Navajo Linguistics: Part II

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0. In the introduction to the first part of this paper it was claimed that all available evidence indicates that the use of a person's first language in his primary schooling is, without question, sound educational practice and that the use of the Navajo language in schools attended by Navajo children is perhaps one of the most significant developments in modern education in this country. These are rather strong statements, and I think it would be worthwhile in the introduction to this second part to discuss the question further. This is especially appropriate in view of the fact that many educators are in disagreement about the principle of 'vernacular education' (i.e., education in one's own language where that is different from the language used nationally), and a number of articles have appeared which are, to varying degrees, critical of the principle (for example: Bull, William A., "The use of vernacular languages in fundamental education," International Journal of American Linguistics 21:288-294 (1955); and Venezky, Richard L., "Nonstandard language and reading," Elementary English 47:334-345 (1970)). I would like to discuss my reasons for believing strongly in bilingual education and to indicate the ways in which certain criticisms of it are, in my opinion, inad-

equate.

Let me begin by stating that, from a linguistic point of view, the idea that a person's primary education should be begun in his native language is completely sound. Consider, for example, the acquisition of reading and writing skills, one of the basic goals in primary education. The point is this: the principle which is basic to literacy in most areas of the world -- i.e., the principle of alphabetic writing -- is independent of any particular language. Once the principle itself is acquired, it can be transferred to another language without difficulty; it does not have to be relearned when a new language is learned. It makes sense, therefore, to teach this principle to a young child in his own language, and it makes no sense whatsoever to teach it to him first in a foreign language, thus placing on him a double learning task. There is an even stronger linguistic point in support of this position. The principle of alphabetic writing can be most effectively taught if the learner is in full control of the phonology of the language for which the writing system is designed -- this follows, since the whole point of alphabetic writing hinges on the relationship between alphabetic symbols and the phonological segments (i.e., the sounds) of the language; the relationship cannot be effectively established unless the phonological structure is under control. Children of school age are in control of the phonology of their native language -- in other words, they come to school with precisely those attainments which are necessary to learn the principle which is basic to literacy; once they learn that prin-
ciple, it will serve them well throughout their lives, and they will be able to apply the principle to any new language which they may learn at a later date. The sooner they learn the principle the better -- they can learn it almost immediately if it is taught to them in their own language.

This line of argument, in one form or another, has come to be a basic one in discussions which are favorable to the idea of bilingual education, and correctly so. But this strictly linguistic argument is by no means the only one which can be used in favor of bilingual education. One of the strongest arguments in support of the use of a community's own language in its education system is the fact that it provides a means by which the linguistic and cultural wealth of the community can play an essential role in the formal education of its children, thereby enabling knowledgeable members of the community to participate in ways which might not otherwise be open to them.

It seems to me that one of the major faults in the studies which have been critical of the use of vernacular languages in education is that they have failed to take into consideration the educational goals which particular communities themselves regard as the major ones toward which they should work. If, for example, a given community decides that its overall goals include not only scholastic achievement, in the commonly accepted sense, but also a high degree of community involvement, both in teaching and in planning, together with a significant contribution from the linguistic and cultural resources of the community itself, then its programs should
be judged in those terms. Most critical essays which I have read on the subject have defined success in rather narrow terms. For example, in a review of a number of experiments, Venezky states that "none of the major studies shows unequivocally superior results for the native literacy approach" (p. 336); however, this judgment is based on statistical comparisons which fail to reflect the overall effect of the programs studied within the communities involved. Thus, in his discussion of a bilingual experiment in the Philippines (reported in Orato, Pedro T., "The Iloilo Community School Experiment: the vernacular as medium of instruction," _Fundamental Adult Education_, 7:173-78 (1956)), he points out that in the sixth and final year of the experiment, there was no statistical difference in reading ability between the experimental classes, whose instruction had been in the children's own language (Hiligaynon) for the first two years, and the control classes, whose instruction had been in English throughout the period of the experiment; but he goes on to say that there were "undeniable non-scholastic advantages for the vernacular group: interest was reported to be higher, parents became more involved with the schools, and the general relationship of the school to the community was improved over what it had been" (p. 337). In other words, the experiment showed that the bilingual approach was in fact superior in terms of its overall effect within the community. I suspect that there were also strictly scholastic advantages for the vernacular group during the period in which the children's native language was being used, and for some time thereafter, but that the statistical studies (made some four
years after the point at which instruction had switched to English) failed to reflect them.

The general point which is illustrated by the Philippines example is made in an even more striking manner by a study conducted in the highlands of Chiapas, Mexico (reported in Modiano, Nancy, "National or mother language in beginning reading: a comparative study," Research in the Teaching of English 1:32-43 (1968)). This involved a comparison of thirteen National Indian Institute schools with thirteen federal and state schools. In the former, the students' native language was used in teaching literacy, while in the latter the national language (Spanish in this case) was used. The results indicate greater success in teaching reading in the National Indian Institute schools, i.e., in those schools where the local language was used as a medium of instruction. Nevertheless, Venezy also uses this example to criticize the approach generally, asserting that the greater success of the National Indian Institute schools over the federal and state schools was due, not to the teaching procedures employed, but rather to the nature of the personnel involved in the teaching program. The teachers in the successful schools were members of the communities from which their students came; by contrast, most of the federal and state school teachers were from other parts of the country, and none of them spoke the language of their pupils. This supports the point made earlier -- the success or failure of an educational program in which a vernacular language is used must be judged in terms of a broad range of considerations, not merely in terms of a single, narrowly defined, academic
goal. The Chiapas case indicates that there is a positive correlation between the involvement of local people in the education of their children and the success of an educational program. And that is one of the unquestionable positive benefits of a bilingual program for a community whose language is different from the national one, i.e., it greatly increases the opportunity for talented individuals within the vernacular community to make their rightful contribution -- as teachers, counsellors, administrators, and so forth -- to the education of its young people.

In considering these cases, and others, two ingredients seem to emerge as extremely important to the success of an educational program -- i.e., (1) community control and involvement, and (2) the contribution of the community's own linguistic and cultural resources. These are, for example, precisely the ingredients which make programs like that of the Rough Rock Demonstration school so important.

