

Causes of Rapid Phonological Change:
The Case of Atsina and Its Relatives

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1.1 Causes of Change

The cause of change has always been one of the great unanswered questions of linguistics. It is easy enough to describe the effects of a particular change, but the theories that have been advanced to account for the change's arising in the first place range from the laughable to the merely inadequate.

Istvan Fodor (1965) suggests a distinction between internal and external factors. Internal causes of change are the "inherent laws" of a language which cause it to change in a particular way. Fodor observes (15) that the nature of such laws has not been elucidated; nor can it be -- the question is circular: Language X has changed in a certain manner because it was the inherent tendency of that language to do so.

Among the external factors examined by Fodor are the effects of history, culture, society, geography, neighbouring peoples, and the national character. Some of these are undoubtedly major conditioners of phonological and other linguistic change, but others are merely coincidental and unrelated to linguistic developments.

1.2.1 Complexity

Fodor (1965:18) states the following as a law: the number of the elements of the system is in inverse ratio to the measure of its stability. In other words, systems with large numbers of components (e.g. the morphological system) should change more readily than one with few components, like the phonological system. This is contradicted by the history of Arapaho-Atsina: the drastic changes in the phonological system are outlined in section 2, but there has not been any large-scale reshaping of the morphology. If a rule must be formulated, I would suggest the converse: a system resists change in direct ratio to its complexity, since each element in a complex system (such as an Algonquian transitive verb paradigm) tends to support the others. However, this is little more than the statement of an observed tendency, having nothing to do with causality: it predicts what will change, not why it will change.

1.2.2 History and Culture

In a number of languages, major linguistic changes have coincided with important historical events or the introduction of new cultural items. According to Fodor (1965:22), "all linguistic changes of a greater size may be connected with a historical upheaval of great importance, but one cannot always find significant linguistic alternations after all great historical transformations"; however, he claims (23-26) that events that increase "the cultural level of the people", such as the adoption of a writing system, a

new religion, or advances in transport and communication, tend to impede linguistic change, perhaps after having caused a brief period of rapid development. In place of his two variables, I substitute one, "cultural conservatism": linguistic changes will tend to occur at the same rate as innovations in other parts of a society's culture.

1.2.3 Society

Under the heading of social effects Fodor (1965:29) mentions, only to reject, a causal connection between social and linguistic change, the theory promoted by the Soviet linguist Marr. He suggests (30) that increasing urbanization slows down change by making the linguistic norm accessible to a larger percentage of the population.

1.2.4 Geography

Fodor groups three variables as part of the effects of geography: the density of population; the degree of geographic isolation; and a supposed difference between newly-settled areas and the homeland. He also includes density of population as a social effect (1.13), since urbanization inevitably implies increased concentrations of people. I doubt that density in itself is a factor that predictably affects the rate of linguistic change: a dense population enjoys better communications among its members than a sparse one; should it then resist or accept rapidly disseminated innovations?

Fodor claims (1965:32) that "the more geographically isolated a people is, the less its language reveals changes", citing Basque and the Caucasian languages as examples. I am not aware of any evidence that these languages are more conservative than their neighbours; on the contrary, a language cut off from its near relatives may change more rapidly than the norm, since it lacks the levelling and retarding influences related dialects have on each other.

I do not see why living in an area previously not inhabited by members of a particular language group should have any effect other than requiring a few new lexical items to cover concepts not encountered in the homeland.

1.2.5 Foreign Influences

It has long been recognized that the assimilation of foreign groups into a culture, whether at a high or low status level, may influence the language of the host nation. Fodor concludes, however, that it is impossible to measure the effect of such foreign influences (1965:34-35). I would divide his variable into two: areal influences, quantifiable in terms of the degree of uniformity among neighbouring languages, and the effect of diglossia, whether in the form of two closely related languages or dialects, or of more distantly related (or unrelated) languages, measurable in part in terms of the percentage of bilinguals in the population.

1.2.6 National Character

The last variable Fodor considers (1965:35-40) is "the role of national character ("Volksseele")". He suggests a distinction between "the extrovert national character of the southern type (Italian, Spanish) and the introvert character of the northern type (English, Scandinavian)", expecting that "the more communicative peoples of more vivacious life rhythm" will experience a more rapid rate of change.

Research into this variable is fascinating, but completely unrewarding. The introverted Vikings who conquered Normandy and Sicily underwent a series of linguistic changes which led to the submergence of their language in the face of a larger (and more extroverted) substratum; their equally introverted cousins who settled Iceland, on the other hand, have (as Fodor predicts) been remarkably conservative. A comparison of the rates of change in the dialects of Ottawa and Los Angeles should provide useful data concerning this factor.

1.3 Factors to be Considered

Of Fodor's six external variables, only "culture" (in the form "degree of cultural conservatism") and "foreign influences" (divided into "areal influences" and "diglossia") strike me as fruitful areas of research. I would separate out "literacy" as an independent variable from the cultural factor, and add "population size" and "degree of fragmentation" (presumably part of his geographic variable) as others worthy of consideration. In sections 2 to 4 these factors will be examined in relation to the phonological changes that have taken place during the recorded history of several languages. My tentative conclusions are presented in section 5.

2. Algonquian Languages of the Great Plains Area

2.1 Algonquian Subgroups

At the time of first contact there were about forty named political groups speaking Algonquian languages. Less than a dozen are still spoken by any considerable number of people, and at least twenty have died out, often with little record of what they were like.

There have been a number of attempts to set up subgroups within the Algonquian family. Truman Michelson (1921) suggested four divisions:

1. Arapaho, including Besawunena, Atsina, Nawathinehena and Ha[?]anahawunena
2. Blackfoot
3. Cheyenne (and Sutaio)
4. All the rest.

He later retracted his statements, having proven (Michelson 1935) that the divergent character of the Plains languages was due to recent sound changes, not early splits from the rest of the family. His revised opinion is reflected in Leonard Bloomfield's statement (1946:85) that the reconstruction

of Proto-Algonquian "will, in the main, fit all the languages". Regrettably Bloomfield also quoted the earlier classification, which is therefore still cited by archaeologists, historians, and others on occasion.

Bloomfield's reconstruction was based on four languages spoken in the Great Lakes area; he therefore referred to it as Proto (or Primitive) Central Algonquian, since in 1925 he had no way of knowing whether it would account for the other members of the family. Even after it had been shown, by Michelson (1935: cf. above) and Frank Siebert (1941) among others that "PCA" was indistinguishable from Proto-Algonquian, some linguists, notably Charles Hockett, retained the "Central" label. There are no innovations shared by Cree, Fox, Menomini and Ojibwa to justify setting up a Central subgroup of Algonquian: this was demonstrated to Hockett's satisfaction at a 1964 conference and he has withdrawn his support for "PCA".

At the same conference, Ives Goddard presented a reconstruction of part of the verb paradigm (Goddard 1976b), showing that all the languages on the Atlantic coast shared a series of innovations in the inflection of transitive inanimate verbs. Various phonological and lexical innovations have also been claimed for Proto Eastern Algonquian, but I have shown elsewhere (Pentland 1979a) that all the proposed markers of Eastern Algonquian either are not unique to the subgroup or are not found in all the member languages.¹ There are thus no established subdivisions within the Algonquian family; it is convenient, however, to refer to Plains, Central and Eastern languages when discussing features due to areal diffusion.

2.2 Developments in Non-Plains Languages²

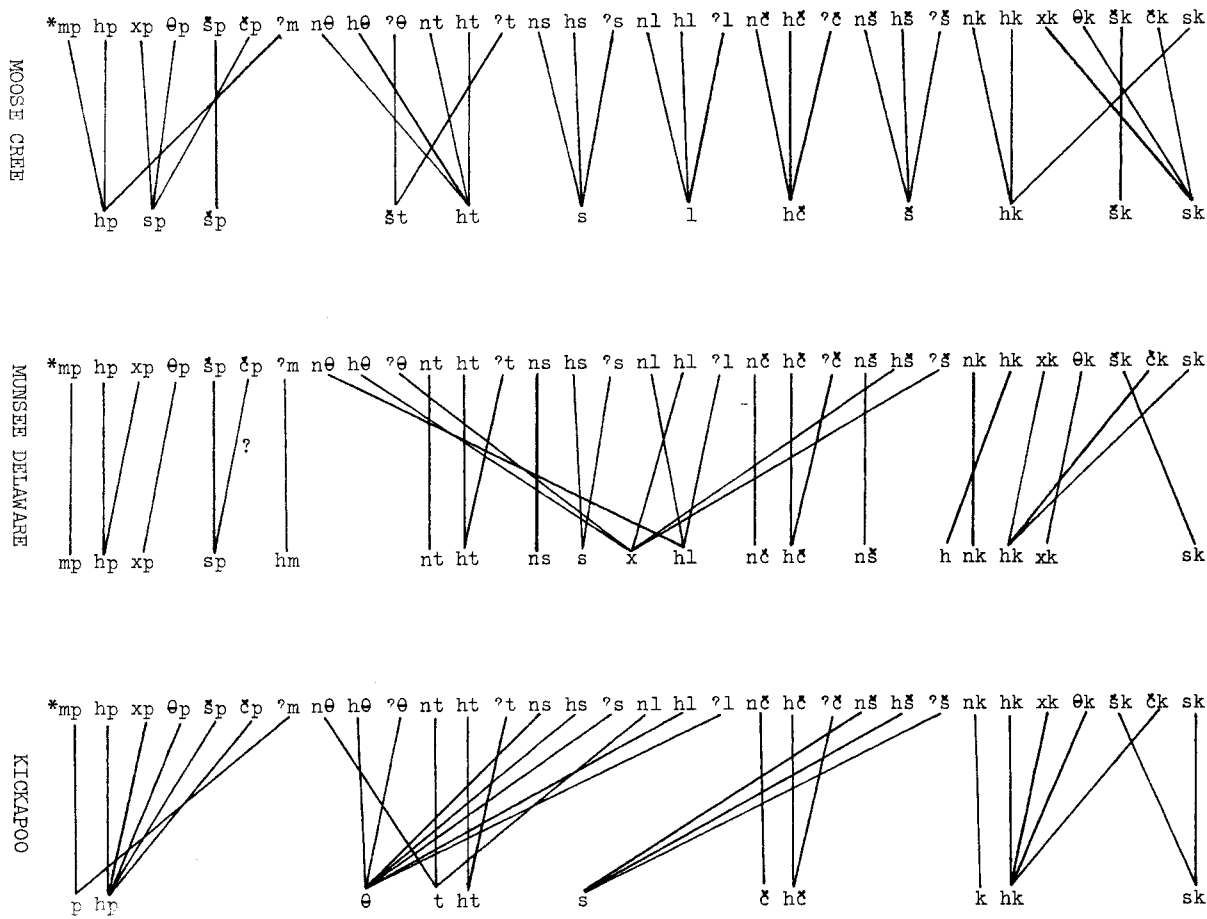
Most Algonquian languages have simple histories as far as changes to single segments are concerned. Proto-Algonquian had the following consonants and vowels: *p t č k θ l s š h m n w y a ā e ē i ī o ō. Cree (Moose dialect) has merged *θ with *t and short *e with *i; Munsee Delaware has l < *θ and *l, and has lost the length contrast with high vowels; Miami has merged *θ with *l but retains all other segments. Modern Kickapoo has gone a little further, but there are still no very startling changes: *θ, *l > n, *s > θ, and *š > s. In many cases it is possible to reconstruct a lengthy Proto-Algonquian word with some degree of assurance from a single cognate.

The main changes in the phonological systems of the daughter languages take place among the consonant clusters. No language maintains a contrast between all 32 of the clusters reconstructed in Proto-Algonquian -- there are extensive mergers in each language, but no two have exactly the same results. The developments in three languages -- the Moose dialect of Cree, Munsee Delaware, and Kickapoo -- are illustrated in Table 1.³

2.3 The Plains Languages

Arapaho, Besawunena, Atsina, Nawathinehena and Ha²anahawunena are often referred to as dialects of a single language, but this is not strictly correct (though the cover term "Arapahoan" will occasionally be used in this study). Besawunena does appear to have been only dialectally different from Arapaho; Atsina is sufficiently different to cause problems in communication

TABLE 1. Mergers of Proto-Algonquian Consonant Clusters.



