contrast *ɬ aspectual (note 68).

47. *ɫ̓^{w} Connective particle, in env/ Aux - Verb Phrase. If this is to be identified with the homophonous particle *ɫ̓^{w}, 'because,' then the common semantics suggested is perhaps 'evidential.'

48. *téɫ̓^{w} Root, 'play.' Cf. Nominalization /stíq^{w}ab/, 'game, toy.'

S.9. 49. *k^{w}ə́n Root, 'take hold of, hold.'

/k^{w}ədátəbdəx^{w}/ shows double transitive marking; *t, 'general transitive,' and *n, 'intentional.' We also note the use of the recipient suffix *m, here signifying 'for one's own benefit.'

50. *t-e-ké-ʔweh Demonstrative, consisting of *t, Definite; *e, near interest (note 15); *ké 'that'; *ʔweh 'existant' (note 25). *ké, is found only in Demonstrative.

N.B. In fast speech /tičíʔwə / (cf. note 25 for /qáʔwə/).

51. *xáq Root, 'stain.'

52. *w(ə)l Reflexive suffix.

53. *mn Nominalizing suffix, with *n(ə)x^{w}-root -.

*n is here lost (see n-loss, Chap. II).

S.10. 54. *ʔ The intermittent occurrence of /ʔ/ in such transitive constructions makes it uncertain, but paradigms suggest it may be an allomorph of *n 'intentional.'

S.11. Note here the juxtaposition of predictates, with 'sequential' implication. Thus (S. 10), 'He stained shag,' then (S. 11) 'so he was black.'

S.12. 55. *cóh Particle, 'let's.' Cf. /có bitíq^{w}abɬ/ 'let's dance.' Probably not identical with the homophonous *∫cóh, Aux fn. 1, note 45).

56. *káwɬəm Probably * káwɬ-m (or even * káw-ɬ-m), 'nourish,' here 'nourishment' (with *s nominal). Dictionary marking [not k → č] In /skáwɬəbs/, the final /-s/ is problematic. The construction looks like a Genitival: cf. /siʔəhás məʔ́əh/, 'dad's house,' from /siʔə́h/ 'house,' and /məʔ́əh/ 'dad.' Thus, here 'the nourishment of . . .' and the final /-s/ is really *as, 'possessive' (note 22).

57. *ɬ-ax^{w}-á-ʔwát Probably consists of

*ɬ, 'unrealized, future,' as in S. 16, 33 (note 68).

Cf. 'absent, fabled past,' as in Determiner in S.22 (note 82) and 'absent, yonder,' as in Adverb in S. 16 (note 67).

*ax^{w} 'those who,' as in Nominalizations of the type in prefix *n-əx^{w} (perhaps better, *n-ax^{w}) 'derived agent' as in S. 9 (note 5[b]). But possibly *a-x^{w}, with x^{w} 'Deictic, Directional' (cf. note 59).

*áʔwat is either (a) *∫ʔáwat 'last,' as in /ʔáwatčəd/ 'I'm last,' or (b) *á formative, -*∫ʔwát 'existant' (note 64).

S.13. 58. *hén Probably *∫hé, 'go' (cf. S.19 /hí́ʔ/, notes 73, 74), plus *n 'intentional.' Cf. /hiʔə́x^{w}aɬ / in S. 29 (note 89).

59. *ʔax^{w}ó́ Probably *ʔa (/ʔa ~ʔə /), 'subordinate,' with *x^{w}o,

'directional.'[1]

Cf. /ʔaxʷəʔwís/ 'up, upwards,' with /ʔwís / 'high.'

/tədíščəd ʔəxʷu sqʷuqʷóʔbəš/ 'I arrived at Skokomish,' and

/q̓ʷáʔ ʔəxʷu tisiʔə́h / 'far from the house.'

N.B. /q̓ʷúʔúləh ʔəxʷu.../ ---> /q̓ʷúʔúləxʷu / in fast speech.

60. *sénakʷ Probably *sén,[2] 'big'[3] although the citation form is /sisíd/, with reduplication. It is unlikely that the underlying shape is *s-ʃhén(a) (with *s, nominal, and *hén(a) as in note 58), since we do not expect h-loss immediately before a stressed vowel[4]. The second element is presumably *(a)kʷ, 'water,' although the usual Twana 'water' suffix is *(a)yakʷ, as in /ʔəsx̣ʷələ́q̓ʷiʔəkʷ / 'boiling water' (from /ʔəsx̣ʷələ́q̓ʷ/ 'burned,' plus *(ə)-yakʷ).