I would like to consider briefly another case which seems to me to illustrate these points in an especially powerful way. This is the Cherokee experience during the nineteenth century (reported in part in Walker, Willard, "The design of writing systems for native literacy programs," a paper presented at the 1968 meeting of the American Anthropological Association). During the period in which the community was in control of its own educational system, the Cherokees achieved a level of literacy, not only in Cherokee itself (over 90%) but in English as well, which exceeded that of the neighboring Anglo populations in Texas and Arkansas.
The story begins with the invention, by Sequoyah, of a syllabic writing system for the Cherokee language -- this story is of considerable interest in itself, so I will take the liberty of quoting Walker's account of it (p. 23):

Sequoyah's syllabary was the end product of some twelve lonely, frustrating years of trial and error. Obsessed with his notion that Indians, like the more educated of the white people, might learn to communicate with "talking leaves," Sequoyah let his farm go to ruin, neglected his family, defied tradition, and was ultimately tried for witchcraft as the predictable result of his eccentric and antisocial behavior. By 1819, however, he had perfected the syllabary and taught his daughter to read, so that when asked to demonstrate his system before a committee of Cherokee elders he wrote a dictated statement which was subsequently read aloud by his daughter. His achievement was one of the most remarkable intellectual tours de force in American history. Equally remarkable, however, was the fact that within a few years thousands of tribal Cherokees became literate in their native language. People wrote letters, kept accounts, and copied the sacred songs and curing formulas. A weekly newspaper called The Cherokee Phoenix was printed by a Cherokee national press as early as 1828.

As is well known, during the succeeding decade, the Cherokees were forced by the U.S. Government to migrate over "the trail of tears" to what is now Oklahoma. Despite the tremendous hardships of the removal, which caused the death of a great many people, and despite the later ravages of the Civil War, which "left virtually every building in the [Cherokee's] New Nation gutted or in ashes" (Walker, p. 24), the Cherokees were able by means of their own sys-
tems of education to achieve the levels of literacy mentioned above; in addition, the Cherokee press printed nearly fourteen million pages of books, pamphlets, and biblical passages. And the school systems set up by the Cherokees, and others of the Five Civilized Tribes, were "the best managed of any west of the Mississippi River" (Spicer, Edward, A Short History of the Indians of the United States, Anvil (1969), p. 76).

However, in 1898 Congress passed the Curtis Act which dissolved the governments of the Five Civilized Tribes thereby ending the period in which the Cherokees were in control of their own education system. In addition, the Cherokee press was confiscated by the U.S. Government in 1906. After this time, the successes which had been achieved in education in the Cherokee community were to a large extent reversed. To quote from another paper by Walker ("An experiment in programmed cross-cultural education: The import of the Cherokee Primer for the Cherokee community and for the behavioral sciences," mimeo (1965), p. 8):

It seems clear that the startling decline during the past sixty years of both English and Cherokee literacy in the Cherokee tribe is chiefly the result of the recent scarcity of reading materials in Cherokee, and of the fact that learning to read has become associated with coercive instruction, particularly in the context of an alien and threatening school presided over by English speaking teachers and controlled by English speaking superintendents and PTA's which conceive of Cherokee as a "dying" language and Cherokee school children as "culturally impoverished" candidates for rapid and "inevitable" social assimilation.
I think it would be difficult to decide which factor -- (a) community control or (b) the use of the community's own language -- was primarily responsible for the early successes of Cherokee education. In fact, I think it would be foolish to attempt to decide this question, since the two factors are probably inseparable. The Cherokee experience must be judged according to the way it actually functioned -- i.e., it was successful as a bilingual program conceived and conducted by the Cherokees themselves. The successes were reversed when, as a result of action by the U.S. government, it ceased to be a bilingual program and ceased to be under the control of the Cherokee community.

If one looks at bilingual programs in terms of their functioning within the communities in which they operate, it seems reasonable to assert, in contradiction of Venezky's statement quoted earlier, that the relevant cases demonstrate the superiority of the bilingual approach rather unequivocally.

(It might be appropriate here to list some additional sources which describe and comment favorably on bilingual programs: UNESCO, The Use of Vernacular Languages in Education, Monographs on Fundamental Education, No. 8. Paris: UNESCO (1953); Harris, Joy Kinslow, "Linguistics and Aboriginal Education: a practical use of linguistic research in Aboriginal education in the Northern Territory," Australian Territories, Vol. 8, No. 1, pp. 24-34 (1968); Nida, Eugene A., "Approaching reading through the native language," Language Learning, Vol. 11, No. 1, pp. 16-20 (1949); Castro de la Fuente, Angelica,
I believe that the Navajo educators who have embraced the idea of bilingual education have made a tremendously important decision. Furthermore, I think that the available evidence indicates they have made the correct decision. With this in mind, I would like now to return to the central topic of this paper -- i.e., the possible role which Navajo linguistics might play in bilingual education in Navajo communities.

As I have attempted to demonstrate in this foregoing discussion, it is important to evaluate an educational decision in terms of the goals which members of the community involved have in mind when they make it, not in terms of abstract academic goals regarded as important by persons outside the community. At least one Navajo community has articulated its educational goal very succinctly as that of "full bilingual-bicultural participation" (Rough Rock Demonstration School, A Bilingual Proposal, p. 8 (1970)). It is obvious that the role of the Navajo language is central to the realization of this goal and that a great deal of thought must be given to the question of what, exactly, this role should be. The ultimate decision in this regard must be made by the Navajo community.
I assume, on the basis of what I have learned of existing and projected programs, that the role of the Navajo language in Navajo education will be greater than that sometimes suggested as the proper role of the vernacular language in schools -- i.e., as a mere bridge to literacy in the national language. Rather, I assume, Navajo will play some part in a student's education throughout his school years. As an outsider, and as one who has little experience in primary and secondary education, I cannot do more than suggest ways in which my own area of competence, linguistics, might be relevant to a continuing bilingual education program.

As I suggested in the first part of this paper, one way in which Navajo linguistics might contribute to the education of Navajo children and young adults is as a means of teaching certain methods and concepts of scientific inquiry. The study of one's own language is an extremely efficient vehicle for teaching such concepts as generalization, theory and hypothesis, proof, explanation, and abstraction, as well as methods of analysis and scientific description. The question as to whether or not this is an appropriate role for the Navajo language in schools attended by Navajo-speaking students must, of course, be answered by the Navajo community. In order to answer the question, however, it is necessary to understand something of what it entails. I would like, therefore, to continue the discussion of Navajo linguistics begun in the first part of this paper and to explore further various possibilities for developing curriculum materials which could be used in the school situation.
Within the area of descriptive, or structural, linguistics there are a number of components. In practice, linguists may specialize in one or another component, though it is recognized that an adequate account of a particular language is an articulated combination of all of them. Among these components are:

syntax
morphology
phonology
semantics

Syntax is the study of the structure of sentences -- the purpose of a syntactic study is to determine the rules which define the grammatical (i.e., well-formed) sequences of words in a particular language. Morphology is the study of the structure of words -- i.e., of the ways in which morphemes are combined in the construction of grammatically well-formed words. Both syntax and morphology are concerned with the study of morpheme sequences and combinations, and they are sometimes referred to jointly as 'morphosyntax'. It is not necessary to be precise in distinguishing syntax from morphology; but in general a statement or rule is syntactic if it involves a relationship among words (e.g., agreement, ordering) and it is morphological if it involves a relationship among morphemes within a word. Thus, for example, the rule which states the relationship between

'ashkii 'at'ééd yoo'į.
The boy sees the girl.'

and the cognitively synonymous

'at'ééd 'ashkii boo'į.
is a syntactic rule, since it involves the ordering of words and
a relationship between a particular verb form (/yoo'uf/ or /boo'uf/)
and the linear ordering of the subject and object noun phrases.
On the other hand, the proper ordering of meaningful elements within
the verb word, for example -- i.e., the fact that the stem is final,
that the classifier precedes the stem, that person markers precede
the classifier, and so on -- is a morphological matter.