(Salzmann 1960:40); while Nawathinehena was probably unintelligible to speakers of the other languages. Ha'anahawunena became extinct before it could be recorded, but is said to be the most different from Arapaho (Kroeber 1916:74).

The earliest confirmed location of the Atsina was in central Saskatchewan in the late 1700s. The Arapaho (and presumably the other Arapahoan groups) were somewhere south of them, probably across the Missouri River in eastern Montana, but they were not contacted until the early nineteenth century. The Blackfoot were apparently early arrivals on the plains, but the archaeological evidence is inconclusive (Forbis 1968:43-44). The Cheyenne were historically horticulturalists living in earth-lodge villages at the edge of the plains; they became mounted buffalo-hunters only in the second half of the eighteenth century (Swanton 1930).

Compared to the central and eastern Algonquian languages, those spoken in the central plains area show the results of rapid and drastic phonological change. My main interest is in the history of Atsina and its close relatives, since they alone are attested in a string of vocabularies recorded at about 30-year intervals over more than two centuries.⁴

The documentation is far from ideal: for Nawathinehena we have a total of 67 forms (including variants), all that Kroeber (1916) was able to obtain. The Besawunena corpus contains 75 forms, also collected by Kroeber; as it is clearly very similar to Arapaho it is ignored in the present study. Of Ha'anahawunena there is not a single word. This is especially regrettable in the light of Indian statements that it was intermediate between Arapaho and Blackfoot (Kroeber 1916:74). Vocabularies of Arapaho begin to appear in the 1840s; it is the best attested language of the group, but the Atsina records cover a longer period.

2.4 Early Sound Changes

2.4.1 Initial *i

Bloomfield's reconstruction of Proto-Algonquian has *e, never *i, in the first syllable of words. In most of the daughter languages west of the Allegheny Mountains only *i occurs initially, only *e after a consonant, thus *elenyiwa 'man' vs *nepyi 'water': Ar inén, néć; At inín, nec (K); Nw iten, nec; Ch hetane, mahpe; cf. Fox ineniwa, nepi, Shawnee ileni, nepi.

2.4.2 *wa, *ya

The Plains languages have generalized an old rule (from Proto-Algonquian?) by which *a in the suffixes *-aki 'animate plural', *-ali '(animate) obviative singular; inanimate plural', and *-ahi '(animate) obviative plural' becomes *ō after postconsonantal *w, *ē after postconsonantal *y. In Arapaho, Atsina and Cheyenne (no Nawathinehena forms were recorded) *yē later becomes *ī (> Ar, At ii/uu, Ch e) as in Ojibwa, e.g. *amekw-a, -aki 'beaver(s)' > Ar ébes, ébessi, Ch hóma'e, homá'ne; *ečy-i, -ali 'feces' > Ar bihiθ, bihiθii 'buffalo chip', At biihićii

(pl.) 'manure', Ch hemáhkáse, hemáhkáséstse 'buffalo chip'.

2.4.3 Clusters with *-θ, *-l

Of all the Proto-Algonquian consonant clusters those ending in *-θ and *-l are the most unstable: there are unexplained alternations between *θ and *l everywhere, and a strong tendency to merge these clusters with those ending in *-s or *-š. Except in Cree-Montagnais there is at least partial merger in every language, probably the result of the diffusion of rules across language boundaries from several innovating centres.

Arapaho and Atsina generally keep *-θ distinct from *-l, as does Blackfoot, but in the first two *-θ in consonant clusters merges with *-š, *-l with *-s, while in Blackfoot *-θ becomes *-s, *-l becomes *-š. In Cheyenne and Nawathinehena *-θ and *-l both become *-s in clusters. In Cheyenne a nasal is lost before another consonant: *nθ therefore develops the same as intervocalic *θ. However, *nl has the same reflex as *ns (rather than intervocalic *l), showing that the two rules must have overlapped. Arapaho and Atsina occasionally show a reflex of *ʔš rather than *ʔs from *ʔl, while there are more than a few problems in sorting out the Blackfoot evidence. The complicated and sometimes incomplete mergers point to diffusion of the assibilation rule rather than an inheritance from Proto-Algonquian. Since the rule is so widespread, it must have begun to spread very early, long before the Algonquians reached the plains.

Proto-Algonquian *nθ becomes *ʔx in Arapaho-Atsina (later Ar s/x, At θ/s, with compensatory lengthening of a preceding short vowel), but *θ (> t) in Cheyenne: *mānθehsi 'flint, flint knife' > Ar wóoxé, At wóoθo, Ch mōta (archaic; modern mōtšéške). There are no cognates in the Arapahoan languages, but *nl becomes *(n)s (>h) in Cheyenne: *newīnla 'I name him' > Ch naveho. The cluster *ʔθ also becomes *ʔx in Arapaho-Atsina, but *ʔs in Cheyenne (>ʔh/ʔn) and Nawathinehena (>hʔ), e.g. *neʔθ- 'three' > Ar nééso, At nééθ, Nw nahʔah(a)ʔ (nahahaʔ K), Ch naʔhe. In Arapaho-Atsina *h is lost before consonants, but not before it has conditioned the change of *hθ to *hx (>Ar s/x, At θ/s); in Cheyenne and Nawathinehena *hθ becomes *hs (>Ch h/hn, Nw hʔ): *metātahθenwi 'ten' > Ar béteetox, At bétootos, Nw matātah(e)ʔen (maxtoxtahāhāʔ K), Ch māhtōhtōha. The other attested cluster is *ʔl, which becomes *ʔs in all the southern Plains languages (later Ar, At, Nw hʔ, Ch ʔh/ʔn), e.g. *pemiʔlē- 'to fly along' > Ar ceebīhʔox, Ch e-ameʔha 'he flies along'. However, in the same morpheme, *-ʔlē- 'to fly; bird', Arapaho and Atsina also have a reflex xʔ, which shows the metathesis of *ʔh < *ʔs < *ʔl but the x of *ʔx < *ʔθ: *māskiʔlēwa 'magpie' > Ar wooʔūxʔei (sic? wouxei K), Nw māʔtiʔēn (mouxtiān K), Ch moʔéʔna.

2.4.4 Single *θ, *l

Interacting with the changes of 2.4.3 are the developments of Proto-Algonquian *θ and *l outside consonant clusters (i.e. initially and intervocalically).⁵ While I will continue to write "θ", I am convinced that it must have been a lateral (probably voiceless *t̥) in the light of the subsequent changes.

At a very early stage in the breakup of Proto-Algonquian, a peripheral group of languages which included (Pre-) Cree-Montagnais, Blackfoot, Cheyenne, Nawathinehena, Arapaho-Atsina and Powhatan developed a flap pronunciation of *θ, i.e. voiceless lenis [t̪], as in Canadian English writer, metal. In Cree-Montagnais and Blackfoot t̪ fell together with ordinary t < *t. Nawathinehena and Cheyenne continue to maintain a contrast between t̪ and t -- the former is unaspirated, the latter [ht]. By the time of our first records, Atsina had the reflexes tθ, ts, and t; Arapaho has θ.

In Blackfoot, Cheyenne and Nawathinehena, Proto-Algonquian *l merged with *θ as t̪ (> t); this is also the stage reached by Powhatan. Arapaho-Atsina, together with Swampy Cree, the Saulteaux dialect of Ojibwa, Massachusetts-Cowesit and other languages,⁶ underwent another very early change, that of *l to n, thus merging with *n. Compare the reflexes of *aθemwa 'dog' and *elenyiwa 'man': Ar éθ, inén; At ót (<ótθ), inín; Nw iten, aṭam; Ch hoṭame, heṭane; Bl imitá (metathesized, as often in Bl), nit- 'ordinary' (< elen-, metathesized); Swampy Cree aṭim, ininiw; Ojibwa anim, inini; Massachusetts aném, nín; Powhatan aṭemohs (attemous).

2.4.5 Vowels and Semivowels

In proto-Algonquian the semivowels *w and *y occur before all vowels except *ō.⁷ In the eastern languages *wV is usually maintained, but *y is lost after a consonant. The central languages merge all the combinations of postconsonantal *y plus short vowel with *i; postconsonantal *w plus short vowel usually becomes *o.

The Plains languages also merge postconsonantal *yV with *i, but only *we and *wi become *o -- *wa remains except in Cheyenne (where it too yields *o). The changes in the Arapahoan languages are reminiscent of Cree, which also maintains *wa but has i, o from the other combinations, but this is probably a coincidence. Compare the underlined vowels in the following cognate sets (by a later rule Arapahoan has i, Cheyenne e < *o): *mekwepyathekwi 'metal' Ar bé?ičiθe?, At be?icite? (bet'-ste Hayden 1863, beitsit K), Nw meh(i)?icite (māhi'itsitā K), Ch ma?(k)aeta (dissimilation?); *wemaskōswa?θemwa 'elk-dog = horse' > Ar iwōxuuhōox, At iwōsiihōóθ, Nw ma?sūtiḥ'em (masoutihem K), Ch mo?(k)éhēno?ha (-no- unexplained); *nekwi?sa 'my son' > Ar neih'e, At neih'e, Nw nei'teh? (neictā' K), Ch nae'ha.

Postconsonantal semivowels are lost before long high vowels in all the Plains languages. Arapaho and Atsina maintain *wē, *yē, but in Cheyenne and Nawathinehena *wē becomes *I, and in Cheyenne *yē does as well, as in Menomini: *eθkwēwa 'woman' > Ar isei, At iṭee, Nw ih(i)?i, Ch hé'e, cf. Menomini netḥkí?seḥsem 'my girl'; *nyēw- 'four' > Ar yéin, At yéén, Nw niābah(a)?, Ch neva. Nawathinehena shows the effects of overlapping rules: while it has iā (< iē by vowel harmony) in 'four', *yē becomes *I in *myēhkani 'road' > Nw mīh(i)'an (mihiaⁿ K), Ch meonótse (pl.); Ar bóóó, At b'óóó have recent vowel harmony.

2.5 The Great Plains Sound Shifts.

The changes described in 2.4 took place at an indefinitely early

time in the history of the Plains languages, probably while all the Algonquian peoples were still in a fairly compact area around the lower Great Lakes. The rules could then have spread readily through languages which were not yet very different from each other. No doubt other rules diffused so thoroughly that their results are attributed to Proto-Algonquian itself, e.g. the palatalization of *t to *č before *i, *y, and the confusion of *θ and *l mentioned in 2.4.3. The remaining rules are of a different sort: most of them are unrelated to changes in non-Plains languages, and their cumulative effect is to make the Plains group look completely un-Algonquian.

2.5.1 Consonant Clusters

Every Algonquian language has its own distinctive treatment of the Proto-Algonquian consonant clusters. In Cheyenne preconsonantal *n- and *h- were lost (after the changes of 2.4.3); all other consonants (*ʔ-, *x-, *θ-, *s-, *š- and *č-) became glottal stops. In Nawathinehena preconsonantal *š- becomes (?)š-, *s- becomes (?)s- (> ?t-), and all other consonants become ?- (or ?h-, depending on how the development of postconsonantal *k is described). In Blackfoot, Proto-Algonquian *ʔ- remains, while all other attested first members of consonant clusters become x-. Arapaho-Atsina (at this stage still a single language) drops *h- (after the changes of 2.4.3), and changes preconsonantal *š-, *θ-, *č- to x-, all other consonants to glottal stop. The developments are summarized in Table 2.

PA	Ar-At	Nw	Bl	Ch
*š-	x-	(?)š-	x-	?-
*θ	x-	?h-	x-	?-
*č-	x-			?-
*h-	-	?h-	x-	-
*n-	?-	?h-	x-	-
*ʔ-	?-	?h-	?-	?-
*x-	?-	?h-	x-	?-
*s-	?-	(?)s-	x-	?-

Table 2. Plains Algonquian Reflexes of the First Members of Consonant Clusters.