S.14. 61. *ʔəkʷ Probably *ʔə , 'subordinate,' with *kʷ , a determiner particle also found

(a) in one allomorph of 'plural,' as in /təkʷɬ[5] łáwalbəš/, 'lots of men' (/łáwalbəš/, 'man, Indian')

(b) in Negative, as in /xʷáʔqəkʷsqóʔodsəbs ʔu Jack /, 'Jack won't drink it' (*xʷáʔ-qəh-kʷ-s- stem+suffixes : cf. Notes 24 [ii], 19 [a]).

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[1] If 'Obviative' is related, then better to call *xʷ 'directional,' or even 'Deictic' (for it may also mean 'until'). Then *ó is 'Emphatic.'

[2] Compare the place-name /q̓ʷəlʔsíd/ 'Quilcene,' at the northernmost tip of early Twana territory.

[3] I find no bound pronominal for 'big,' although /písat/ occurs in place of /sisíd/ with plural nouns.

[4] *s-hén. may still be the origin of this form, if (e.g.) it were a loan from a dialect or language in which h is lost in this environment. Note that it is preferable in such a case to assume a Twana allomorph *en, rather than employ a special h-loss rule for a single form. Cf. *s-háboh 'tale,' where h is retained after s-nominal.

[5] Apparently kʷ ~ q̓ʷ. Cf. Chap. II, sec. 2.1. 'Plural types.'

62. *tá4 Root, 'shout.' With 'Intensive Repetitive' Reduplication, 'holler.' For Intensive/Repetitive in C_1V_1, compare /bipáčč̌əd/ 'I'm trying,' and /bipápačč̌əd/ 'I'm trying things on' (/pá č̌/, 'try').

63. *q Bound pronominal, 'language, speech.' Cf. /sq^{w}uq^{w}ó?bəšq /, 'Skokomish language.' Cf. the free form /slé?el?k^{w}əd/ 'language.' an Attenuative formation based on *s-∫lék^{w}-a-d.

S.15. 64. *s-?wát Here, the unstressed form, 'What's-his-name.' Probably better *s-?weh-at. See note 25 for * weh and its uses, and cf. S.10 /łax^{w}á?wat / (Note 57).
Cf. also /sə?wát4/ 'whose is it?' with *4 'unspecified.'[1]

65. *łə́q^{w} Root, 'lick, lap.' See note 66.
But this may be related to /łq^{w}ədá4/ 'the dead' (-*lh, cf. Chap. II, sec. 15.9).

66. *éq^{w}an Possibly *éq^{w}-a-n, with *a, formative, and *n Nominalizing (cf. *ékan as *ék-a-n at note 21, fn. 1).
This is the bound pronominal 'head.'
The form /tisədəx^{w}łə́q^{w}aq^{w}əd/, *t-e-s-n-x^{w}-∫łə́q^{w}-eq^{w}an, is probably an idiomatic expression for 'wind-fall' (i.e., 'wind-fallen tree'). I have assumed the idiom is 'lap-head,'[2] referring to the head of a fallen river-side tree.
Cf. Nominalizations entailing 'that which,' with /dəx^{w}- stem -bəd/, (as in S. 16), with the 'Actor' Nominalization here.

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[1] Or, 4 may be identical with 4 'directional.' Here /t-4/ (*t-4) → [*].

[2] The present expression should then be an 'Actor' nominalization. Cf. /bə́taq^{w}íq^{w}ad/ 'licking his head,' from *me- t̓áq^{w}-éq^{w}-a-n.

N.B. /sədəx^{w}ɬə́q^{w}aq^{w}ə d ɬcə́ʔidəx^{w} .../——► /sədəx^{w}ɬə́q^{w}aq^{w}ə ɬ cə́ʔidəx^{w} .../ in fast speech (loss of word-boundary. Cf. Chap. II, sec. 19 for loss of stem-final *n).

S.16. 67. *ɬcə́ʔy Possibly *ɬcə́yʔ, with glottal attraction (see Chap. II, sec. 3.3), Adverbial 'there'; with further sub-analysis, *ɬ-cə́yʔ , where *ɬ is Directional (but not 'unrealized, absent' (see note 57, 68) despite the semantic agreement: cf. /ɬiʔə́h/ 'here').

68. *ɬ Aspectual prefix, 'Unrealized.' (See note 57, N.B. to note 5, and notes 67, 82).

Contrast *ɬ 'lst person plural' (note 46).

S.17. 69. *móʔq Root, 'duck.' Note the neutralization of Rounding, with following * - omš, giving /bóʔq^{w}ubəš /.

70. *ómx Pluralizing suffix. Although the more specialized identification 'generic plural' would cover the present case, since the species 'duck' is involved, *ømx is not always generic in Twana. See Chap. II, sec. 2. Cf. *mx as bound pronominal for 'people, race,' as in /sq^{w}uq^{w}óʔbəš/ 'the Skokomish.'