Phonology is the study of the sounds of a language and of the
rules which are involved in defining the phonetic representation of
sentences. In earlier discussions, I alluded to a great many 'rules
of pronunciation' or, as linguists call them, 'phonological rules'.
For example, the operation which converts the vowel /a/ to /e/ before
/i/, thereby deriving

neilnish

from

naiilnish
'we are working'

is a phonological rule. We assume that this rule exists in Navajo
because the adverbial prefix /na-/ seems to have /a/ as its vowel
basically -- it appears with the vowel /e/ only when followed by /i/.
Furthermore, the same rule turns /a/ to /e/ in certain other prefixes
under the same conditions -- for example, the /yá-/ of the verb
/yá-í-ti'/'to speak' becomes /yé/ when the verb is put into the
first person nonsingular (i.e., the form in which the person marker
appears as /ii/). Thus,

yáiilti'
is pronounced

yéiilti'
'we are speaking'

in accordance with this phonological rule.

The phonology of Navajo is extremely complex and it is one of the most fascinating areas of Navajo grammar -- the study of it will keep linguists busy for many years, and it provides a number of interesting possibilities for use in elementary and secondary education. It is customary, and appropriate, to think of phonology from two points of view: (1) from the point of view of the phonological rules used in deriving the actual pronunciation of linguistic forms from the more abstract representations which underly them, and (2) from the point of view of the sounds themselves. The latter study is referred to as 'phonetics', and will be elaborated in some detail later.

Semantics is the study of meaning -- that is to say, it is concerned with the meanings of morphemes and with the rules involved in combining the meanings of morphemes to determine the meanings of larger and more complex linguistic forms (i.e., words, phrases, and sentences). Linguists have not been extremely successful in studying semantics; although a large amount of important work has been done on it, it is reasonable to say that the study of semantics is still in its infancy. Paradoxically, however, the meanings of linguistic forms are very accessible to native speakers of a language, and their intuitions about meaning constitute a major part of the data which grammarians use in developing linguistic theories. This accessibility also makes semantics extremely valuable in teaching; a great many interesting semantic projects can be constructed for use in the earliest, as well as more advanced, levels of education -- e.g., the
game entitled *making generalizations* suggested in the first part of this work is semantically based, and the construction of a Navajo dictionary (with definitions in Navajo) suggests itself as an important project which could be undertaken in schools attended by Navajo-speaking students. The construction of dictionaries involves semantics in obvious ways, since each dictionary entry is associated with a definition consisting, in part, of the meanings of the entry. However, there is more to a dictionary than that -- other aspects of the entries (e.g., their usage, their etymologies (sources), commentary on their acceptability, where these are known) are also given. There is, in fact, a field, called 'lexicography', which concerns itself with these matters. Dictionary projects in Navajo schools would be of immense value, not only in teaching, but also as resources. There is, as yet, no dictionary for Navajo in which the definitions are in Navajo itself -- the construction of such a dictionary, or of several at different grade levels, would provide an excellent vehicle for teaching the formulation of adequate, comprehensible, definitions, a skill which is of great value throughout a person's life, both within and outside of the school situation and regardless of the language he uses later in life.

In concluding this brief discussion of descriptive linguistics, I should perhaps point out that there are several different theoretical frameworks which influence the work which linguists do -- that is to say, linguists are not all of the same persuasion, so to speak. The framework which has influenced my own work, including what little work I have done on Navajo grammar, is that which has come to be known as 'generative transformational'; it is due primarily to Noam Chomsky (*Syntactic Structures*, Mouton (1957); *Aspects of the Theory of Syntax*, MIT Press (1965); Chomsky, Noam, and Morris Halle, *The Sound Pattern of English*, Harper and Row (1968)).
Comparative Linguistics

There are two senses of the term 'comparative linguistics' which should be rather sharply distinguished -- one is more properly called 'historical linguistics', the other 'language typology'. I will discuss them in the order just given. Both are concerned, in part, with the problem of explaining similarities and differences among languages.

In order to introduce the subject matter of historical linguistics, I will present a comparative table consisting of words from Navajo, Apache (from San Carlos), and Hopi, together with their English equivalents:

<table>
<thead>
<tr>
<th>Navajo</th>
<th>Apache</th>
<th>Hopi</th>
</tr>
</thead>
<tbody>
<tr>
<td>shí</td>
<td>shíi</td>
<td>ní'</td>
</tr>
<tr>
<td>ni</td>
<td>n̓ídi</td>
<td>'im</td>
</tr>
<tr>
<td>naaki</td>
<td>naaki</td>
<td>lööyi</td>
</tr>
<tr>
<td>díné</td>
<td>mnée</td>
<td>sino</td>
</tr>
<tr>
<td>i̞óó'</td>
<td>łog</td>
<td>paakiw</td>
</tr>
<tr>
<td>lééchájí</td>
<td>líítchaayáné</td>
<td>pooko</td>
</tr>
<tr>
<td>-jaa'</td>
<td>-jaa</td>
<td>naqvi</td>
</tr>
<tr>
<td>-náá'</td>
<td>-náá</td>
<td>poosi</td>
</tr>
<tr>
<td>-zéé'</td>
<td>-zé'</td>
<td>mo'a</td>
</tr>
<tr>
<td>-woo'</td>
<td>-woo'</td>
<td>tama</td>
</tr>
<tr>
<td>-tsoo'</td>
<td>-zaad</td>
<td>leŋi</td>
</tr>
<tr>
<td>-kee'</td>
<td>-kee'</td>
<td>kiki</td>
</tr>
<tr>
<td>jóhona'a'éí</td>
<td>yaa'áí</td>
<td>taawa</td>
</tr>
<tr>
<td>tó</td>
<td>tóó</td>
<td>kiįiyi</td>
</tr>
<tr>
<td>tséé</td>
<td>tséé</td>
<td>'owa</td>
</tr>
<tr>
<td>ni'</td>
<td>ni'</td>
<td>tickwa</td>
</tr>
<tr>
<td>łid</td>
<td>łid</td>
<td>kwiiciįwi</td>
</tr>
<tr>
<td>kó'</td>
<td>kó'</td>
<td>qóyóhi</td>
</tr>
<tr>
<td>tl'oh</td>
<td>tl'oh</td>
<td>tiisáq̓a</td>
</tr>
<tr>
<td>yas, zas</td>
<td>zas</td>
<td>niva</td>
</tr>
</tbody>
</table>

'I'
'you'
'two'
'person'
'fish'
'dog'
'ear'
'eye'
'mouth'
'tooth'
'tongue'
'foot'
'sun'
'water'
'stone'
'ground'
'smoke'
'fire'
'grass'
'snow'
A glance at these comparative word lists is sufficient to show that Navajo and Apache are very much alike and that Hopi is very different from both of them. The conclusion that the linguist draws from this is that Navajo and Apache are related. The linguist typically thinks of it in the following way: Navajo and Apache were once the same language and the similarities between them are due to the fact that they have a common linguistic ancestor. In other words, their common linguistic ancestry explains their similarity. On the other hand, Hopi does not appear to be related to Navajo and Apache -- the differences are too great. The linguist would suggest that what explains the fact that Hopi is so different from Navajo and Apache is that they do not have a common linguistic ancestor -- at least not in the recent past.