2.5.2 Vowel Shifts

While the changes in consonant clusters appear drastic, the same sort of development was going on in every Algonquian language. Speakers of one language quickly learn the major correspondences of others that they encounter, and may even attempt to switch languages (for reasons of prestige, etc.) by applying their knowledge (cf. Wolfart 1973). Thus the developments of 2.5.1 would not have made the Plains languages completely unintelligible to speakers of Fox and the other central languages.

What does make Cheyenne and the Arapahoan languages look very

different is the fronting of all high vowels: Proto-Algonquian *ō becomes *i, e.g. *mōswa 'moose', diminutive *mōswehsa (> *mōsohsa by 2.4.5) > Ar bii, bihihi? 'buffalo cow', At bʔiih 'id.', Nw mīih(i)? (mixtihi K) 'deer', Ch mēhe 'buffalo cow'.

In Arapaho-Atsina the semivowel *w also merged with *y, but Cheyenne keeps the two apart (as v and t); as often, Nawathinehena shows both treatments, with w in initial position (like Cheyenne), i after consonants (cf. Arapaho-Atsina y), and both b (=w? -cf. Cheyenne [β]) and n (like Arapaho-Atsina) intervocally: *wāp- 'white' > Ar, At nook-, Nw wāk-(wanātsiāⁿ K), Ch vohp-; *neʔəwātah- 'eight' > Ar nées(y)ootox, At néeθ(y)ootos (postconsonantal *y is later lost in Arapaho and Atsina, after conditioning the front-vowel alternant of the preceding consonant), Nw neh?iāteh(e)?en (nexiotāhāhāⁿ K), Ch naʔnohtoha; *nyēwi/*nyēwahəwi/*nyēweni 'four' > Ar yéin, At yéen, Nw niābah(a)?, Ch neva; *me-watayi 'someone's belly' > Ar, At wonót, Nw manatan (monoxtaⁿ K).

2.5.3 Developments of *s

A second change which did nothing to improve intelligibility between the Plains and non-Plains languages was the shift of *-s in consonant clusters to -h, elsewhere to h (Cheyenne, Arapaho-Atsina) or t (Nawathinehena): *asātwiya 'cottonwood, tree' > Ar ohóót, At ohóótʔ, Nw atāt (hoxtox K), Ch hohohote.

The cluster *ʔh (< *ʔs etc.) metathesized in Arapaho-Atsina and Nawathinehena, but not Cheyenne, to hʔ. In initial position in Arapaho-Atsina h < *s fell together with *y; except after a consonant *y then becomes n. An example of n < *y < *w was given in 2.5.2; for n < *y, cf. *ayāpēwa 'male (of large animal)' > Ar, At enééce, Ch hotóaʔa (Nw hitāⁿmōⁿ K is either not cognate or a loan from Ch); for initial n < *s, cf. *sakimēwa 'mosquito' > Ar nóúbee, Ch hóoma.

2.5.4 The *k > ø, *p > k Chain

The final part of the Great Plains Sound Shift is a push-pull chain whereby *k becomes ø and *p becomes k in Arapaho-Atsina and Nawathinehena. Goddard (1974:107) has suggested that this change be considered part of a "delabialization" process together with *w > *y, though there does not seem to be any way of writing a single rule; he adds "to the extent that contemporary theory is unable to specify a common principle in the changes *w > *y (~*n) and *p > *k it seems likely to be deficient."

The loss of *k, by far the most common consonant in Proto-Algonquian, and the shift of *p to k dealt the final blow to intelligibility between Arapahoan and the other languages. In Cheyenne *p and *k were not lost completely, becoming hp and hk (cf. *t>ht), later hp ~ ø, hk~n~ø under unknown conditions. Cf. *mexkenāhkwa 'turtle' > Ar be?énoo, At b?énoow, Nw mah?enāh(a)? (maʔānaʔhāⁿ K), Ch ma?eno, pl. ma?enone; *kisoʔə- 'sun' > Ar iisis, At iisis, Nw isih(i)?en (hīcihiāⁿ K), Ch ése?he; *wāposwa 'rabbit' > nooku, At noókoóc (suffix?), Nw mākut; *čīpayaki 'ghosts' (pl.) > Ar θiikonoʔ, At ciikono, Ch seto.

2.6 Later Prehistoric Changes in Arapahoan

Compared with what has already been described, the later changes in Arapaho-Atsina and Nawathinehena are trivial. Proto-Algonquian *θ by this time had passed from t to an affricate, c or č in Arapaho-Atsina, thus merging with Proto-Algonquian *č. Before a consonant cluster Arapaho-Atsina shortened long vowels, e.g. *awānseh̄sa 'child' > Ar, At on^hē; subsequently a preconsonantal glottal stop is lost with compensatory lengthening of a preceding short vowel: *ne[?]θa 'my husband' > Ar néés, At néés. These changes did not occur in Nawathinehena.

All the Arapahoan languages have rules of vowel harmony, but the conditions have not been worked out even for Arapaho, which is the only language in the group still spoken. Some cases of vowel harmony are known to be early because of interactions with other rules; other examples post-date rules which entered the language in the historic period. Harmony usually affects only the low vowels, *ē and *ā (the latter conventionally written o/oo in Arapaho and Atsina), e.g. *mexkāci 'someone's foot' > Ar wó[?]ooθ, At wó[?]ooc, Nw mā[?]hāc; *aθemwa 'dog' > Ar éθ (stem éēeb-), Nw atām, but unharmonized At óteb-.

One unusual type of vowel harmony occurred fairly early: in Arapaho and Nawathinehena ī becomes ū, a high back unrounded vowel, [u], not previously in the segment inventory, after a syllable containing *ā (Ar o/oo, Nw a/ā), provided that no dental consonant intervenes; in Atsina ī becomes ū only if immediately following ǝ (< *ā). The odd restriction, and the fact that Atsina does not have the same version as Arapaho, shows that the rule spread from one of the group to the rest. It cannot have been inherited from a Proto-Arapaho-Nawathinehena stage since its operation depends on the specific reflexes of each language: *sk becomes ?t in Nawathinehena, so the sequence *āski becomes ā[?]ti, but in Arapaho *sk becomes nondental ?, so the result is oo[?]u, e.g. *māski[?]lēwa 'magpie' > Ar woo[?]úx[?]ei, Nw mā[?]tih[?]ēn.

A second difference between Arapaho and Atsina is that Atsina at this time lost *y (< *w, *y) after *x (< *š and postconsonantal *-θ) and *č (< *č, *θ).

Following the vowel harmony rule and the Atsina loss of *y described above, all the Arapahoan languages share in a fronting rule which probably diffused from Atsina. The results of this rule, which in Atsina affects *t, *č, *k, *x and *m, in Arapaho *k, *m and *x, and in Nawathinehena only *k (with traces of *m and *x perhaps due to the fact that Kroeber's informant spoke Arapaho better than Nawathinehena), are set out in Table 3.

ARAPAHO	t<*t	č<*č/θ	k<*p	x<*š/θ	m<*m
next to ǝ < *ā	t	θ	k	x	w
before ū < *ī/ǝ	t	θ	k	x	w
before ē < *ē	t	θ	č	s	b
before ī, y < *ī/ǝ, y/w	t	θ	č	s	b

ATSINA

before	ǝ<*ǎ	t	tθ	k	θ	w
before	ǝ<*ǝ	t	tθ	k	θ	b
before	ĩ,y<*ĩ/ǝ,y/w	tʸ	č	č	s	bʸ
word-final		tʸ	č	č	s	bʸ

NAWATHINEHENA

(*č) (*θ)

before	ǎ<*ǎ	t	c	č	k	s	m
before	ũ<*ĩ/ǝ	t	c	č	k	s	m
before	ǝ<*ǝ	t	c	č	k	s	m
before	ĩ<*ĩ/ǝ/y/w	t	c	č	c	s (š?)	m

TABLE 3. Arapahoan Consonant Reflexes

Following the changes caused by the fronting rule, Arapaho and Atsina lost postconsonantal y (< *y, *w). All the Arapahoan languages also dropped final short vowels, a change which may have taken place much earlier, since it does not interact with other rules.

2.7 Sources for Atsina History

In the last copy of his Observations on Hudson's Bay, compiled ca 1792, Andrew Graham includes a brief "Fall Indian" vocabulary. I have shown elsewhere (Pentland 1976) that Graham copied this from Edward Umfreville (1790). He did, however, collect a "Blackfoot" vocabulary on his own, probably at York Factory in 1772, which includes, among other languages, Atsina. For 'knife' Graham gives "Estewan-Wath (or) Mein-me-amungo" = Blackfoot *isttoan*, Atsina *wóoθ(o)*, Assiniboiné *mĩn(a)* and unidentified "me-amungo". The word for 'gun', "Cattee", is also probably Atsina (modern *kocíyo*). For 'tobacco' Graham has "Pistachkansheshawan"; the first part is Blackfoot *pistaxkan*, the second Atsina *cíísóówoo(n)*.

From 1784 to 1787 Edward Umfreville wintered at Frenchman Butte, Saskatchewan, near the Alberta border, as a trader for the Northwest Company. During his stay on the North Saskatchewan River he gathered material for a book on the fur trade, including short vocabularies of the surrounding languages (Cree, Assiniboiné, Atsina, Blackfoot, and Sarcee) which he published in 1790.

A somewhat larger collection of data was made by Peter Fidler during his residence at the mouth of the Red Deer River (near Empress, on the Alberta-Saskatchewan border) in the winter of 1800-1801. Fidler's Atsina vocabulary, along with short word lists of Crow and Shoshone, is included in his manuscript journal, now in the Hudson's Bay Company archives in Winnipeg.

From 1832 to 1834 Alexander Philipp Maximilian, Prince of Wied-Neuwied, toured North America, collecting (among other things) vocabularies of every language he encountered. His Atsina list (1906, 24:226-227) contains only 46 words, but they are much better recorded than other such amateur efforts.

Ferdinand Vandever Hayden was a geologist who made several western journeys from 1853 on; in 1855, while exploring the upper Missouri River, he met the Atsina on the Milk River (along the Alberta-Montana border) and obtained a vocabulary of about 150 words. Hayden states (1863:233) that he always consulted "the chiefs and leading men" for his data.

A less reliable collection is the short vocabulary and schedule of kinship terms which Lewis Henry Morgan (1871) obtained in 1862 from an Atsina woman who also spoke Blackfoot, via a Blackfoot-English bilingual. Later vocabularies do not usually add greatly to our knowledge of the changes in Atsina, since by the end of the nineteenth century the language was substantially as Taylor recorded it just prior to its extinction in 1967.

2.8 Changes in the Historic Period

2.8.1 Loss of Final Syllables

There is a general tendency in all Algonquian languages to drop final vowels (which in Proto-Algonquian were always short) and the entire final syllable if it consists of a sonorant consonant (especially a nasal or semivowel) plus the obligatory short vowel. Final syllables are often analogically restored in nouns and verbs, since they would be lost by rule only in part of the paradigm, e.g.

*eʷahikani	>	*eʷahika	'pointer, index finger'
*eʷahikanali	>	*eʷahikana	'pointers'
*eʷahikanenki	>	*eʷahikanenki	'on the pointer'
*newāpamāwa	>	*newāpama	'I see him'
*newāpamāwaki	>	*newāpamāwaki	'I see them'

This stage is perhaps best attested in Miami-Illinois, but almost all the languages show the effects of final syllable loss in a few words, especially in indeclinable particles, e.g. Fox *nōhika*, Potawatomi *nohək* 'seven' < *eʷahikani (from counting on the fingers) beside the thousands of nouns ending in Fox *-ikani*, Potawatomi *-əkən*.