S.18. 71. *ƛáƛ̓ Root(?), meaning? (See fn. to note 71/72.)

72. *xn Bound pronominal, 'foot.' Cf. S.31 /təščəlʔášəs/ (note 92), and S.34 /sx̣^{w}íššədəx^{w} / (note 94).

71/72. Since *ƛáƛ̓ does not re-occur in the Twana corpus, we may either attempt another analysis of /ƛáƛ̓šədəbdəx^{w}/, or seek parallels. (a) Other analyses. (i)**ƛáƛ̓x-n-m-n-əx^{w}, with **ʃƛáƛ̓x. Roots CVCC are rare, however: this would then be *ƛáƛ̓əx, which does not recur in Twana. (ii) **ƛáƛ̓-x+ etcetera. An *x suffix is normally Benefactive, however, and this seems not to be the

case here. Cf. S.30 /čábaš/ (note 81). (iii) *ɬáṯ-xn + etcetera is a plausible analysis, with *xn (note 72).

(b) Parallels. (i) Within Twana, it is tempting to seek a connection with /sɬṯáči / 'beach,' but see note 76 for difficulties. (ii) Squamish /n-ɬá?šn / 'sole of foot' (Kuipers, 1967) is a very attractive parallel,[1] for it suggests the etymology 'press foot' for Twana *ɬáṯ-xn, perhaps best now re-interpreted as *ɬá?-t (transitive)+ xn.[2]

S.19. 73. *hé?ó Probably *he?- ó, or *he-?ó. For *he(?), cf. notes 58, 89; for *(?)ó 'Emphatic,' cf. fn. 1 to note 59.

74. *h Aspectual suffix, 'Derived Incompletive.' Cf. Attenuative *h (Chap. III). Compare /hi?údəx^{w} /, 'come on!' and /hi?ódəx^{w}/, 'he was coming along,' and S. 32 /?əsúɬ̣ldəx^{w} / (note 93).

75. *?ak Preposition, 'in(to), along.'

76. *ɬáṯáke 'Beach.' Posibly *ɬəṯ-á-ken. Here, *ɬəṯ is almost certainly not connected with *ɬáṯ of S. 18 (note 71):

(a) Phonologically, /sɬṯáči / can only be derived from *s-ɬəṯ-

(b) Semantically, *ɬáṯ, 'press' seems remote from the present meaning.

On the other hand, consider Squamish /ɬə́s/ 'to land,

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[1] Especially in view of the connection implied (dictionary entry ʃɬî?, ɬa?, 'grab, seize, get hold of') with Squamish /ɬí?-t/, 'grab, tr.,' Coeur d'Alene /ɬi?/, 'crush by pressing,' and Kalispel /ɬe?/, 'to press, milk a cow': cf. Twana /beɬíčal?bəš / 'I'm milking the cow,' suggesting that Twana /ɬíč/ may be from earlier *ɬe? - t (transitive) - s (Dative transitive).

[2] A historical, not a generative re-interpretation. I suggest that ? was historically absorbed by t (giving *ɬáṯ). A similar history may be suggested for the č in /ɬéč- / 'squeeze' as element in 'milk,' in fn. 1 above.

go to shore', with Twana /bip̓t̓áčəbčəd/ 'I go near the beach (by canoe).' Even more suggestive is Coeur d'Alene /p̓ät̓/ 'be smooth,' and Thompson, Tillamook /čin/ 'mouth, edge' (but cf. Twana /úcad/). Thus, possibly 'smooth edge,' with loss of final *n as in a few forms like Twana /səbədbádi/ 'mountains,' (cf. /səbádid/ 'mountain').

In any case /-áči/ in this form is hardly to be identified with /-áčih/, bound pronominal for 'hand.'

S. 20. 77. *néx ~ *n-ʔéx Probably best *n-hé-x ; *hé, 'go,' with suffixes *x(?), *n 'intentional,' and *s 'Dative' (notes 27, 39, 40); giving 'get to, arrive at.'

S. 21. 78. *yə́q̓ Root, 'file.'

S. 22. 79. *n 1st singular possessive prefix.[1] Cf. its use with obligatorily nominalized verb roots, such as /dəsx̣áƛ̓/ 'I want,' *n-s-x̣áƛ̓.

80. *nám Probably *n-am, *n unidentified prefix; *am,m 'possession.' Cf. /təbəsəʔwádaš/ 'one having spirit power,' from /səʔwádaš/; and bəsqʷəbáyʔčəd/ 'I've got a dog,' from /sqʷəbáyʔ/. Cf. *ab in S.30 /čábaš/ (note 90)

81. *x Benefactive suffix. Cf. S.30 /čábaš/ (note 90)

79/80/81. Thus, 'my possession for the sake of,' i.e., 'my gift for.'