Although Navajo and Apache are similar, there are differences -- words are pronounced in a different way and, in some cases, the meaning of words is different (e.g., /-zaad/ means 'tongue' in Apache but 'language' or 'word' in Navajo). If Navajo and Apache were once the same language, then how does the linguist explain these differences? The explanation is to be found in another aspect of the nature of language -- i.e., in the fact that languages change as time passes. The changing nature of languages is very evident, for example, if one compares samples of English written five or six hundred years ago with samples of modern English, or if one compares Latin with Spanish (one of the modern forms of Latin). In the case of Navajo and Apache, it is reasonable to assume that they have also changed, and further, that they have changed in different ways. At some time in the past, they were presumably one language (called Southern Athabaskan or Apachean by linguists); when the two communities separated and began to develop their own separate traditions, the languages also changed separately. One of the ways in which languages change is in the pronunciation of words -- this is referred to as
'phonological change' and is typically very systematic. Thus, it is normally the case, for example, that where Apache has a final /g/ in words, Navajo does not have it, or else has /'/ instead, though the rest of the word may be almost identical. This can be illustrated in the following table:

<table>
<thead>
<tr>
<th>Navajo</th>
<th>Apache</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>ióó'</td>
<td>ióg</td>
<td>'fish'</td>
</tr>
<tr>
<td>-ts'a'</td>
<td>-ts'ag</td>
<td>'hear'</td>
</tr>
<tr>
<td>-tso</td>
<td>-tsog</td>
<td>'yellow'</td>
</tr>
<tr>
<td>-do</td>
<td>-dog</td>
<td>'hot'</td>
</tr>
<tr>
<td>-cha</td>
<td>-chag</td>
<td>'cry'</td>
</tr>
</tbody>
</table>

Another way in which languages change is by shifting the meaning of a word. This is apparently what happened to the stem /-zaad/ in the Apache linguistic tradition -- assuming that it originally meant 'language', or the like, its meaning shifted to 'tongue'; in any event, both Navajo and Apache have the stem, but in different meanings, thus there was probably a meaning shift in one language or the other. Languages can also undergo changes in their grammars -- rules can be added to or dropped from grammars, and rules can change in terms of their application. The study of grammatical change has a great deal to contribute to the general study of language, but it is somewhat beyond the scope of this brief discussion.

If it is true that languages change as time passes, then it should be the case that the number of changes increases as the time between two stages gets longer. And if this is true, then languages which have been separated for a long time should be more different from one another than languages which have been separated for a short time only. Navajo and Apache are quite similar, suggesting that they have been separated for a rather short time. But if we compare
Navajo with Sarcee, for example, it is possible to detect similarities, but not as many as with Apache. Sarcee is an Athabaskan language spoken in Canada, and its relationship to Navajo can be illustrated in the following table:

<table>
<thead>
<tr>
<th>Navajo</th>
<th>Sarcee</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>shí</td>
<td>sini</td>
<td>'I'</td>
</tr>
<tr>
<td>ni</td>
<td>nini</td>
<td>'you'</td>
</tr>
<tr>
<td>naaki</td>
<td>akii'</td>
<td>'two'</td>
</tr>
<tr>
<td>diné</td>
<td>diná</td>
<td>'person'</td>
</tr>
<tr>
<td>łóó'</td>
<td>tiúk'á</td>
<td>'fish'</td>
</tr>
<tr>
<td>łééchą́'í</td>
<td>tił́</td>
<td>'dog'</td>
</tr>
<tr>
<td>-ja'a'</td>
<td>-dzigh</td>
<td>'ear'</td>
</tr>
<tr>
<td>-náá</td>
<td>-ná</td>
<td>'eye'</td>
</tr>
<tr>
<td>-zéé'</td>
<td>-zo'</td>
<td>'mouth'</td>
</tr>
<tr>
<td>-woo'</td>
<td>-ghu'</td>
<td>'tooth'</td>
</tr>
<tr>
<td>-tsoo'</td>
<td>-tsu'</td>
<td>'tongue'</td>
</tr>
<tr>
<td>-kee'</td>
<td>-ka'</td>
<td>'foot'</td>
</tr>
<tr>
<td>jóhonaa'éí</td>
<td>ch'at'ághá</td>
<td>'sun'</td>
</tr>
<tr>
<td>tó</td>
<td>tú</td>
<td>'water'</td>
</tr>
<tr>
<td>tsé</td>
<td>tsá</td>
<td>'stone'</td>
</tr>
<tr>
<td>ni'</td>
<td>ni</td>
<td>'ground'</td>
</tr>
<tr>
<td>łid</td>
<td>tili</td>
<td>'smoke'</td>
</tr>
<tr>
<td>ko'</td>
<td>ku'</td>
<td>'fire'</td>
</tr>
<tr>
<td>ti'oh</td>
<td>-ti'ugh-</td>
<td>'grass'</td>
</tr>
<tr>
<td>yas, zas</td>
<td>zas</td>
<td>'snow'</td>
</tr>
</tbody>
</table>

Although Sarcee is not as similar to Navajo as Apache is, it is certainly more similar to it than Hopi is. In fact, the similarities are so great that the linguist would definitely consider Sarcee to be related to Navajo. One of the strongest pieces of
evidence in favor of this point of view actually has to do with the differences. Recall that phonological change is highly systematic -- that is, if a sound changes, it normally changes in the same way in all morphemes. Thus, while Sarcee /tli/ 'smoke' looks somewhat different from Navajo /tíd/ 'smoke', it is possible to propose that they were originally the same (or, as linguists say, they are 'cognate') because they involve a correspondence which is regular -- where Navajo has an initial /t/, Sarcee typically has initial /tli/:

<table>
<thead>
<tr>
<th>Navajo</th>
<th>Sarcee</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>tíd</td>
<td>tli</td>
<td>'smoke'</td>
</tr>
<tr>
<td>tìq</td>
<td>-tìn(=)</td>
<td>'many'</td>
</tr>
<tr>
<td>tòó'</td>
<td>tìûk'á</td>
<td>'fish'</td>
</tr>
<tr>
<td>tììì' 'horse'</td>
<td>tli</td>
<td>'dog'</td>
</tr>
<tr>
<td>tìeezh</td>
<td>tìûaz</td>
<td>'earth'</td>
</tr>
</tbody>
</table>