Cheyenne provides the clearest evidence for a similar rule in the Plains languages: *cī^umāni 'boat' > *semo*, pl. *semonótse*; *wəxpwākana 'pipe' > *heʔóhko*, pl. *heʔóhkono*; *eʷkwēwa 'woman' > *héʔe*, pl. *héʔeoʔo*. Nawathinehena drops all final vowels, but the final syllable loss rule must be ordered before the merger of *w and *y with *n (part of the Great Plains Sound Shifts, 2.5.2), since only *w and *y are subject to deletion, and after the change of *wē to Nawathinehena *ī* (2.4.5), since they are lost only after Nawathinehena *ī* (which also drops if short), thus *eʷkwēwa 'woman' (> *-īn(a)* by 2.4.5 and 2.5.2) > *ih(i)ʔī*; *sīpyiwi 'river' > *tīc*; but *metōni 'someone's mouth' (> *-īn(i)* by 2.5.2) > *matīn*.

In modern Arapaho and Atsina, final b/w (< *m) and n (< *n, *w, *y) are dropped together with a preceding short vowel, e.g. *aθemwa 'dog' > Ar éθ, At ót; *metōni 'someone's mouth' > Ar bétii, At bit^vii. In the earliest recordings of Atsina, however, final sonorants are often still present, e.g. *wexpwākana 'pipe' > Ar ííćóo, At ííćóo, but 1786 Pe-chou-on (initial P- is probably glottal stop); *θe'θēmāwa 'tobacco' > Ar síísowoo, At cíísóowoo, but 1772 sheshawan, 1786 Chees-ou-on. In other words the sonorant was already gone by the late seventeenth century: *eškwetēwi 'fire' > Ar sítee, At isítee, 1786 U-sit-ter (-er represents [ɛ]); *aθemwa 'dog' > At 1786 Hudth-er. By 1800 almost all final sonorants have been lost: *kōna 'snow' > Ar ííí, At íii, 1800 Ehe; *a'senya 'stone' > Ar óhe? (and with final syllable restored, Ar óhe'en, At óh'en) 'mountain', At 1800 hā; compare also E chog gah 'pipe', Che thow ā 'tobacco', Is sit ta 'fire' and Hot thay 'dog' from the Fidler manuscript with Umfreville's slightly earlier recordings. There are few final nasals in Fidler (1800), none in Maximilian (1834), good evidence for the claim that rules spread through a language word by word.

2.8.2 Development of *m

In 2.8.1 Proto-Algonquian *m still behaves like a nasal consonant in Arapaho and Atsina, though in the modern languages it has become Ar b/w, At b^y/b/w. In Nawathinehena and Cheyenne *m has not changed, but even in the earliest recorded Atsina it was already w before *ā: *mānθehsi 'flint, flint knife' > Ar wóoxé, At wóoθo, 1772 Wath, 1786 & 1800 Wath; *(we)-maškwōswa'θemwa 'elk-dog, horse' > Ar iwóxuuhóox, wóxhoox, At iwósiihóoθ, wóshóoθ, 1786 Wau-ce-hoth, 1800 Woos se hauth. In other environments *m persists well into the historical period -- before *ē Umfreville (1790) has b three times, m twice, Hayden (1863) has 3 m's, 10 b's; before *ī, *ō (> At i, ii) and word-finally spellings with m, b and w are evenly matched until the middle of the nineteenth century, when b (perhaps already b^y) becomes the most common reflex, but m does not disappear until the end of the century: *me'tekwi 'stick, bow' > Ar béete?, At béete, 1786 Bart, 1800 Bate ā, 1834 nemāth (ne- 'my'), 1855 ma-ta', 1862 Bā'-ta, 1899 bāt; *metātahθ- 'ten' > Ar béteetox, At bétootos, 1786 Met-tar-tuce, 1800 Bat tau tuse, 1855 ma-ta-ta'-sits, 1899 betāntos; *mīθehši 'hair' > Ar héíθ-, At b^yíít-, 1834 nāwi-tāss (ne- 'my'), 1855 mī'-ta 'hair', bī'-ta 'head', 1862 Be-at-ah', 1899 bīta'an.

2.8.3 Development of *θ, *č

In Table 3 the Atsina reflexes of *θ and *č are given as tθ before low vowels, č (=tš) elsewhere. In the eighteenth-century vocabularies č is by far the most common reflex before i and in final position; Umfreville (1790) writes "tc(e)" twice (in the same morpheme), perhaps representing [tš]. The nineteenth-century vocabularies on the other hand have only c (=ts), which is also the modern Atsina reflex: *θe'θēmāwa 'tobacco' > At cííćóowoo, 1772 sheshawan (i.e. [(t)š-]?), 1786 Chees-ou-on, 1800 Che thow ā, 1855 se-tha'-wa (i.e. [(t)s-]), 1862 Tza-thā'-wā; *aθwi 'arrow' > Ar óθ, At óc, 1786 Utce-ee (pl.), 1800 Otch e (pl.), 1855 uts, 1862 ot'-zo, 1899 hotsi (pl.). Before low vowels there is a similar split: only tθ

("t" once) in the eighteenth century, only t in later vocabularies, e.g. *a_qemwa 'dog' > Ar é_o, At ót, 1786 Hudth-er, 1800 Hot thay, 1834 hóte_{wi} (pl.), 1855 a'-te, 1899 hote; *nyā_qananwi 'five' > Ar yó_oón, At Yó_oón, 1786 Yau-tune (perhaps [tʰ] for [t_o]), 1800 Yāde thun, 1855 kin-a-ta'-nits (inflected form), 1862 Ya-nā'-tā-ne.

2.8.4 Development of x

The development of prehistoric x (< Proto-Algonquian *š, etc. -- 2.4.3, 2.6) is a little more complicated. The modern Atsina reflexes are θ before low vowels, s elsewhere; the *x > s shift had already occurred before our records begin, but before low vowels the vocabularies show "s" and "th" about equally until late in the nineteenth century: *pēšy_qewanwi 'one' > Ar čé_éséy, At čé_ééy, 1786 Kar-ci, 1800 Ka thi u, 1899 tcā_oéity; *neš_ki_nš_kwi 'my eye' > Ar nes_ii_éé?, At *nes_ii_é, 1786 Nun-nec-so-on (error for Nun-nce-so-on?), 1834 ne-sēh-seh, 1855 ba-si'-the (be- 'someone's'), 1862 Pa-sa'-thā, 1899 bes_oé; *nyīš_wanwi 'two' > Ar ní_iso, At ní_iθ, 1786 Neece, 1800 Neethe, 1862 Na-na'-tha, 1899 nī_éä. Goddard (1974:114) supposes that the early reflex was "ç" (= [s]?); whether it was ordinary [s] or not does not really matter, since there were no other similar sounds in the language with which it could be confused.

2.8.5 Development of k

The change that has caused the most confusion among linguists is phonetically a very common one: early Atsina k before e becomes [č] in men's speech, [kʰ] in women's speech. Taylor (1967:118) notes that Edward Umfreville's 1786 vocabulary has "Kar-ci" < *pēšy_qewanwi 'one' and concludes "Umfreville's informant must have been the Atsina wife of some company employee." Besides the fact that Taylor is referring to the Hudson's Bay Company, which Umfreville had left to join the Nor'-Westers in 1784, there is no reason to assume that Atsina women accompanied the men on the hazardous trip to the trading post, which lay in enemy (Blackfoot) territory. Until the end of the nineteenth century all vocabularies have "k" before e, including that of Ferdinand Hayden, who wrote "Whenever I have been obliged to accept the aid of women or ordinary men, I have always submitted the results to a chief to be verified or rejected" (Hayden 1863:233). Kroeber's 1899 collection (published in 1916) is the first to show the č of modern men's speech: *penkw-e_oéwi 'gunpowder, ashes' > Ar če_éi_éee, At č_éi_éee (men), k_y_éi_éee (women), 1786 Kidth-er (misprinted H-), 1800 Keet thay; *ayāpēwa 'buffalo bull' > Ar ené_éč_éee, At ené_éč_éee, 1800 En ah k ("k" = [k_é]), 1834 enáhkiä, 1855 a-ni'-ke-a, 1899 hānā_n_tyeyi (ty for [č] is common in Kroeber's vocabularies); *nexpetwini 'my arm, hand, finger' > Ar nē_éč_ét, At nē_éč_ét_y, 1834 nah-kōth, nah-kettinach (pl.), 1855 ba-kit', ma-kit'-in (be- 'someone's'), 1862 Bā'-kik, 1899 bā_ytyeyi.

During the nineteenth century several Atsina phonemes developed more fronted allophones before front vowels: *ki (< Proto-Algonquian *pi) became či, then ci; *či (<*či) became ci as well, and *s (<*x<*š) became θ. Presumably *ke (<*pe) shifted to k_ye, but the palatalization went unnoticed as long as it remained within the range of American English /k/. By the turn of the century, however, k_y was sufficiently fronted for Kroeber to hear it

as [tʷ] and [č], though he notes (1916:84) "Ty seems to be a very posterior t; it is sometimes heard as ky, and the Arapaho so render it in trying to reproduce Gros Ventre." As Flannery (1946:134) observes, Kroeber does not mention any difference between men's and women's speech, but by the time she did her fieldwork the distinction was firmly entrenched. It is apparent that Atsina women were at least a full generation behind the men in adopting fronted allophones of k; but if there were sex distinctions before 1900 they were not conspicuous enough to appear in the vocabularies (the only variation noted is a single "k" for tʷ recorded by Lewis Henry Morgan in 1862 from an Atsina woman).

Flannery (1946:135) suggests that the difference between men's and women's speech may have accelerated the death of the language:

...if a member of either sex "talked like the other" he or she was considered bisexual. ...many of the young folks who have some speaking knowledge but not full fluent mastery of Gros Ventre refuse to attempt to speak it. They are afraid of making just this type of error,--they know they will be laughed at, and furthermore they know the connotation in the minds of the older generation.

2.9 Dating the Plains Algonquian Changes

If all languages undergo phonological innovations at the same constant rate, we would have to agree with Kroeber (1916:73) "that the Arapaho have been separated from the Central and Eastern Algonkins for more than a thousand years." Nothing less would allow for such drastic sound change: virtually every Proto-Algonquian segment has changed into something else, often with damaging side effects, e.g. the loss of *k not only creates vowel clusters of up to four morae in length, but also results in several important inflectional endings' merging with zero.

By the time the first vocabularies were published (Blackfoot and Atsina 1790, Cheyenne 1839) the Algonquian languages spoken on the Great Plains were already so different from each other and the rest of the family that the relationship went unnoticed for some time. Once the shifts had been worked out, however, Cheyenne, Arapaho, Atsina and Nawathinehena⁸ turned out to be ordinary Algonquian languages: most lexical items continue well known Proto-Algonquian shapes, and the morphology is similar to the other members of the family. Before the Great Plains Sound Shift took place, these languages would have been easily recognized as Algonquian, and limited communication would have been possible with the Cree, Menomini, Miami and other groups east of the Plains.

Ives Goddard (1967a) has presented a correspondence that may help to date the sound changes: Arapaho *kokúy*, Atsina *kociyo* 'gun' are perfect cognates of Miami *papikwani* 'gun' (< Proto-Algonquian **papikwani*, **pepikwani* 'flute'). Unless Arapaho-Atsina extended the aboriginal word for 'flute' independently of the Miami, the major changes included in the Great Plains Sound Shift must have occurred after guns reached the western Great Lakes area, i.e. after A.D. 1600.

There is other evidence that the changes are recent: the Plains Cree still call the Cheyenne *kā-nēhiyawēsicik* 'those who speak a little like us', the diminutive form of their own name. For such a term to persist Cheyenne cannot have undergone the major shifts more than a few centuries ago.