82. *ɬ-e-t Determiner (cf. note 15). *ɬ, 'distant, absent,' here 'fabled'; *e, Near interest; *t, Definite.

N.B. As with *t (see note 15), the aspectual *ɬ and determiner ɬ are probably historically identical. However, they behave differently syntactically: *ɬ as aspect 'unrealized'

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[1]Possessive markers are prefixes (1st, 2nd persons singular), or suffixes (the rest). (See Fig. 70.)

follows the *t Definite (as in S.16 /təɬs- /), while *ɬ as Determiner 'absent, fabled' precedes it, as in S. 22, the present case.

S. 23. 83. *náx^{w}-m Probably *náx^{w}-a-m (cf. /dáx^{w}abčəd/, 'there I was!'), where *na is to be identified with Auxiliary *ʔəná, 'just' (note 45). The variant occurs in fast speech.[1]

S.24/25. 84. *ʔe-ʔénəʔwət Reduplicating Durative Intensive (cf. *la-lʔám, note 30). For meaning, compare /sʔídəʔwət / 'What is it?' Compare also /ʔwát/(note 25), which suggests the analysis *ʔén-ʔwat (note 58 for *hén is relevant). Also interesting is Twana 'heart,' /yədəʔwás/, alternating with /ʔídəʔwət/.

WWE has /ídəwʔáčč /, 'what did you say?' showing glottal stop attracted by the stress, and *s, Dative (?).

S. 26. 85. *ʔé-ʔéxək-a-n Reduplicating Intensive (cf. *tá-taɬ-q-m, note 62). But the root is probably not *ʔéxək . Rather, compare /ʔəsxčád/, 'how?' from stem /xčád/. Cf. /xčád x^{w}u /, 'what did he say?' in WWE corpus, with the comment: 'used in enquiring about something not heard or understood correctly.'

S.27/28. 86. *kn First person singular suffix.

87. *xáwʔ Root, 'bone.' Free variants /šáwʔ ~ šáwʔ/, see Chap. IV, sec. 3.5. Dictionary marking [š → š optional].

S.29. 88. *háy Exclamation, 'come on, let's.' Cf. /háyʔ bəsaʔáčəb/, 'Let's work.' Cf. note 89 for possible relation to *hé(?) of note 58.

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[1] The subtlety of the distinction as well as the paucity of examples makes it difficult to decide, but present /ná- / may well be *na, whereas *ʔəná may in reality be *ʔə-ná. *ʔə might then be identical with *ʔə- 'subordinate,' as in /ə-x^{w}ú/ (note 59).

89. *hé-ʔɔ́x^{w}-aɬ *he is possibly to be identified with *háyʔ (note 88). But stressed *hé occurs, as in S. 13 /hídabdɔx^{w} / (note 58). Thus, *he here is better identified with *hé of note 58. A putative *ɔ́x^{w} is not found elsewhere; temporarily, we assume a stem *he-ʔɔx^{w}, 'bring.'

That the stem is not necessarily the whole form *he-ʔɔ́x^{w}aɬ is clear from the contrast /hiʔɔ́x^{w}aɬ / vs. /hiʔɔ́x^{w}ɔdɔx^{w}štɔbɔš / 'bring it to me.' *aɬ is clearly another morpheme.[1] *aɬ is probably to be identified with the composition-formative (often with adverbial force) found in /stibʔátaɬ x^{w}úʔbat / , 'man's paddle,' from /stibʔát/ 'male, man,' and /x^{w}úʔbat/ 'paddle'; cf. also /ʔɔsáʔlaɬ čɔʔwɔš / 'double-wived,' from /ʔɔ sáli(h)/, 'two,' and /čɔʔwáš/, 'wife.'

It is of course possible that the semantically significant morpheme here is *ɬ, with *a as a formative. In that case, compare *ɬ in /ɬcɔ́ʔi/ 'there' (note 67), from which we characterize *ɬ as 'Directional,' supported by /čáɬldɔx^{w}štɔbɔš/, 'give it to me' (see note 90 for /č-/).

S. 30. 90. *kám Stem 'give,' probably 'make, create possession,' thus *k+ám. For *k, 'create, make,' cf. /bɔčsiʔɔ́h/ 'build a house,' with *be, 'Progressive aspect,' and /siʔɔ́h/, 'house,' also, cf. /čáɬ-/ (see note 89 for /-aɬ/) in /čáɬldɔx^{w}štɔbɔš/ 'give it to me.' For *am, 'possess,' see notes 80/81 on /dɔsɔd-abš/, and compare /dɔščábšɔbčɔd/, 'I give it away.'