The word for 'fish' provides another example of a regular correspondence between Sarcee and Navajo -- where Sarcee has the vowel /u/, Navajo has the vowel /o/:

<table>
<thead>
<tr>
<th>Navajo</th>
<th>Sarcee</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>tôó'</td>
<td>tìûk'á</td>
<td>'fish'</td>
</tr>
<tr>
<td>-k'os</td>
<td>-k'us</td>
<td>'neck'</td>
</tr>
<tr>
<td>k'os</td>
<td>(na)k'us</td>
<td>'cloud'</td>
</tr>
<tr>
<td>-god</td>
<td>-gud-</td>
<td>'knee'</td>
</tr>
<tr>
<td>-tso</td>
<td>-tsù́́</td>
<td>'yellow'</td>
</tr>
<tr>
<td>tìl'tóól</td>
<td>tìl'úl</td>
<td>'rope'</td>
</tr>
<tr>
<td>tòó</td>
<td>tú</td>
<td>'water'</td>
</tr>
</tbody>
</table>

It would be extremely difficult to explain the regularity of these correspondences without appealing to the theory that Sarcee and
Navajo are related, i.e., that they have a common linguistic ancestor.

The greater number of differences between Navajo and Sarcee, as compared to the number of differences between Navajo and Apache, suggests that Sarcee is more distantly related to Navajo than Apache is. One way to think of it is by analogy with kinship among people -- one might say, for example, that Navajo and Apache are 'brothers', or 'sisters', while Sarcee is a 'cousin' to Navajo and Apache. In fact, this is very similar to the way in which linguists actually refer to relationships among languages -- the biological, or kinship, model is constantly used. Thus, they would say that the Navajo and Apache languages are the 'daughters' of a common 'parent', called 'Southern Athabaskan'. The relationship might be diagrammed in the following way:

```
Southern Athabaskan
   /
  /    
Navajo  Apache
```

The parent is Southern Athabaskan and the descendents are Navajo and Apache. If one adds to this the more distantly related Sarcee, the 'family tree' becomes somewhat more complicated:

```
Athabaskan
   /
  /    
Southern Athabaskan
   /
  /    
Navajo  Apache  Sarcee
```
Here, the 'grandparent', so to speak, is Athabaskan (sometimes spelt 'Athapaskan'), and its descendents are Southern Athabaskan and Sarcee. Actually, there are a great many Athabaskan languages -- most of them are spoken in Canada and Alaska, there are a few on the Pacific coast in California and Oregon, and there are several spoken in the Southwest (i.e., Navajo and the various Apache languages: Chiricahua, Jicarilla, San Carlos and White Mountain, Kiowa-Apache, Lipan, and so on). A complete and accurate family tree of the Athabaskan languages is still being developed by comparative Athabaskanists. (An idea of the relationships among Athabaskan languages can be gained from Hoijer, Harry, "The chronology of the Athapaskan languages," International Journal of American Linguistics 22.219-232 (1956). The Apache and Sarcee words in the comparative tables above are from this publication and partly from Hoijer, et al. Studies in Athapaskan Languages, University of California Publications in Linguistics, Vol. 29 (1963).)

Navajo, Apache, and Sarcee (as well as a great many other languages) belong to the Athabaskan family. However, Hopi belongs to a different family of languages, called 'Uto-Aztecan', which includes in addition to Hopi such languages as Ute, Paiute, Comanche, Shoshone, Papago, Pima, Yaqui, and Aztec. It has not been possible to establish any relationship between the Athabaskan and Uto-Aztecan language families -- if they are related, then they have been separate traditions for such a long time that linguistic change has made it impossible to discover the common heritage; that is to say, it is not possible to discover cognate morphemes which are shared by, say, Navajo and Hopi. This is not to say that there aren't some words which are similar in the two languages -- e.g., Hopi /koliciyaw/ 'skunk' beside Navajo /golizhi/ 'skunk', and Hopi /picooti/ 'pig' beside Navajo /bisóodi/ 'pig' -- but these are probably borrowings (i.e., words borrowed from one language into
the other) rather than cognates (i.e., words descended from a common linguistic ancestor).

One of the tasks of historical linguistics is 'historical reconstruction' -- i.e., the attempt, by means of a comparison of modern languages, to determine the phonological and grammatical structures of the ancestral language; it can be thought of as an attempt to 'undo' the linguistic changes which have taken place in separate but related linguistic traditions in order to establish the ancestral language from which the modern ones descended. For example, the historical linguist would, among other things, attempt to determine whether the final /g/ found in San Carlos Apache was also found in the language which was the common ancestor of Navajo and Apache, and he would attempt to determine whether the stem /-zaad/ meant 'language' or 'tongue' in the common ancestor. A great deal of work has been done toward a reconstruction of the common ancestor of all Athabaskan languages, but a great deal remains to be done -- very little work has yet been done on historical reconstruction for the intermediate families, like Southern Athabaskan, and this is a necessary step toward a historical reconstruction of the family as a whole.

Historical linguistics provides a number of possibilities for use in education for Navajo-speaking students. Like the other areas of linguistics, it involves the construction of theories in an attempt to explain certain observable facts. There exist a number of descriptions of Apache languages from which material could be drawn to teach students the elementary steps in the comparative method -- i.e., the discovery of sound correspondences and the reconstruction of certain aspects of the ancestral Southern Athabaskan language. It might be possible to arrange for Navajo-speaking students to work together with some of their Apache-speaking colleagues on a comparative dictionary of Navajo and Apache -- such a work does not yet exist.
and would be an extremely worthwhile project for advanced students.

By contrast with historical linguistics, language typology is concerned with similarities and differences among languages which are not due to common ancestry but rather to universals of human language. There are certain features which all languages appear to possess -- all of them have grammars which are amenable to the kind of study begun in the first part of this work, i.e., all have grammatical and phonological rules, and all have more or less the same parts of speech (nouns, verbs, determiners, etc.). Although there are obvious differences among languages, it is interesting to note that certain differences consistently hang together. Thus, for example, although Navajo and Japanese are not related, so far as we know, there are certain consistent similarities -- in both languages, the verb appears finally in sentences:

\[ \text{diné léechág'í yiyiíltsá.} \]
\[ \text{hito-wa inu-o mita.} \]
\[ \text{(the person the dog saw)} \]
\[ \text{'The person saw the dog.'} \]

And in both languages, the morphemes which express such meanings as in, to, with, etc., follow the noun with which they are associated (i.e., they are postpositions):

\[ \text{hooghan-góne'} \]
\[ \text{uchi-ní} \]
\[ \text{(house-in)} \]
\[ \text{'in the house'} \]

\[ \text{hooghan-góó} \]
\[ \text{uchi-e} \]
\[ \text{(house-to)} \]
\[ \text{'to the house'} \]
By contrast, in languages like Arabic and Hawaiian (also not known to be related), the verb appears initially in sentences, and the morphemes expressing such meanings as in, to, etc. precede the noun with which they are associated (i.e., they are prepositions). And this is generally true -- although there are some exceptions, 'verb-final' languages are typically also 'postpositional' languages (Navajo, Japanese, Turkish, Korean), and 'verb-initial' languages are typically also 'prepositional' languages (Arabic and other Semitic, Hawaiian and other Polynesian). Typological correlations of this kind are of great interest to linguists and, it is hoped, may someday lead to a general theory of grammar that will tell us a great deal about all of the languages of the world.