In a note on words for 'buffalo' in Indian languages of the south-eastern United States, Allan Taylor (1976) shows that the most plausible source of Tunica *yániši*, Creek *yanása*, Cherokee *yahnsa*, etc., is Navajo (or other Apachean Athapaskan) *ayání ʔa* 'a/some buffalo'. Since the Athapaskans did not reach the southern plains before A.D. 1200 (and possibly considerably later) the term could not have spread across the Mississippi before then. Even more interesting is Taylor's observation that the Caddoan words -- Caddo *tanahaʔ*, Wichita *ta·rha*, Kitsai *tánaha*, Pawnee *tarahaʔ*, and Arikara *tanáhaʔ* may be cognate if we postulate a later Caddoan change of *y to t and *s or *š to h. Goddard (1974:110) points out that Proto-Arapaho-Atsina and Wichita have almost identical phoneme inventories. I do not think it coincidental that Caddoan and the Algonquian languages of the Plains share both inventory and at least two fairly unusual sound changes (*y > t in Cheyenne, though not in Arapahoan, and *s > h in Cheyenne, Arapaho-Atsina and Nawathinehena [in Nw only in consonant clusters]): both groups lived on the edge of the plains until the arrival of the horse made it possible for them to become efficient buffalo hunters. If the changes occurred first in Caddoan, they were likely passed on to the Algonquians by the Pawnee and Arikara, the two tribes who were historically closest to the Cheyenne and Arapaho.

Arapaho, Atsina and Cheyenne have a new word for 'corn', Ar *béskootéé*, At *bískóotée*, Ch *hoókóhtsése* (pl.) (Cheyenne also retains *máhaeme* < **melōmini*): while Arapaho *sk* cannot derive from the same Proto-Algonquian source as Cheyenne *k*, the two words can be traced to a post-Great Plains Sound Shift form **-xkātē-*, which is similar enough to Mandan *koxate* (*kó-ha-tē* Curtis 1909, 5:172; cf Crow *xò·xá·ši*) to make it likely that the Algonquians received the word from them. The Mandan villages along the Missouri River were the main source of corn for all the northern equestrian tribes, but the Cheyenne, at least, grew their own supply until forced out of the Red River valley in the late eighteenth century (Swanton 1930).

The linguistic evidence indicates that the Cheyenne (and, presumably, the Arapaho-Atsina) did not trade corn from the Siouan village tribes until after the major sound changes had taken place. On the other hand, they apparently knew about firearms before the shifts occurred: this narrows the date down to sometime between 1600 and 1775.

Ray (1974:157ff) shows that the Blackfoot and Atsina got their first horses between 1690 and 1750; the Cheyenne became mounted a little later, probably around 1750. Without horses, life on the plains would not have been very enticing to these people, whose skills in horticulture, hunting and fishing were fitted for a Woodland environment. As long as they remained on the edge of the plains, they were in contact with other Algonquian groups; this would have tended to level out differences in the various languages.

If, as seems likely, the Great Plains Sound Shift was only part of the drastic cultural change the Cheyenne and Arapahoan tribes underwent in shifting from the woodlands to the plains (cf. Goddard 1974:116), all of the changes listed in 2.5 and 2.6 must have taken place between 1700, when the first horses arrived, and 1750, since they were already complete when Andrew Graham accidentally obtained the first few words of Atsina. Once they had arrived on the plains, the rate of change did not return to its old low level: in 2.8 it was shown that Atsina has had at least one significant phonological innovation in every generation from the time of the first record up to the death of the language. The continuing rapid rate of change cannot, then, be due entirely to accompanying cultural change.

The literacy rate was always zero, the same as other, more conservative Algonquian languages. Foreign influences were strong: the Atsina have throughout their recorded history found it necessary to be bilingual in Blackfoot (more recently, in English) in order to communicate with the outside world. As these languages are not similar to Atsina in any meaningful way they would exert no retarding force on the rate of change. There has always, it seems, been only one band of Atsina, so the effect of fragmentation is nil. An important factor is the size of the Atsina-speaking population. Always a small tribe, harassed by more powerful neighbours, the number of speakers dropped sharply in the last years of the language's existence for two reasons: there was no perceivable advantage to be gained by learning it, and a definite disadvantage socially to speak it badly.

3. Icelandic

The Icelandic language is well known as one that has undergone almost no changes during the last eight centuries. It is also one of the best documented languages in the world, since literacy has always been greatly prized in Iceland, and manuscripts were copied and circulated there far more freely than in other parts of Europe.

3.1 Old Icelandic

3.1.1 Introduction

In a copy of Snorri Sturluson's Edda made ca 1360, the scribe thoughtfully included four "grammatical treatises" on the Icelandic language as appendices. The first to appear in the manuscript (Codex Wormianus), hence known as the First Grammatical Treatise, is generally attributed to Hallr Teytsson, a member of one of the most famous families in Iceland (his foster-uncle was Ari the Learned), and was composed ca 1130-1140. I have summarized the Treatise in 3.1.2, following the edition of Einar Haugen (1972) but substituting modern linguistic jargon, in keeping with Hallr's position as the first modern descriptive linguist.

3.1.2 The First Grammatical Treatise (summary)

In addition to the five Latin vowels (a e i o u) Icelandic has the following four: q ɛ ø y. Q (ɔ) is less open (kveðinn minnr opnum munni)⁹

than a, but more open than o; ɛ (ɛ) is less open than a but more than e; ø (ö) is less open than e and more than o; y (ü) is less open than i and more open than u. All but i occur between the same two consonants:

sa·r	'wound'	sq·r	'wounds'
so·r	'(he) swore'	sø·r	'fair, reasonable'
su·r	'sour'	sy·r	'sow (pig)'
[se·r	'oneself'	sę·r	'sea' ¹⁰

Nasalization (f nef kveðinn) and length (hvárt stafr er langr eða skammr) are also phonemic (grein sú er máli skiptir 'a distinction which changes the meaning'):¹¹

far	'vessel, ship'	fa·r	'danger'
rām̄r	'strong'	rā·mr	'hoarse'
ha·r	'hair'	hā·r	'shark'
flytr	'(he) drives'	fly·tr	'(it) floats'
brýnna	'to water (cattle)'	brȳ·nna	'fair (wind)'
sy·na	'lap (of board)'	sȳ·na	'to show'

A vowel becomes nonsyllabic (hafnar sínu eðli 'loses its nature') when joined with another vowel: austr 'east', ǣrn (-iarn) 'iron', eir 'copper, brass', ęor 'steed', eyrer 'ounce', ȳin 'wine'.

The consonants are p t k b d g f θ s h l r m n. When it occurs immediately before g in the same syllable n assimilates (tektr viðbland) to [ŋ], but the alternation is not phonemic. After a vowel all consonants except θ [h does not occur] may be long (megu hafa tveggja samhljóðanda atkvæði 'may have the pronunciation of two consonants') or short, e.g. Eigi eru ql ql at einu 'Not all beers are alike'; Huer kona ok huerr karlmaðr skyldu þess fús, sem guð er fúss 'Every woman and every man should be desirous of that of which God is desirous'.

3.1.3 Hallr's Conservatism

The First Grammatical Treatise describes a variety of Icelandic which was conservative, perhaps already obsolete, even in Hallr Teitsson's time. His discussion of the diphthong ǣ makes it clear that most people already had raised the glide to i, though he (and "many sensible men") still perceived it as ǣ. By the end of the twelfth century the vowel system had been reduced from the 27 (plus 9 allophones) he could distinguish to 15, by the rules listed in 3.1.4-3.1.8.

3.1.4 Short ɛ

Though Hallr claimed that short ɛ was distinct from e, it is likely that he was misled by the contrast between long ɛ· and e·. Hreinn Benediktsson (1959:290) observes "There is evidence of the merger of these two phonemes in some positions already in the tenth century, and their definitive merger hardly took place later than in the middle of the twelfth

century", but Haugen (1972:41) notes that Hallr got his example of \tilde{e} historically correct even if he had already merged ϵ with e: $\text{u}\epsilon\text{r}$ 'man' > $\text{u}\epsilon\text{r}$, $\text{u}\tilde{e}\text{nesk}$ 'he is wont' > $\text{u}\tilde{e}\text{nesk}$.

3.1.5 Phonetic Adjustments

Hreinn Benediktsson (1959:291) suggests that following the loss of short ϵ , i was lowered and a fronted (with subsequent lowering of short o and u) to distribute the phonetic ranges of the surviving short vowels more evenly, i.e. [i e (ϵ) a o u] became [i ϵ a o u]. This phonetic adjustment had no effect on the transcription of stressed vowels, but unstressed e and o (the only other unstressed vowel is a) were henceforth identified with i and u: $\text{fr}\tilde{\text{a}}\text{m}\tilde{\text{e}}\text{r}$ 'forward (m.pl.)' > $\text{fr}\tilde{\text{a}}\text{m}\tilde{\text{i}}\text{r}$, $\text{se}\cdot\theta\text{o}$ 'look thou!' > $\text{se}\cdot\theta\text{u}$.

3.1.6 Long q

Soon after the Treatise was compiled, $\text{q}\cdot$ became $\text{a}\cdot$, while nasalized $\tilde{\text{q}}\cdot$ merged with $\tilde{\text{o}}\cdot$, e.g. $\text{s}\text{q}\cdot\text{r}$ 'wounds' > $\text{sa}\cdot\text{r}$ (homophonous with the singular), $\text{u}\text{q}\cdot\text{n}$ 'hope' > $\text{u}\text{a}\cdot\text{n}$; $\tilde{\text{q}}\cdot\text{l}$ 'strap' > $\tilde{\text{q}}\cdot\text{l}$, $\text{q}\cdot\text{le}$ 'Ole (man's name)' > $\tilde{\text{o}}\cdot\text{li}$.

3.1.7 Nasalization

"Probably not later than in the latter half of the twelfth century" (Hreinn Benediktsson 1959:293) nasalization of vowels was lost: $\tilde{\text{o}}\cdot\text{l}$ 'strap' then became $\text{o}\cdot\text{l}$, $\tilde{\text{i}}\cdot$ 'in' > $\text{i}\cdot$, $\text{fr}\tilde{\text{a}}\cdot$ 'from' > $\text{fra}\cdot$.

Nowhere in the large corpus of Old Icelandic except the seven pages containing the First Grammatical Treatise is nasalization indicated. That it did exist in Hallr Teitsson's day is certain, however: his long nasalized vowels always correspond to Proto-Germanic *Vn, e.g. $\text{r}\tilde{\text{q}}\cdot$ 'corner, nook' < * $\text{wranh}\tilde{\text{o}}$ (cf. English wrong), $\tilde{\text{o}}\cdot\text{rar}$ 'our' < * unzaraz (cf. German unser), $\tilde{\text{i}}\cdot$ 'in' < *in.

3.1.8 Short q

Around the end of the twelfth century q merged with \emptyset (long $\text{q}\cdot$ had already disappeared, 3.1.6): ql 'ale' > $\emptyset\text{l}$, uqn 'used to (f.)' > $\text{u}\emptyset\text{n}$. Thus Hallr's system of a e i o u q ϵ \emptyset y, plus nasalization and length, was reduced to a e i o u \emptyset y, long and short, plus long $\epsilon\cdot$, within two or three generations.

3.2 Middle Icelandic

3.2.1 Introduction

I use the term Middle Icelandic to include the period between the middle of the thirteenth and the end of the seventeenth centuries. Most Old Icelandic literature survives only in copies made during the early Middle Icelandic stage, and their spellings clearly show that the mergers described in 3.1 had already taken place.

3.2.2 Long ø

The beginning of the Middle Icelandic period is marked by the merger of long ϕ with ϵ , thus reducing the vowel system to relative symmetry:

	-back	+back	-back	+back
+high	i y	u	i· y·	u·
-high	e ø	a o	e· ϵ ·	a· o·
	Short		Long	

While ϵ now functions as the long counterpart of ϕ it was probably not a rounded vowel (Hreinn Benediktsson 1959:296): $m\phi$ ·nde 'he ridged the roof' > $m\epsilon$ ·ndi, ϕ ·ra 'to upset, madden' > ϵ ·ra. For ϵ · Modern Icelandic orthography has æ, continuing the manuscript æ. (from Hallr Teitsson's e caudata, ϵ , borrowed from Latin and Old English tradition), but italic and handwritten æ, which appears in the manuscripts as a graph for ϕ (·) following the mergers of 3.1.6 and 3.1.8, thus $m\epsilon$ ndi, æra.

3.2.3 Unrounding of y(·)

During the fifteenth and sixteenth centuries y(·) unrounded to i(·): flytr '(he) drives' > flitr, sy·na 'to show' > si·na, eyrer 'ounce' > eirir 'cent (1/100 of a króna)'.