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[1] On syntactical grounds, almost certainly not to be identified with *ʔáɬ, 'quickly.' Cf. /ʔáɬ tɔsɔk^{w}swɔcɔ́čabs / 'He's running fast,' and /sisídab ʔɔtiʔáɬ / 'He's getting bigger fast,' which exemplify the positional constraints on *ʔáɬ, 'fast.'

S.31. 91. *ƛ̓ák Root, 'put on.' Cf. /ʔastə́čstčəd / 'I'm wearing it,' with causative transitive (see note 3).

92. kə́ləh Root, 'first, foremost, front.' Here, 'front,' as in an animal. Cf. /təčə́ləh tədkʷtábac/ 'my first husband,' and /čə́ləh tičíʔwi dəkʷtábac / 'my husband was in front.'

92/72 In /čəlʔášəs/, stress-shift in the complex *kə́ləh-xə́n-as must give *kələ́h-xən-as. The development of ʔ and á follow the rules given (see Chap. II).

S.32. 93. *ʔəsól Root (?). Possibly *ʔə-sól. Cf. *sólʔ in /súlʔ qʷəlʔsíd/, 'going to Quilcene,' and *sol in /ʔəsúlabdəxʷ/ 'he took it.' Here, with aspectual *h,[1] as in S. 19 /hiʔódəxʷ/, note 74.

S.33/34. 94/72. *x̣ʷéC*xn 'Deer.' Almost certainly contains the bound pronominal *xn, 'foot,' From the Augmented form, it is clear that the *s- in /sx̣ʷíššəd/ is *s, Nominal. The rest of the shape is obscure.[2]

I.5.2. Grammatical Morphemes[3]

To supplement the Commentary on the Tale, we here gather together (Figs. 69-74) a representative sample of non-root morphemes, mainly affixes. These have been arranged for ease of comparison with the relevant Sections in Hess (1967), although (as indicated in the Comentary [Appendix I, sec. 5]) I do not always agree with the analyses or sub-analyses there.

It is clear that non-root morphemes have a variety of shapes: I comment on these in order of departure from the 'canonical' shapes seen in

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[1] See Chap. II, sec. 15.9 for the alternation.

[2] I shall rehearse elsewhere my reasons for supposing that the underlying shape of 'deer' is *xʷéh+xn. Is /s-x̣ʷíʔay/ 'sheep' related?

[3] For convenience of external comparison, the transcriptions present surface contrasts.

roots (as illustrated in 'The Shapes of Twana Morphemes,' Appendix II, sec. 2, Figs 75-85).

Personal pronouns (Fig. 71) resemble roots type CVCV́C (Fig. 79). These are the nearest in shape to 'canonical' roots.

'Chameleon'[1] morphemes (Fig. 73) are those involved in reduplication of various kinds.

'Grammatical' affixes are again of various shapes, but maximally CVC (Figs. 69, 70, 72).

Particles (Fig. 74) are simple (a,b,c) or complex (d).

(a) Transitivity	
-d(ə x^{w})	general intention, responsible
-s	purpose, causative
-t	general
(b) Goal of Action	
-b	specific goal
-wəl	reciprocal
-t	reflexive
-bəš	1st sing.
-i(d)	2nd sing.
-bəɬ	1st plural
(c) Aspect	
bi-	unmarked, present progressive
ʔas-	stative
(d) Derivational	
-(a)-b	by means of
-b	internality, and medio-passive

Fig. 69. Morphemes of the Verb System[1] (Selected)

[1]Cf. Hess (1967), sec. 311.

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[1]A 'chameleon' morpheme is one whose shape is controlled by the shape of some element (usually the root) of the stem in which they occur (see Hockett, 1950).

(a)	Possessive	
	d-	1st sing.
	ʔi(s)-	2nd sing.
	-(a)s	3rd person
	-ɬ	1st plural
	-ləp	2nd plural
	-sʔəɬ	3rd plural
(b)	s-	Nominalizer
(c)	(-tə)d	Implement
	- aɬ	Attenuative

Fig. 70.--Morphemes of the Substantive System[1] (Selected)

[1]Cf. Hess (1967), sec. 320.

dəcə́h	1st person sing.
dəʔwéh	2nd person sing
cə́díɬ	3rd person sing.
dibáɬ	1st person plural
təwəlʔwə́lap	2nd person plural
cədcə́daɬ	3rd person plural
ʔwát	Who?

Fig. 71.--The (Free) Personal Pronouns[1]

[1]Cf. Hess (1967), sec. 340. Here, there seems little point in attempting any sub-analysis. Second and third persons plural are clearly reduplicating Augmented forms, regularly derived by the rules given in Chap. II of this thesis.