In a bilingual program, language typology has an obvious role to play -- the typological differences and similarities between English and Navajo, for example, provide an excellent opportunity for students to learn about linguistic structures; contrasts and comparisons not only help to focus attention on grammatical and phonological rules but they also help to identify areas which might require special practice in learning a new language. An excellent project for advanced Navajo-speaking students would be a detailed contrastive grammar of Navajo and English -- although this is a rather advanced project, contrasts and comparisons between Navajo and English can be started quite early, as soon as a student becomes bilingual to some extent.

**Psycholinguistics**

The linguist is concerned primarily with the knowledge people possess which enables them to speak and understand the sentences of their native languages. Those psychologists interested in language are concerned with the psychological correlates of linguistic knowledge. Another way to phrase this is to say that the linguist
is interested in what a person must know to speak and understand, while the psychologist is interested in how he speaks and understands -- i.e., what strategies does he use in bringing his linguistic knowledge to bear in speaking and understanding languages.

Consider again the cognitively synonymous pair of sentences

'ashkii 'at'ééd yoo'į.

and

'at'ééd 'ashkii boo'į.

What the linguist might say about these sentences is that, in order to understand them properly, the native speaker of Navajo must know that there is a rule in Navajo which relates sentences of the form

SUBJECT OBJECT (yi-)VERB

to sentences of the form

OBJECT SUBJECT (bi-)VERB.

In other words, he is interested in what such sentences have to say about the grammar (i.e., theory of linguistic knowledge) of Navajo -- he would say that this is one of the facts about Navajo which a person must know in order to speak and understand the sentences of Navajo. The psycholinguist, on the other hand, is more interested in how a person utilizes this knowledge in speaking and understanding. He does his research on such matters by constructing experiments in which speakers are asked to perform tasks designed to reveal the
strategies they use in understanding. The psycholinguist might, for example, attempt to discover whether the native speaker of Navajo uses such strategies as the following:

(1) In a sentence with two noun phrases and a verb, interpret the first noun phrase as the subject and the second noun phrase as the object UNLESS

(2) the verb has the object prefix /bi-/; in that case, interpret the first noun phrase as the object and the second noun phrase as the subject.

In other words, he attempts to discover the clues which the speaker uses in understanding sentences. The discovery of such clues is of considerable importance in determining the psychological reality of the theories (i.e., grammars) which linguists propose.

One of the most fruitful areas of investigation in psycholinguistics is language acquisition in children. Children learn their native languages surprisingly quickly, and it is possible to some extent to observe their acquisition of specific rules as their speech becomes more similar to the adult standard. However, a great deal can be learned about language in general by observing the differences between the speech of a young child just beginning to learn his language and that of a mature speaker. Many linguists feel that the child is equipt, as part of his birthright, with a highly sophisticated linguistic theory which enables him to learn a language on the basis of the sentences he hears being used by older children and adults within his community -- some insight into this fantastic capacity which children have can be gained by observing what people commonly refer to as the 'mistakes' of child language -- these 'mistakes', which usually involve simplifications and over-generalizations, reveal many aspects of the child's idealized grammatical theory and the strategies he uses in learning the rules of the language he hears
about him. Thus, when the English-speaking child says *feet* instead of *feet* for the plural of *foot*, it is clear that he has learned the general rule of English plural formation -- i.e., add *-s*. He has learned the general rule, but not the exceptions. And when the English-speaking child asks *what he will say*, instead of *what will he say*, he has learned one fact about English question formation -- i.e., the 'wh-word' appears initially in the sentence, but he has not yet learned the part of question formation which stipulates that the subject (e.g., *he*) follows the auxiliary (e.g., *will*) in questions. What is especially interesting in cases like this is that they show that the child *must* have a theory of grammar, since he uses linguistic forms which he never hears from older speakers -- to some extent, his own grammar is independent from that of the community; the task of learning his native language involves, in large part, changing his grammar until it closely approximates the community standard; he does this without specific instruction, for the most part, which means that he must have built within him a very powerful linguistic theory which enables him to accomplish the task.

Psycholinguistic investigations are extremely difficult to carry out. Nonetheless, there are aspects of the study of child language which can be done in the school situation. For example, a catalogue of observations on the 'mistakes' which young children make in speaking their own language would be of great interest in that it would help to identify some of the rules which children acquire as they are learning to speak.

**Ethnolinguistics and Sociolinguistics**

The relationship of language to culture and society has been a subject of great interest to linguists, anthropologists, sociologists, and philosophers since the very beginnings of the disciplines concerned
with the study of man. The concerns of ethnolinguistics and socio-
linguistics are too vast to permit me to discuss them adequately
here, but I will indicate some of the topics which are included in
them.

An idea which is central to many studies in the area of ethno-
linguistics is that the language which a community speaks reflects
a great deal about its culture and worldview. The most obvious
way to see this connection is to examine a dictionary of the lan-
guage -- by and large, the concepts which are named in the dic-
tionary correspond to concepts which have cultural reality for the
speakers of the language. And by examining the meanings of the
items included in the dictionary, it is possible to gain some in-
sight into the ways in which speakers of the language classify the
elements of the world in which they live -- thus, for example, the
exact meaning of the Navajo expression '/iɬ  naa'aash/', by com-
parison with the English term cousin, reveals that that part of
reality which concerns kinship is subclassified differently in the
two languages. The class of individuals designated by the term
'/iɬ  naa'aash/' is different from the class designated by the English
term cousin; the former refers to the children of one's father's
sister and one's mother's brother, while the latter refers to the
children of one's father's brother or sister and one's mother's
brother or sister -- while it is possible to translate '/iɬ  naa'aash/
as 'cousin', it is not always possible to translate cousin as
'/iɬ  naa'aash/'. A complete comparison of English and Navajo kin-
ship terminology would show that the two systems are quite different --
the meanings of Navajo and English kinship terms do not correspond
exactly. In general, this experience would be duplicated in other
parts of the dictionary, e.g., color terms, verbs of eating, verbs
of handling, verbs of going, verbs of falling, verbs referring to
objects at rest, terms for sizes, shapes, and qualities, and so on.
The extent to which the classification and analysis of reality as revealed by the language corresponds to the culture of a people is a matter of some dispute, but I am sure that all students of culture would agree that a knowledge of the language which a community uses is of great importance in gaining an understanding of its culture.