Hreinn Benediktsson (1959:299) demonstrates that while the change of long y· to i· is predictable, the general trend of Icelandic vowel developments should have led to a merger of short y with u. He cites doublets like spirja, spurja 'to ask' < spyria, kissa, kiusa 'to kiss' < kyssa, to show that this shift did actually start, but observes (311) that the merger of y with u is in general prevented by high functional load.

3.2.4 Palatalization

The loss of contrast between ϕ and q (3.1.8) and the abortive merger of y with u (3.2.3) created new consonants (or consonant clusters) where there had previously been predictable allophones: before the shifts, k and g were [k_i g_i] only before front vowels and glides, but palatalization became phonemic with the merger of front and back vowels, e.g. kiurr (~kirr) 'quiet, still' < kyrr, kiør 'choice, decision' < kør (contrasting with kør 'sickbed' < kqr), giør 'flock of birds' < gør (contrasting with gørn 'guts' < qqrn).

3.3 Modern Icelandic

3.3.1 Diphthongization

In the fourteenth century long nonhigh vowels began to diphthongize: e· ϵ · a· o· became [e_i a_i au ou] respectively.¹² This should have led to the merger of e· with the previously existing diphthong e_i (< e_i , ey), and fourteenth-century manuscripts do have spellings like leit for le·t '(he) let, had (s.t.) done', but they were prevented from falling together by the reversal of [e_i] from e· to [i_e] (Hreinn Benediktsson 1959:298). Similarly [au] from a· should have merged with the diphthong au , but the latter became [ϕ_u] (> modern [ϕ_y]) or, as Hreinn Benediktsson would have it, [ϕ_i].

The fronting of *au* must have occurred after the palatalization of *k/g*, since *kaupa* 'to buy' is modern [køypa], not [kiøypa]. The modern pronunciation of *u* as [y] and the change of *ę* to [ai] must also be later than 3.2.4: *kunna* 'to know how' > [kynna], not [kiynna]; *kęla* 'to cool' > [kięla] > [kiaila].

3.3.2 Consonants

Among the consonants there have been few phonemic changes. Final double -rr, -ss (and sometimes in verbs, -nn) are shortened, e.g. *berr* '(he) carries' > *ber*, *i-ss* 'ice' > *i-s*, *ski-nn* '(it) shines' > *ski-n*. Final postvocalic -t becomes *ð* (written and pronounced *ð*), e.g. *ðat* 'that' > *ðað* (orthographic *það*), *li-tit* 'little (nt.)' > *li-tið*, *farit* 'gone' > *farið*.

The rest are minor rules: the suffix -r becomes -yr (orthographic -ur, still written -r by some conservatives) after a consonant, e.g. *maðr* 'man' > *maðyr*, *tekr* '(he) takes' > *tekyr*; final -k becomes *g* in *miðk* 'very much' > *miðg* and the pronouns *mik* 'me', *þik* 'thee', *sik* 'oneself'; the middle voice endings -umk (1 sg.) and -sk become -st, but -umk (1 pl.) becomes -ymst (written -umst).

3.3.3 Allophones

There are a number of changes which do not show up in the orthography; most need not be considered phonemic changes, though the allophones are sometimes startling. Only the more important alternations will be described (for a complete listing see Stefán Einarsson 1949:1-29), and only the northern dialect (Akureyri), since it is the one with which I am most familiar.

The fricatives *f* and *θ* (but not *s*) are voiced if not initial, doubled, or next to a voiceless consonant, e.g. *hafði* '(he) had' > [havði]. Pre-vocalic *u* becomes [v], e.g. *þa'n* 'hope' > [vaun], *tvę-r* 'two (f.)' > [tvaiv]; the combination *hv* becomes [kv], e.g. *hvat* 'what' > *hvað* > [kvað]. Post-vocalic *g* becomes [i] before front vowels and before *i* (which then drops), [x] before voiceless consonants and the cluster *lt*, and [ɣ] before back vowels, *ð* (< *θ*), *r*, the cluster *ld*, and finally: *daginn* 'the day' > [daiin], *hugsa* 'to think' > [hyksa], *sígt* 'sailed' > [sıxt], *sagði* '(he) said' > [sayði].

Doubled *pp*, *tt*, *kk* are preaspirated [hp ht hk]; *bb*, *dd*, *gg* are voiceless lenis [p̥ t̥ k̥]. The combinations *fn* and *fl* become [pn pl] intervocalically, [pn pl] finally; similarly, *rn* and *nn* become [tn] between vowels and before *r*, [tn] finally (but *nn* changes only if the preceding vowel is long or a diphthong), and *rl* and *ll* become [tl] intervocalically and before *r* or *n*, [tl] word-finally: *efli* 'strength' > [epli], *höfn* 'harbour' > [høpn], *barn* 'child' > [batn], *brunn* 'brown' > [brutn], *brunni* 'browner' > [brutni], *karl* 'Charles' > [kaɾl], *allr* 'all' > [aɿlyr], *fjall* 'mountain' > [fiatɿl].

3.4 The Icelandic Rate of Change

3.4.1 Recent Changes

Icelandic did not, of course, cease to change once the modern stage had been reached. In the eastern and southwestern dialects short [ɪ y] (orthographic i/y and u respectively) have been lowered to merge with e and ø; for some speakers the change is limited to those environments where the vowels are lengthened (i.e. before single consonant, one of p t k s followed by i, r or v, or finally), but others have the merger everywhere, creating a new vocalic system (Hreinn Benediktsson 1959:305; modern Icelandic orthography is given in parentheses):

[i]	(í, ý)	[u]	(ú)
[ɪ]	(i, y, e)	[ɔ]	(o)
		[a]	(a)

plus the diphthongs [i̯ɪ ʏ̯ɪ a̯ɪ a̯ʊ ɔ̯ʊ] (most vowels and diphthongs may also be preceded by i̯, e.g. [i̯a̯ʊ], orthographic já). At present this merger is considered "vulgar" (Stefán Einarsson 1949:11), but it is especially common in North American Icelandic, and is probably the next change that will spread throughout the language.¹³

3.4.2 Dialect Differences

Icelandic is unusual among European languages in having few dialect differences -- even a narrow phonetic transcription shows little difference between the four recognized dialect areas (cf. Stefán Einarsson 1949:viii) -- but more important is the fact that there is no preferred, "standard", or "received" variety:

One of the best known and most remarkable characteristics of Icelandic, at least as compared with most or all other European languages, is the uniformity of the language area. ...not only are the dialect differences few and insignificant; for the most part the different varieties of Icelandic also enjoy the same social reputation. The different geographically distributed variants are all considered equally "good" or "correct" (Hreinn Benediktsson 1959:306).

3.4.3 Conservatism

Such uniformity is a consequence, not a cause, of Icelandic's unusual situation. Ever since the use of the Latin alphabet for writing the vernacular was introduced (a generation before Hallr Teitsson wrote his treatise) Iceland has maintained a higher literacy rate than any other country in the world. There have never been any political barriers to travel around the island, nor, for the most part, to the rest of Scandinavia. The Icelandic parliament, founded in A.D. 930, drew representatives from the whole country; any man of influence would have tried to attend the sessions every year. The Christian church, which in the rest of mediaeval Europe had a virtual monopoly on learning, became the national

religion by act of parliament in A.D. 1000; since the local leaders appointed their sons to the clergy (Hallr Teitsson's great-grandfather Gizurr brought Christianity to Iceland; another great-grandfather, Ísleifr, his grandfather Gizurr, his son Gizurr, and Hallr himself were all priests) literacy was promoted among the upper classes rather than confined to monasteries. Though Icelanders have always been great travellers, few outsiders ever made their way to the island: isolation and the lack of exploitable natural resources (other than the fields and the sea) have kept the culture remarkably conservative.

3.4.4 Icelandic's Score

Icelandic thus scores very high for all the variables I have tried to isolate:

Literacy: highest in the world.

Cultural conservatism: high.

Areal influences: none.

Population size: median (ca 200,000 in the twentieth century).

Diglossia: virtually nil (3.4.2)

Fragmentation: a large group emigrated to North America in the 1870s; communication was maintained to some degree, but outside Iceland the language is likely to become extinct before any major changes will have had time to become established.

The fact that the language has not changed significantly in the last eight centuries is self-reinforcing: modern Icelanders can read twelfth century literature with no difficulty, so that the older forms continually exert a retarding influence on the language.

4. Cameroon Pidgin English (Wes-Kos)

4.1 Political History of Cameroon

The earliest contact between Bantu-speaking peoples and the western world was about 2500 B.C., when Egyptians visited the land of Punt (= bu-ntu 'country of the ba-ntu', Doke 1938). Two millenia later Hanno led a Carthaginian expedition around the west coast of Africa, giving special attention to the volcanic Mount Cameroon, which he named the Chariot of the Gods, but until the sixteenth century A.D. the main trade route was overland, across the Sahara from Carthage, later from Tripoli, to Lake Chad and thence down to the coast (Eyongetah & Brain 1974:9-11, 14-15).

With the opening of a sea route to Cameroon in the late fifteenth century, trans-Saharan caravans became unprofitable. Though the Portuguese made the initial contact, they were soon supplanted by Dutch, English and French traders, interested mainly in slaves. Political control lagged far behind merchant and missionary influence: when the British finally decided to annex Cameroon in 1884 to prevent the French from doing so, they were surprised to find that the Germans had beaten them both, having bribed the local chiefs to sign their treaty. Native opposition to German rule resulted in almost continuous warfare until 1915, when British, Belgian and French troops occupied the colony. All but a narrow strip along the

Nigerian border became a French trusteeship, gaining its independence in 1960; the southern half of the British protectorate joined it a year later to form the Federal Republic of Cameroon.

4.2 The Status of English in Cameroon

While control of trade passed to German interests in 1884, British and American missionaries were allowed to remain with their churches and schools. Pidgin English, originally limited to use as a lingua franca between coastal traders and inland tribes, became more widespread under German rule: even the German treaties were written in English (Eyongetah & Brain 1974:26).

In West Africa Pidgin English probably first developed in the seventeenth century, when the British became the most influential traders. It has been continually reinforced and altered by the presence of a small local elite of speakers of standard English in Cameroon: merchants, missionaries, school-teachers, and (more recently) native graduates of English universities. For our purposes the source language may be taken as identical to modern "received pronunciation" (RP) British English as recorded by Daniel Jones (Jones & Gimson 1977). There are a few survivals in modern Wes-Kos of an earlier stage, in which the phonology was simpler and the vocabulary was drawn from other European languages besides English (e.g. piccaninny, a West Indian borrowing of Spanish pequeño or Portuguese pequeno, pequenino 'little'; savvy < Spanish sabe [usted] '[you] know'; palaver < Portuguese palavra), but phonologically the best fit is provided by RP English.

4.3 Wes-Kos Phonology I: Substratum

4.3.1 The Corpus

My description of Wes-Kos (Cameroon Pidgin English) is based on two texts, "Dodo-Bar fo Manjo" and "Yes, marred na ndeck", written by a Mr. Jonghe for his column "King fo toly" ('the story king') in Le Courier Sportif du Benin (Douala, western Cameroon) and reprinted in G. D. Schneider's West African Pidgin-English (1966). Phonologically this dialect is rather different from the variety Schneider describes: Mr. Jonghe is a native speaker of Bamileké, while Schneider's informants are from the Kom and neighbouring tribes in North West Province.

4.3.2 The Sound System

The Wes-Kos phonological system is very different from the English dialect on which it is based, but similar to Bamileké and other languages of Cameroon. The consonants are listed in Table 4. Syllables may begin with any consonant, a consonant followed by l, r, or w (attested clusters are pl, bl, fl, mbl, kl, gl; pr, br, fr, tr, ndr, kr, gr; mw, tw, sw, šw, nčw, kw, gw, ngw), or zero. The underlying clusters sp, st, sk, sl, sm and sn have variable surface forms. Most of the non-English combinations occur only in personal and place names, but there are also loanwords from

various substrate languages (e.g. mbiambiá 'hair') and reshapings like mblóda 'brother', nyi 'he'.