-əx^{w}	change of state	
-ʔəb	renewed action	
ɬ-	expective, unrealized	} perhaps better as aspect markers
t-	remote	
-əl	desiderative	

Fig. 72.--General Inflectional Affixes[1] (Selected)

[1]Cf. Hess (1967), sec. 351.

$\underline{C_1V_1C_2}$	Augment reduplication (Chapter II)
$\underline{C_1V_1+\acute{V}_1h}$	Attenuative reduplication (Chapter III)
$C_1V_1+\underline{\acute{V}_1C_2}$	Distributive infix (Chapter II)
$\underline{C_1V_1}$	Intensive reduplication
$\underline{V_1C_2}$	Inchoative reduplication (Fig. 84).

Fig. 73.--General Derivational Affixes[1] (Selected)

[1]Cf. Hess (1967), sec. 352.

(a)	Pronominal	
	-čəd	1st person sing.[1]
	-č	2nd person sing.
	-Ø	3rd person sing.
	-ɬ	1st person plural
	-čp	2nd person plural
	wəɬ~ ʔəɬ	3rd person plural
(b)	Interrogative	
	-ʔwi(h)	Interrog.
(c)	Determiner	
	-t	Definite
	-s	Feminine
	-i	Near interest
	k^w	Hypothetical
(d)	Demonstratives and Deictics	
	tiɬiʔə́h	this
	tičíʔwe(h)	that
	ticíʔwe(h)	that (Fem.)
	ɬiʔə́h	here
	ɬiʔíɬ	over there
	ɬcə́ʔy	way over there

Fig. 74.--Particles[2] (Selected)

[1]For the singular only, a sub-analysis is possible. Thus, -č = non-3rd person sing.; -d = 1st person sing.

[2]Cf. Hess (1967), sec. 360.

APPENDIX II

THE SHAPES OF LEXICAL MORPHEMES

II.1. A Note on the Shapes of Morphemes in Twana

The corpora in the body of this thesis are somewhat eclectic, chosen as they were to illustrate the core problems of Twana phonology. To balance the picture slightly, Figures 75-85 present a small sample of non-grammatical morphemes, which it is hoped will be of some interest at least to Salishans. For the (mainly simplex) forms given, the following comments are to be noted, corpus by corpus.

Figure 75 represents a large number of CVC roots, most of which are found as verb stems or nouns. Probably without exception, CVC is the minimal shape for a stem.

Figure 76 shows roots in CCV́C. But the Augment process (Chap. II) clearly shows that, with rare exceptions ('pan' is perhaps one), these must be considered underlyingly *CVCV́C,[2] except that clusters with a laryngeal are tolerated.

Figure 77 shows roots in CV́CC. We note that very few of these (sub-corpus [a]) do not have a laryngeal in cluster. For these non-laryngeal clusters, 'milk' is clearly a loan, while 'breath' seems to be reduplicating. This leaves only 'cow' and 'midday' as possible -CC types.

Figure 78 shows that CV́CVC is a common type, although the -d in 'mountain, slave, food, clear the throat' may be a formative.

Figure 79 shows type CVCV́C, another common type. Here only 'leave it' is suspect. This is probably a transitive formation, with typical V́$_1$

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[1] For convenience of external comparison, transcriptions present surface contrasts.

[2] It is recalled that such forms constitute the strongest evidence for the existence of unstressed shwa in dictionary entries.

reduplication (Chap. I, sec. 2.4) and -d, 'Intentional': as an Imperative, however, it is unique in lacking final /- x^{w}/, Transitive, full form (see Fig. 69).[1]

Figure 80 presents forms with medial clusters. Sub-corpus (a) is again (compare Fig. 76) suspect of containing CVCVCVC forms, especially in 'nose' and 'Caucasian' /x^{w}ə́ltəb/. /pástəd/ 'Caucasian' is, of course, the Salishan shape for 'Boston.' Sub-corpus (b) presents a problem mentioned but not solved in the text (Chap. II, sec. 12.1), that of geminates. Sub-corpus (e) is suggestive of possible sources of such geminates--but these arose in a number of ways at present obscure.

Figure 81 illustrates again laryngeal clusters, this time medially. These laryngeals are all abutting a non-obstruent, which suggests that some of them are not 'original,' especially those with a shwa in the next syllable. Even a form such as /q̓^{w}i^{ʔ}wác/ 'ashes,' may prove to have come from *q̓^{w}əywác quite regularly by the rules already given in Chapter II (sec. 1.2.1).

Figure 82 shows longer forms, almost certainly not roots as they stand. I group these by finals, for convenience of external comparison. Possible formative elements to be isolated are:

1. /-d/, Transitive(?); /-əx^{w}/ (?).

2. /-ádi(h), -áči(h),-áyas/ which appear elsewhere as bound pronominal classifiers.