Differences in naming practice among languages also penetrate into the grammar. That is to say, grammars differ in terms of the categories which are given formal representation in them. For example, English distinguishes two third person forms in reference to animate beings -- these are represented by the pronouns he and she. The principle which underlies the English system is that of 'gender' -- he is masculine, she is feminine. Navajo also has two third person forms -- corresponding to the pronouns /bí/ and /hó/ -- but the principle which underlies the distinction is vastly different, having to do in part with definiteness or specificity and in part with respect usage. In English, the category of number recognizes a distinction between 'singular' and 'plural', while in Navajo the category of number is represented by an extremely rich system of distinctions (which have been the subject of an important study by Witherspoon, Gary "Navajo categories of objects at rest," American Anthropologist 73.110-127 (1971)). An excellent example of the relationship between grammar and the classification of phenomena in the world is to be found in a detailed study of the Navajo rule of subject-object switch. Recall that the rule can apply freely in some cases, cannot apply at all in some, and must apply in others. Although I do not understand the rule thoroughly at this point, it appears that its application is conditioned in part by the semantic classification of the noun phrases functioning as subject and object. Evidently, there is a hierarchy, or ranking, of Navajo nouns along a semantic dimension relating to the ability of entities denoted by
nouns to act, to effect causation, and the like; nouns denoting human beings rank highest in this hierarchy, while nouns denoting abstract concepts (e.g. /ság/ 'old age', /dikos/ 'cough', and so on) rank lowest. The applicability of subject-object switch depends, to a large extent, on the relative position of the subject and object noun phrases within this hierarchy (cf. Hale, Ken, "A note on subject-object inversion in Navajo," MIT ms. 1971). It is interesting to note that from a purely syntactic point of view, the Navajo rule has the same effect as the English passive rule -- i.e., the rule which relates the English sentences the boy saw the girl and the girl was seen by the boy. Both the Navajo rule and the English rule involve an inversion of the subject and the object so that the object is mentioned first rather than second. However, the rules differ in terms of the conditions under which they apply -- while the applicability of the Navajo rule depends on the nouns, the applicability of the English rule depends on the verb. Some English verbs cannot passivize, while others may do so freely; the nouns do not matter -- thus, while John bought a book has a passive version a book was bought by John, the sentence John had a book does not have a passive version *a book was had by John (the verb buy can passivize, while the verb have cannot).

This aspect of language is extremely rich in terms of the possibilities it offers for the development of materials and the initiation of projects which can be used in education -- particularly in a bilingual program. The construction of an adequate dictionary of Navajo, for example, will necessarily involve a study of the ways in which the conceptual world is classified and understood from the point of view of Navajo culture. (Some idea of the immense richness of the Navajo systems of terminology can be gained by a consideration of the work of Oswald Werner and Kenneth Begishe, as represented, for example, in their recent paper "A lexemic typology
of Navajo anatomical terms I: the foot," International Journal of American Linguistics 36.247-265 (1970).) Contrastive studies of Navajo and English terminologies provide an excellent opportunity to examine differences between the two languages -- such studies could be begun quite early in bilingual phases; one could, for example, construct units based on comparisons of Navajo and English terminologies within individual domains, e.g., color terms, kinship terms, body part terms, terms having to do with fire, water, landscape, motion, stance, emotions, health, and so on. At more advanced levels, a contrastive study of Navajo and English grammatical categories could be undertaken -- units could be developed around specific grammatical rubrics, e.g., the systems of number distinctions, tense and aspect distinctions, the category of person, the distinctions made in the determiner system, and so on.

The native speaker of a given language knows not only the rules of grammar which define the grammatical sentences of the language, but he also knows the meanings of its morphemes and how these meanings correspond to the universe -- to that extent, at least, he knows the culture of the community which uses the language. It is this aspect of knowledge which constitutes a large portion of the subject matter of ethnolinguistics. However, a mature member of a particular linguistic community has other knowledge as well -- he knows how to use the language in various social situations; he knows when it is appropriate to use the language in a particular way and when it is not; he knows what forms of speech he may use in addressing certain people and which forms he may not. This area of knowledge forms one facet of the subject matter of sociolinguistics -- i.e., the study of the relationship between language and the social forces which influence language usage and speech performance. The use of the Navajo pronoun /hó/ (and the corresponding verb forms) in reference to specific individuals is largely a sociolinguistic matter, as are the
differences in linguistic usage between different kinsmen, the conditions under which it is appropriate to use slang, the use of special modes of address to indicate respect, lack of respect, intimacy, and so forth. I have very little knowledge of this aspect of linguistics although I suspect that a great many useful projects could be designed for the study of Navajo sociolinguistics by Navajo-speaking students.

At this point, I would like to return to the subject of Navajo grammar. I will begin with a review and limited extension of some of the concepts discussed in the first part of this work and then I will explore in detail certain particular aspects of the description of Navajo.

2. When a person speaks a sentence in his language, he is associating a particular meaning with a particular sequence of sounds -- one might think of this process as being one in which the speaker formulates a semantic object (i.e., the meaning of a statement or question) in his mind and, by applying the rules of his language to it, produces a physical representation of it in the form of sound waves which can be picked up by the ears of his audience. When a person understands a spoken sentence of his language, he is likewise using the rules of his language to establish an association between a particular physical representation, in sound, and a particular semantic object, or meaning, in his mind. It is appropriate to think of the grammar of a language as being the mental apparatus by means of which the native speaker establishes this association between sound and meaning. Actually, the term 'grammar' is used by
linguists ambiguously to refer both to this strictly mental apparatus, which cannot be observed directly, and to the linguist's theory about this mental apparatus. For the most part, I will use the term in the latter sense, although it should be kept in mind that the adequacy of such a theory depends upon its ability to approximate the linguistic capabilities of language speakers. If one considers this requirement on grammatical theories, it is possible to gain some appreciation of what a grammar must contain -- it must include at least (1) a dictionary, or lexicon, of the morphemes of the language, (2) a body of rules for combining morphemes to form grammatical words, phrases and sentences, (3) a set of rules which assign meanings to words, phrases and sentences, and (4) a set of rules which assign phonological representations to words, phrases, and sentences (i.e., convert them into the sequences of sounds which are actually pronounced).