In the dialect of Wes-Kos that Schneider (1966) describes there are seven vowels (i e ε a o u), all of which occur with high (V) or low (unmarked) tone; there are no long vowels or diphthongs: trái 'try' is disyllabic [trá-í]. Jonghe's spellings, which are based on English orthography, suggest a five-vowel system (a e i o u) in his dialect; he does not indicate length or tone.

	[+anterior]				[-anterior]			
	[-cor]		[+coronal]		[-cor]		[+nas]	
	[-nas]		[+nas]		[-nas]		[+nas]	
[-cont, -voice]	p	mp	t	nt	č	nč	k	nk
[-cont, +voice]	b	mb	d	nd	ǰ	nǰ	g	ng
[+cont, -voice]	f	mf	s	ns	š	nš	h	-
[+cont, +voice]	w	m	r	n	y	ny	l	ŋ

Table 4. Wes-Kos Consonants.

The restrictions on occurrence of syllable-final consonants vary, depending on the speaker's mother tongue and his command of standard English. In underlying forms perhaps all consonants are possible: most of the gaps noted (in Wes-Kos as a whole) are due to restrictions in English, e.g. the lack of final mb, mf, r, ny, h, and ng. A single consonant cluster, ks, also occurs in final position.

4.3.3 The Bamiléké Sound System

The Fe'fe' dialect of Bamiléké has a similar consonant inventory: the only additions are a series of voiced fricatives (v mv z nz ž nž ɣ) and, in final position, ʔ. According to Ngangoum (1970) r occurs only in loanwords (many speakers substitute l); mp is realized as mb; ǰ and g are always prenasalized nǰ, ng; and there is an additional set of clusters ending in -h (ph, mvh, nk, etc.).

The main difference between Wes-Kos and the Fe'fe' dialect is in the vowel inventory. Ngangoum (1970) gives the following table (I have altered some of his symbols for typographical reasons):

i	ii	ĩ	u	uu	u		
e	ee		ə	əə	o	oo	
ε	εε				ɔ	ɔɔ	õ
a	aa	α			ɒ	ɒɒ	õ

To demonstrate that length and four tones (here numbered 1 [low] to 4 [high]) are distinctive he gives the following set: nkam¹ 'qui disperse', nkam² 'morceaux', nkam³ 'réunir', nkam⁴ 'disperser', nkaam³¹ 'quantité', nkaam²³ 'notable'. There are also a few diphthongs, and complicated tone sandhi rules. Reanalysis of the basic phonetic data would probably reduce the consonant and vowel inventories considerably, but requires access to the "étude complète inédite" on which Ngangoum (1970) is based.

4.4 Wes-Kos Phonology II: Superstratum

In this section each word is given in four forms: Jonghe's spelling, my interpretation of it, the RP English equivalent, and the standard English orthography; the last column serves also as an informal gloss of the Wes-Kos form.

4.4.1 English θ and ð become Wes-Kos t, d:

throweh	trówé	θrə(ə)wéy	'throw away'
wity	witi	wið, wiθ	'with'
dat	dat	ðat	'that'
oda	áda	áðə	'other'

4.4.2 Initial s- Clusters

In the dialect described by Schneider (1966) initial s- is lost before a consonant followed by r (probably also l), e.g. trét 'straight', sw becomes šw (šwít 'sweet'), and other initial clusters of s + consonant insert an epenthetic low tone i, e.g. sitík 'stick'. There are no examples of sCr-, sCl- in my corpus, but the other clusters appear to remain:

swit	swít	swi·t	'sweet'
smoll	smól	smo·l	'small'
speshill	spéšil	spešl	'special'
stick	stík	stik	'stick'

Speakers of Wes-Kos who are less familiar with English do away with all s-initial clusters, as the combination does not occur in Bamiléké. In an earlier stage of Wes-Kos this was the norm; at least one example survives:

toly	tóli	stó·ri	'story'
------	------	--------	---------

4.4.3 Syllable-Final Clusters

Most syllable-final consonant clusters are eliminated. Clusters with nasal first element usually remain as Wes-Kos prenasalized consonants, but nθ is reduced to n:

mun	mán	manθ	'month'
danss	dáns	da·ns	'dance'
tchenj	čénj	čeynĵ	'change'

Non-nasal consonants are lost before and after fricatives (which must be voiceless in Wes-Kos), but ks remains:

dassol	dás-ól	ðats ɔːl	'that's all, only'
lep	lép	left	'left (past part.)'
sep	sép	self	'self'

Jonghe writes "ask" but probably pronounces it aks, continuing the common nonstandard southern British form (standard ask is an early seventeenth-century loan from the northern dialects). On the other hand, his "wity" reflects voiceless θ, the northern variant, in 'with'.

4.4.4 Wes-Kos l and r

English l remains before a vowel, and syllabic l becomes il:

louk	lúk	luk	'look'
play	plé	pley	'play'
pípil	pípil	piːpl	'people'

In the western dialect described by Schneider (1966) syllabic l becomes u with low tone, e.g. pípu 'people'.

In the variety of English on which Wes-Kos is based postvocalic r is realized as a central glide (ə) or lengthening of the vowel. RP ə (<er) becomes Wes-Kos a with low tone, and iə (<ir) becomes ía:

afta	áfta	aːftə	'after'
pawa	páwa	pawə	'power'
biye	bía	biə	'beer'
hiya	hía	hiə	'here'

Elsewhere postvocalic r becomes zero, though Jonghe sometimes retains the English spelling:

day, dey	dé	ðeə	'there'
fo, for	fó	fɔː	'for'
work	wók	wəːk	'work'
tannap	tanóp	təːn ap	'turn up' ¹⁴

In relatively unassimilated words, Wes-Kos retains English prevocalic r, but more often it is replaced by l, following the pattern of Bamiléké:

rum	rúm	ruːm	'room'
contry	kóntri	kántri	'country'
married	máred	márid	'married, marriage'
blouck'am	blók-am	brɛwk 'əm	'broke them'
kell-am	kél[i?]-am	kári 'əm	'carry them'
toly	tóli	stóːri	'story'

There is a single word with r < l in Jonghe's texts: "mindro" 'middle'. Schneider's dialect has míndu with regular u from syllabic l.

Schneider (1966) attempts to describe "Broad Pidgin-English", a variety neither overly anglicized nor assimilated to a particular local language -- an ideal seldom met with in the field. There is evidence in his North West Province text for three treatments of prevocalic r: in the majority of words, r is retained; in texts recorded from some Kom speakers, r becomes l, as in the Bamiléké variant, e.g. aláta 'rat', hóngili 'hungry';

a few forms (from another dialect?) have $n < r$, e.g. pánábu 'parable', béni 'bury'.

4.4.5 Wes-Kos Vowels

Length is not distinctive in Jonghe's dialect of Wes-Kos. RP English long vowels (including ey, əw = e', o') merge with their short counterparts, but ə' seems to become o, as do RP ʌ and ɔ.

laskel	láskil	rá'skl	'rascal'
oll	ól	ɔ'l	'all'
possa	pósa	pə's	'purse'
wekop	wékóp	weyk ʌp	'wake up'
rod	ród	rəwd	'road'
swit-wan	swít-wan	swi't wʌn	'sweet one'

English diphthongs usually remain, but ay is recorded as both a and ái:

ma, may	ma ~ mai	may	'my'
san-tan	són-tam	sʌn taym	'sun-time, day'
nait	náit	nayt	'night'
naoh	náo	naw	'now'
nyiouss	nyús	nyu'z	'news'

Almost all words are borrowed in their fully-stressed form (and hence receive high tone on the stressed vowel), as if they were first heard in isolation.

4.4.6 Irregularities

As might be expected in a language with such an unusual history, there are a number of irregular correspondences. Wes-Kos occasionally has e where a might be expected:

tchens	čéns	ča'ns	'chance'
kesh	kéš	kač	'catch'

This may reflect borrowing from a nonstandard variety of English. The following words follow no particular pattern:

nyi	nyi	hi'	'he'
mbloda	mblóda	brʌðə	'brother'
ndeck	ndék	(det ?)	'debt'
noba	nóba	névé	'never'
hansa	hánsa	á'nsə	'answer'

4.5 The Wes-Kos Rate of Change

From standard English to conversational Wes-Kos is a tremendous leap, not only in the phonological component examined here, but also in morphology, syntax, lexicon and semantics. Though the first English contact with Cameroon was more than three centuries ago, the language has not taken that long to change into its present state. As RP English and other

varieties close to it have been used by a small but influential minority throughout the contact period, Wes-Kos is drawing closer to the standard, not diverging further from it (4.2).

In practical terms, the changes took place instantaneously, as the first speakers tried to adapt English words to their own language's sound patterns. Since the amount of change is considerable, no matter how it is measured, the rate of change approaches infinity. Even if we allow a full three centuries for the alterations that have occurred, the rate is still far higher than most languages ever experience.

In the case of Wes-Kos, of course, we do not have to seek far for a reason for the rapid rate of change: it is the usual result when speakers of one language attempt to learn another that is phonologically dissimilar. Except in the special circumstances that give birth to pidgins (and, later, creoles) such imperfectly learned languages quickly disappear: either the student receives further instruction and practice so as to approach the standard version of the language, or he loses it through disuse.

5. Measuring the Rate of Change

5.1 Population Size

As a factor in the calculation of linguistic change, 'population' refers not to the total number of speakers of a language, but to the number who belong to a single effective communications network. For many languages, including North American English, the two numbers are virtually the same, since radio, television and large-scale travel link the entire group together. Languages infrequently used on the radio (e.g. almost all American Indian languages, including Atsina) form single population groups only if all speakers live within easily travelled distances of each other. Cheyenne, for instance, has two populations, one in Montana, the other in Oklahoma; Cree has a dozen or more populations spread across Canada and the northern states; English forms scores or hundreds of populations, some small, like the Tristan da Cunha dialect, others numbering in the hundreds of millions, like "Standard American" or RP British.

On a global scale, the average population of a language is probably about 100,000 people. Assigning this a value of 1.00, the variation due to population size is

$$\left(\frac{5}{\log_{10}(\text{Population})} \right)^n \text{ times the basic rate of change (R),}$$

where n is between 1 and 3. If n is assigned a value of 2.00, a language with 1,000 speakers should change almost three times as fast as one with 100,000 speakers, while "Standard American" would have a rate of 0.4 times the norm or less. Slight alterations in the value of n increase or reduce the stated effect of population size; the correct value for human language as a whole is most likely between 1.00 and 2.00, i.e. population size has a small, but noticeable, effect on the rate of change.

5.2 Fragmentation

The degree of fragmentation (vs homogeneity) of a language has an important effect on the rate of change. Mathematically this variable is included under Population Size (5.1), since fragmentation produces two or more populations where there was formerly only one, but descriptively it is best considered separately.

Fragmentation is due to the separation of one part of the population from the rest, whether by geographical, political, or social barriers. The existence of these barriers can be observed only after the fact: if part of a language population moves to an island it may fragment into a new population (if travel is restricted, as on Tristan da Cunha) or remain part of the original group (as in the case of Old Norse/Old Icelandic until the fourteenth century, since large-scale communication continued to exist); a political boundary may divide the population (the classic example is the Rhenish fan) or have little effect (e.g. the provincial borders of western Canada); social barriers are the subject of a large and increasingly more scientific literature. In the absence of electronic media, sheer distance is an effective cause of fragmentation.

5.3 Areal Influences

As suggested in 1.2.5, areal influences may be quantifiable (after the fact) in terms of the degree of uniformity among neighbouring languages. It seems that large scale bi- or multi-lingualism is not a necessary factor: languages tend to share phonological (and other) features if they remain in contact for any length of time, e.g. the Northwest Coast of North America, India, or western Europe. The variables are the amount of contact, its duration, and the degree of similarity between the languages before contact (i.e. very dissimilar languages tend to borrow less). Relative prestige is not a factor that limits areal influence, though it may have some effect on its direction: Dravidian languages have borrowed as much from Indic as vice versa; Greek and the southern Slavic languages have about equal influence on each other; pidgins like Wes-Kos are more influenced by the substratum's phonology than the superstratum's.