3. /č-s/, an element (elements?) in the numeral system. The /-č/ element may be related to /čt-/, 'tribelet, decade (?)' (see Fig. 85).

Figure 83 shows reduplicating stems for which I do not find the roots cited independently. Except for 'Holy' and 'oar,' these are all stressed on the first syllable--'oar'is in any case a re-fashioned loan from French (via the Chinook Jargon).

Figure 84 presents a sample of Inchoative stems, for some of which independent roots have been found. These show the inchoative relation, e.g. /bíx^{w}čəd/ 'I laugh'; /bíx^{w}ax^{w}čəd/ 'I smile': /k̓^{w}ə́łčəd/ 'I pour'; /k̓^{w}ə́łałčəd/ 'I spill.' The root /q̓áx^{w}/ 'freeze' is found with s-Nominal as 'ice.'

Figure 85 illustrates the various shapes of lexical affixes (or field-suffixes: 'bound pronominal classifiers' in this thesis). Lexical affixes are

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[1]It is of course possible that the -əx^{w} normally found in Imperative singular formations is really -əx^{w}, 'change of state' (Fig. 72).

commonly VCVC, with the anti-canonical vowel-initial that does not seem to occur with roots. For convenience of external comparison, the latter type are grouped by finals; this also facilitates isolation of possible formatives, such as /-d/.

II.2. Morpheme Lists

Root	Gloss
pə́q	white
tə́q	close
cíq	red
čáp	aunt
kə́s	urinate
k^{w}úy	bend
k̓^{w}ə́q̓	salt
q̓^{w}áč	vomit
q^{w}íc	dance
q̓ax^{w}	freeze
síl	cloth
šúx̣ʔ	grind
łúb	scar
x^{w}ə́l	gather
húb	redden
ʔíx̣	scrape
yə́q̓^{w}	wash
líq̓	plant, bury
wáq̓	hurt
q̓ʷóʔ	water
x̣ʔə́ʔ	hunt
ʔé(h)	yes

Fig. 75 --Roots CV́C

	Root	Gloss
(a)	(s)ṗq̓ə́b	flower
	c̓kə́x^{w}	slap
	tḱ^{w}ús	seven
	c̓x^{w}ə́s	five
	(š)č̓táy	pan
	(ʔəs)q̓^{w}ʔt̓ə́x^{w}	thin
	(s)xṗáb	cockle
(b)	pšə́d	comb
	(s)px^{w}ə́b	smoke
	c̓q̓ə́p	spear
	k^{w}tá4	elk-fat
	(s)4péx^{w}	spittle
	x^{w}c̓íl	go down
	(ʔəs)xčád	how?
(c)	ʔwís	high
	ʔláb ~láʔb(WWE)	look
	ʔyə́x̌ʔ	scrounge

Fig. 76.--Roots CCV́C

	Root	Gloss
(a)	q^{w}íst	cow
	x^{w}ák^{w}k^{w}	breath
	ʔták^{w}t	mid-day
	mélk	milk
(b)	súbʔ	smell
	(s)łúbʔ	soup
	čə́bʔ	jam (tight)
	híʔd	long time
	mə́ʔš	defecate
	ʔéʔɬ	bathe
	bílʔ	line up
	tə́lʔ	take off
	q^{w}úlʔ	full
	x^{w}ílʔ	lose
	ʔtə́wʔ	guess
	ʔtáwʔ	mussel
	šáwʔ	bone
	(ʔas)łáwʔ	shelled (clams)
	šúyʔ	incite
	húyʔ	good-bye
	xə́yʔ	stop someone

Fig. 77.--Roots CV́CC

	Root	Gloss
(a)	sídak^{w}	sea
	číɬal	fear
	tálaɣ	use
	(sə)bádid	mountain
	súɬ^{w}ay	younger sibling
	(š)čútaɣ	halibut
	bə́də(h)	child
	(s)tə́čəd	slave
	ɬúk^{w}aɬ	moon
(b)	(s)ʔíɬad	food
	síɬad	provisions
	ʔásax^{w}	seal (mammal)
	ʔúšab	merciful, charitable
	(s)ʔúlaɣ	money, something taken care of
	ʔə́ɣad	clear the throat
(c)	páʔaq^{w}	pipe
	kə́ʔə(h)	mummy
	(s)ɬóʔol	herring

Fig. 78.--Roots CV́CVC

	Root	Gloss
(a)	(s)tiqíw	horse
	(ʔəs)q̓^{w}iɬúč	dirty
	(s)qabúɬ	dug-out canoe
	yabíd	fruit
	k^{w}upíc	master
	cucíd	mouth
	təbíx^{w}	land
	dəcə́h	I, me
(b)	ʔisáw	chew
	ʔilál	weep
	ʔabút	stand
	ʔaxíc	go to bed
	ʔupáɬ	eat
	(s)ʔubát	name
	(ʔəs)ʔəlíx^{w}	hunter
	ʔətə́x^{w}	scratch
(c)	ɬiʔíɬ	yonder
	biʔíd	leave it!

Fig. 79.--Roots CVCV́C

	Root	Gloss
(a)	pástəd	Caucasian
	bəqsə́d	nose
	bə́čɬəd	flea
	bəščə́d?	louse
	xʷisqám	few
	xʷə́ltəb	Caucasian
(b)	(s)q̓ʷəl.ə́p	ashes
	qəl.ə́b	bad
	qʷəl.ə́q	slow
	(s)yəl.ə́b	year
	šəl.ə́s	fish
(c)	(s)qʷə́š.əb	fog
	(s)x̣ʷíš.əd	deer
(d)	qəb.ə́d	axe
(e)	čál.aš	hand
	čə́ltas (Eels)	hand

Fig. 80.--Roots CVCCVC

Root	Gloss
(s)tib?át	man
ẋ^{w}ú?bat	paddle
ṗəl?ád	tree bark
q̓^{w}ə́l?təd	skin
ṗəl?ə́q^{w}	gravel cook
q̓^{w}i?wác	ashes
čə?wát	fine, well
čə?wáš	wife
šə?wáɬ	road
šə́?waɬ	mole
də?wéh	thou
məm?ə́s	thin
bə́y?ac (~ bə́yac)	meat

Fig. 81.--Roots CVC?VC or CV?CVC

	Stem	Gloss
(a)	tusáyad	oyster
	yətáwad	salmon-berry
	páwaqəd	crane (bird)
(b)	q̓^{w}ələ́di(h)	ear
	yəpáči(h)	six
	?əsáli(h)	two
(c)	wədə́bax^{w}	black-berry
	k^{w}ábələx^{w}	root
	q̓^{w}ádayəx^{w}	rat
(d)	?úpədəčs	ten
(e)	dušúyay	wolf
(f)	tqáči(h)	eight
(g)	ƛ̓káyas	basket

Fig. 82--Stems C(V)CVCVC

píš-pš	cat
káw-kaw	goose
k̓á-k̓əh	crow
k̓^{w}ú-k̓^{w}uk̓^{w}	salmon back-bone
q^{w}í -q^{w}ay	necklace
xə́b-xəb	Hamma-Hamma River
xə́t-xət	mallard
xa-xá?	Holy, God
xələ́w?-xələw?	spider, butterfly
x^{w}ay?ə́-x^{w}ay?əx^{w}	fly (insect)
la-láb	oar

Fig. 83. Reduplicating Stems

	Stem	Gloss
(a)	bíx^{w}-ax^{w}	smile
	də́l-al	stop
	cáy-ay	mix up
	k^{w}ə́d-ad	hold
	k̓^{w}ə́ɬ-aɬ	spill
	q̓áx^{w}-ax^{w}	freeze
	ɬíq̓-aq̓	slip
	?íl-al	sing
(b)	(s)?ə́q̓^{w}-aq̓^{w}	snow

Fig. 84.--Inchoative Stems

C	q	language
	č (~ čáɬ)	prepare, make
CC	čt	decade, tribelet
	qs	point
CVC	dís	tooth
	šəd	foot
CVCVC	dábac	body
VC	áp	end, bottom
	áy(h)	plant
	íkʷ	clothing
	ús	face
VCVC	áyas	round object, eye
	ádi(h)	ear
	áči(h)	hand
	áxad	arm
	áɬəɬ	lips
	íčad	back
	íqʷad	head
	íwad	inside
	úcad	mouth

Fig. 85.--Lexical Affixes[1] (Selected)

[1]Cf. Hess (1967), sec. 352.31.

APPENDIX III

SOURCES CITED

III.1. List of Abbreviations

AA	American Anthropologist
AAOJ	American Antiquarian and Oriental Journal
AnLg	Anthropological Linguistics.
BAE-B	Bulletin of the Bureau of American Ethnology.
CA	Current Anthropology.
HAIL	Handbook of American Indian Languages.
IJAL	International Journal of American Linguistics.
JASA	Journal of the Acoustical Society of America.
Lg	Language.
QPR	Quarterly Progress Report (MIT).
RSC-PT	Proceedings and Transactions of the Royal Society of Canada.
SI-AR	Annual Reports of the Board of Regents of the Smithsonian Institution.
SJA	Southwest Journal of Anthropology.
TCLP	Travaux du Cercle linguistique de Prague.
UCPL	University of California Publications in Linguistics.
UCPAAE	University of California Publications in American Archaeology and Ethnology.
ZFE	Zeitschrift für Ethnologie.

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