5.4 The Effect of Diglossia

Where a large percentage of the population controls two distinct varieties of a single language or two related languages, there is invariably some degree of interinfluence. While areal influences do not require bilingualism (at least not on a large scale), diglossia has an effect only when a considerable part of the community is familiar with both languages or dialects. The variables are essentially the same as those listed in 5.3: amount of contact (percentage of bilinguals), duration of contact (number of generations of bilinguals), and degree of similarity before contact (not yet quantifiable). Mathematically the effects of areal influence and diglossia may be combined in a single formula, but the constants necessary to yield a numerical result have not been determined:

$a(\text{Pop}) \times b(\text{Dur}) \times c(\text{Sim}) \dots$ times the basic rate of change (R),

where Pop = percentage of bilinguals (or "amount of contact"), Dur = duration of contact in generations, and Sim = degree of similarity, and a, b, c, etc. are undetermined constants. The formula is repeated for each pair of interacting languages or dialects, thus predicting that where there are many similar dialects in contact over a long period of time, their influence on each other will be very large.

5.5 Cultural Effects

I reject as possible variables such unquantifiable items as "the national character" proposed by Fodor (1965). The only variable I have considered from the cultural component is the degree of cultural conservatism: languages change in inverse ratio to their cultures' degree of conservatism, i.e. $R = \frac{A}{\text{Conservatism}}$... where A is an undetermined constant whose value will depend in part on the way "conservatism" is measured numerically.

The case of the Plains Algonquian languages examined in section 2 shows that this variable may fluctuate greatly over time. Like most other peoples who depend on hunting and gathering (with a little horticulture) as a way of life, the Algonquians are generally conservative when compared with pastoral or industrialized societies. This is reflected in the small amount of change in languages like Cree and Fox over the past three thousand years. It is suggested that the Great Plains Sound Shift reflects a sudden and enormously great change in the degree of conservatism: as the entire culture of the Plains Algonquian peoples was being reshaped (in a very short period of time) during their shift from the Woodlands to the Plains, their languages also underwent a corresponding shift.

If this is a general principle, all societies that have experienced similar catastrophic cultural changes should show similar results. Gradual cultural development does not have such an effect (though it is reflected in assigning a relatively low Conservatism index to the society involved): English did not go through a dramatic change with the advent of the Industrial Revolution, since it was a natural development within the framework of the previously-existing culture, it did not affect the entire English-speaking world simultaneously, and its linguistic effect was submerged in the large size of the population. Many languages which could be usefully compared to Atsina reacted to rapid cultural change by ceasing to exist (which is, of course, the greatest change that can occur): this was the case in Tasmania, much of Australia, and in a large percentage of North American languages. Those that have survived with little apparent change (e.g. many Athapaskan languages) have also experienced relatively little cultural change despite two or three centuries of contact with industrial society. Thus their cultures may be assigned very high values for conservatism, and this is reflected in their slow rates of linguistic change.

5.6 Literacy

While literacy is connected to cultural conservatism, it may have a

determinable effect of its own. The ability to read, especially, to read works written by previous generations, tends to retard the rate of change. Literacy will have a major effect only if a majority of the population can and does read noncontemporary books: there will be a lesser retardation if the only written materials are recent -- in this case the effect is merely one facet of the drag imposed by effective communication across a large population.

The variable for literacy is $n \sqrt{\frac{\text{Number of Illiterates}}{\text{Total Population}}}$ times the

basic rate (R), where n must be greater than 2 (otherwise Icelandic, with ca 98% literacy, would change at only 0.14 times the base rate), but not a very large number (at n = 20 the whole calculation becomes vacuous: all languages would score above 0.8R, most around 0.99R). I would suggest n = 5 as a working hypothesis.

Bright and Ramanujan (1964) have compared the rate of change in phonology, morphology, and lexicon in Brahmin and non-Brahmin varieties of Tamil, Kannada and Tulu, three Dravidian languages of southern India. Tamil and Kannada have been literary languages for more than 1500 years while Tuluhas no tradition of literacy and is seldom written.

Bright and Ramanujan find that in Tamil and Kannada the Brahmin dialects innovate by borrowing lexical items (often retaining foreign phonemes and combinations) and by using old words in new ways, perhaps in an effort to maintain a difference between the Brahmin and non-Brahmin varieties; the non-Brahmin dialects innovate chiefly in the (native) phonological and morphological systems, the parts of the grammar which are relatively static in Brahmin speech. In Tulu the Brahmin dialect is also characterized by phonological and lexical borrowing and semantic changes, but Bright and Ramanujan claim that Brahmin and non-Brahmin Tulu have undergone about equal amounts of change in phonology and morphology. They conclude (1964:1109) that "literacy, wherever it is present in human societies, acts as a brake on processes of linguistic change". Since the other variables are essentially the same for both varieties of these languages, including the degree of conservatism, the existence of a separate literacy variable and its retarding effect are confirmed by their research.

5.7 General Formula for Rate of Change

The variables isolated in sections 5.1-6 were stated in such a way that their influences are compounded in the general formula. A language spoken by a very small, nonliterate, and culturally innovative group will change at a much faster rate than one in which only one of these factors is significantly different than the norm. Unfortunately, I have been unable to suggest a numerical value for the effects of diglossia and areal influences: for Icelandic the value must be very small (i.e. little effect), while for Plains Algonquian and Wes-Kos pidgin the numbers are large. Similarly, the degree of conservatism has not been stated in a way that will yield real numbers; the substitution of a formula based on the number of cultural traits changed by each generation (times an unknown constant) might fill the bill.

The general formula is

$$R = P \cdot D \cdot C \cdot L \cdot \dots \text{ where}$$

R = the general rate of change in a phonological system, in number of changes per generation;

$$P = \frac{5}{\log_{10}(\text{Population})} \cdot n.$$

D = the effect of areal influences and diglossia, calculated for each pair of languages or dialects from the following formula and multiplied together: a(Percentage of bilinguals) x b(duration of contact in generations) x c(degree of similarity);

C = degree of cultural conservatism, from the formula $\frac{A}{\text{Conservatism}}$, perhaps better from the formula

$$\frac{(\text{No. of traits in generation N}) - (\text{No. of traits in generation N+1})}{(\text{Number of traits shared by N and N+1}) \times K}$$

L = the effect of literacy, calculated from the formula

$$L = \frac{n}{\sqrt{\frac{\text{Number of Illiterates}}{\text{Total Population}}}}$$

The trailing dots (...) in the general formula represent further variables which may be found necessary to account for the rates of change of all the languages of the world. It will probably also be necessary to subdivide some of the factors already mentioned in a more rigorous formulation.

The formula yields a rate of change valid only for the two generations considered in C, and only as long as the other variables, such as population size, have not changed. For longer periods of time each of P, D, C and L must be calculated anew for each generation and then averaged.

5.8 Testing the Formula

I have attempted to give a general formula in a form that lends itself to testing in a scientific manner, but before it can be made to yield actual numerical values for the rate of change, the constants (n in formulas P and L, A or K in formula C, a, b and c in formula D) must be determined on the basis of a large sample of languages. Unfortunately, almost all the languages which have long recorded histories belong to a small number of language families; the areal and diglossic factors may be seriously skewed if testing is limited to languages of the Mediterranean basin, India, and the Far East. A further complication is that few languages in the modern world are direct descendents of their literary ancestors: modern standard English is not a lineal descendent of Old West Saxon English, nor is Sanskrit the ancestor of modern Hindi. Over a very long period of time this may not matter much, so the differences between Vedic Sanskrit and modern Hindi, or between Mycenaean and modern Greek might be usefully calculated.

I have left unsolved the problem of how to count linguistic changes. In Old English /f/ becomes [v] in certain environments; in Middle English the change is /f/ becomes /v/. Are we to count this as a change between Pre-Old English and Old English, and another between OE and ME; only as a change between Pre-OE and OE; or only between OE and ME? If an entire class of phonemes changes (e.g. the Germanic sound shifts) do we count one or many changes? Wes-Kos has t from standard English θ, which in turn is from PIE *t: is this two changes, or none?

Until these and other problems are solved, the formula presented here will, like so many other statements in the social sciences, remain unprovable and unusable. Unlike the model described by Fodor (1965:72), however, it can be tested once the numerical values of the variables and constants have been determined from a small number of languages.

Footnotes

¹Compare a classification of Indo-European which set up a Britannic branch, consisting of modern English, Welsh, and Old Norman French: there would be a number of features -- phonological, morphological, syntactic and lexical -- unique to the group, but each member would also share many innovations with non-Britannic languages; their common ancestor is indistinguishable from PIE itself.

²Abbreviations and conventions: Ar Arapaho, At Atsina, Bl Blackfoot, Ch Cheyenne, Nw Nawathinehena; other language names are not abbreviated. Dates without associated authors' names are those of field work on Atsina: 1772 Graham (1969), 1786 Umfreville (1790), 1800 Fidler (MS), 1834 Maximilian (1906), 1855 Hayden (1863), 1862 Morgan (1871), 1899 Kroeber (1916); elsewhere forms from Kroeber are marked K. The standard introduction to Algonquian terminology and the reconstruction of Proto-Algonquian is Bloomfield 1946.

³The history of Munsee was described by Ives Goddard at the 1978 Algonquian conference. The mergers in Moose Cree and Kickapoo were worked out by myself (Cree data from field work at Moose Factory in 1973, Kickapoo from the publications of William Jones and Paul Voorhis).

⁴The basic correspondences between Arapaho-Atsina and Proto-Algonquian were worked out by Michelson (1935). A much more readable and more detailed study is Goddard (1974), but I do not always agree with his ordering of the rules.

⁵A slightly more detailed discussion of the developments of Proto-Algonquian *θ and *l is included in Pentland (1978:116-117); for a full description see Pentland (1979b).

⁶There are traces of an n-dialect in northern New England (Siebert 1975:312) and in the Chesapeake Bay area (Pentland 1979b:331).

⁷Underlying *wō merges with *ō in all Algonquian languages except after a vowel, e.g. *ōlwa 'he howls' (**wōlwa) > Swampy Cree ōnow, reduplicated wāwōnow, Ojibwa wāwōno. There is no evidence for *yō, but such a combination would occur if any language has a reflex of *naky-ohōēwa 'he meets (someone) walking'.

⁸The Blackfoot sound changes have been sufficiently worked out to show that it too derives from ordinary Proto-Algonquian (Taylor 1960), but Blackfoot has rebuilt its vocabulary by creating new combinations of Algonquian morphemes: few full words can be cited as cognates.

⁹Hallr Teitsson's feature [+open] combines modern [+low], [-back] and [-round]: as Haugen (1972:37) observes, "the lips are obviously more open when low vowels are spoken than high ones, but so are they -- in a horizontal dimension -- when spread vowels are compared with rounded ones."

¹⁰The scribe omitted these two examples in copying the treatise.

¹¹It is likely that nasalization was not phonemic with short vowels (Haugen 1972:38-39, 40-41): the nasalized variants occur only next to nasal consonants. While I have followed the manuscript in writing nasalization here, a better analysis would have the nine vowels occurring with length or nasalization, i.e. $\bar{V} : \tilde{V} : \bar{V}$. The two diacritics merge (as length) by the end of the twelfth century (3.1.7).

¹²Compare the reflexes of the short vowels before ng, nk: a e i o u ϕ become [a_ɥ e_ɪ i(i) o_ɥ u(u) ϕ _ɥ] (Stefán Einarsson 1949:9).

¹³The fact that the merger of i, y with e, ϕ must be "fiercely fought on all levels of instruction and education" (Hreinn Benediktsson 1959:306) is a clear indication that it is spreading across the island.

¹⁴Schneider (1966:169) derives "tannap" from 'stand up'. The texts have (266) "Dem boby tannap leckey stick" 'their breasts ___ like sticks/trees', and (273) "traí tannap smoll fo Dodo-bar" '[if you're in the neighbourhood] try to ___ for a while at the D.'.

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