Although only an extremely small portion of a Navajo grammar has been considered here, enough has been presented to permit us to gain an appreciation of the enormous complexity of a grammar. In fact any simple sentence is sufficient to illustrate how vast a person's linguistic knowledge of his language really is. Let us consider, for example, a number of things which the Navajo speaker knows about a sentence like

\[ \text{dzaanééz } \text{tí'í biztál.} \]

It is not sufficient to remark simply that the Navajo speaker knows both the meaning and pronunciation of this sentence. He knows a great deal more. For example, with respect to its meaning, he knows that it is (cognitively) synonymous with

\[ \text{tí'í } \text{dzaanééz yiztál.} \]
That is to say, he knows that these two sentences have the same meaning in that both of them describe an event in which a mule was the object of a transitive action (kicking) carried out by a horse. He knows, furthermore, that the sentence is understood in the same way as the sentence

'ashkii tɬ'iziką' bizghoh.
'The boy was butted by the billygoat.'

in terms of who performed the transitive action and who suffered it. That is, both

dzaanéez ɬɬɬ' biztaɭ.

and

'ashkii tɬ'iziką' bizghoh.

are interpreted as

OBJECT SUBJECT VERB

The first noun phrase in each case is semantically the object, and the second is semantically the subject. By contrast, the cognitively synonymous

ɬɬɬ' dzaanéez yiztaɭ.

is understood in the same way as a sentence like

diné bééghashii yizloɭ.
'The man roped the cow.'
Here the interpretation is

SUBJECT OBJECT VERB

The first noun phrase is semantically the subject, the second is semantically the object. The ability of the Navajo speaker to assign the proper interpretations to these sentences must, of course, be accounted for in an adequate theory of Navajo grammar.

In relation to the structure of the sentence, the Navajo speaker knows that

dzaanéez ḫi'ī' biztaį.

is of the same general form as sentences like

'askii tį'iziką' bizghoh.
'at'éed 'ashkii biiltsą.

All of these sentences consist of a sequence of two noun phrases followed by a verb. This is not the same as saying that the Navajo speaker simply recognizes that each of the sentences consists of three words -- rather, we are saying that he recognizes three major constituents, or parts, in the sentence:

1 2 3

 dzaanéez ḫi'ī' biztaį.

Consider, in this connection, the sentence

dįį dzaanéez ḫi'ī' biztaį.
It contains four words but still only three major constituents:

\[
\begin{array}{ccc}
1 & 2 & 3 \\
\text{di} & \text{dzaanééz} & \text{\textasciitilde} \text{t} \\
\end{array}
\]

\text{biztál.}

It just happens that one of the parts consists of two words. A part of what is involved in knowing Navajo is the ability to determine the proper structural make-up of sentences. To illustrate this point further, let us compare the sentences

'ashkii \text{bil}^{\prime} \text{t} \, \text{yizloh.}

'The boy roped his horse.'

and

'ashkii \text{bil}^{\prime} \text{t} \, \text{yilwoł.}

'The boy's horse is running along.'

Superficially, these sentences would seem to have the same make-up, or structure. But they do not. The first has three major parts:

\[
\begin{array}{ccc}
1 & 2 & 3 \\
\text{\textasciitilde} & \text{ashkii} & \text{bil}^{\prime} \text{t} \\
\end{array}
\]

'yizloh.

while the second has only two:

\[
\begin{array}{cc}
1 & 2 \\
\text{\textasciitilde} & \text{ashkii} \text{bil}^{\prime} \text{t} \\
\end{array}
\]

'yilwoł.

In the second sentence, the words '/'ashkii/ and /bil\text{\textasciitilde}t'/ hang together, they form a single phrase; but in the first sentence '/'ashkii/
and /bilî'ì'/ are separate parts. It is possible to prove this structural difference by putting the sentences in the negative:

'ashkii doo bilî'ì' yizloh da.
The boy did not rope his horse.'

'ashkii bilî'ì' doo yilwoł da.
The boy's horse is not running along.'

Notice that the negative particle /doo/ can occur between /'ashkii/ and /bilî'ì'/ in the first sentence -- this indicates that the two words are separate parts of that sentence. In the second sentence, on the other hand, the negative particle cannot appear between /'ashkii/ and /bilî'ì'/:

'*'ashkii doo bilî'ì' yilwoł da.

This is so because the combination /'ashkii bilî'ì'/ forms a single constituent within the sentence.

The sentence /'ashkii bilî'ì' yizloh/ illustrates another important point about structure. Actually, the sentence is ambiguous -- it can be understood in two ways depending upon how it is analyzed structurally. The interpretation we have considered so far depends upon the analysis according to which /'ashkii/ and /bilî'ì'/ are separate parts; but there is another interpretation according to which /'ashkii/ and /bilî'ì'/ form a single phrase /'ashkii bilî'ì'/ 'the boy's horse':

1 2

'ashkii bilî'ì' yizloh.
'He roped the boy's horse.'
Again, this can be proved by putting the sentences into the negative -- the first meaning, i.e., the boy roped his horse, can be negated as follows:

'ashkii doo bilîfî' yizloh da.
'The boy didn't rope his horse.'

But the second meaning, i.e., he roped the boy's horse, can be negated in the following way.

doo 'ashkii bilîfî' yizloh da.
'He didn't rope the boy's horse.'

It cannot be negated by placing /doo/ between /'ashkii/ and /bilîfî'/ because that would give the other meaning.

The kind of ambiguity represented by

'ashkii bilîfî' yizloh.

is called 'structural ambiguity' by linguists. By this it is meant that the two different sentences are identical in sound but they differ in their structural analysis -- in this case, the sentence with the first meaning is analysed as a structure having three major parts. The linguist might represent this fact in the form of a tree, as follows:

```
  S
 /\  
/   \
NP  NP
    \\  V
     \\ 'ashkii bilîfî' yizloh
      'The boy roped his horse.'
```
By contrast, the sentence with the second meaning is analysed as a structure having only two major parts:

```
S
  NP      V
    'ashkii bili' yizloh
    'He roped the boy's horse.'
```

Since the Navajo speaker can detect the ambiguity, he must be able to analyse the sentence in two different ways -- i.e., he must be able to assign two different structural descriptions to the sentence. The ability to assign an appropriate structural description to a sentence is a part of the speaker's linguistic competence and must, therefore, be accounted for in the grammar.

Another thing that the Navajo speaker knows about the sentence /dzaanéez ií³ bıztá]/ is that the words /dzaanéez/ and /ií³/ belong to one particular class of linguistic elements, while the word /bıztá/ (or, better, the more abstract form /Ɂ-ta]/ 'to kick') belongs to another class. To put this another way, the Navajo speaker knows the parts of speech of the Navajo language -- /dzaanéez/ and /ií³/ belong to the same part of speech as /díné/ 'person, man', /díbé/ 'sheep', /tsé/ 'stone', /chidi/ 'car', and all other morphemes and morpheme combinations used in naming entities; /Ɂ-ta/, on the other hand, belongs to the same part of speech as /Ɂ-loh/ 'to rope', /Ɂ-hash/ 'to bite', /Ɂ-cha/ 'to cry', /na-l-nish/ 'to work', /Ɂ-wol/ 'to run', and all other morphemes and morpheme combinations used in naming actions, events, or states. Knowledge of the parts of speech of one's native language is a part of one's knowledge of the lexicon or dictionary of the morphemes of the language. This aspect of a speaker's knowledge must also be
represented in the linguist's grammatical theory of the language, of course -- this would be done by identifying lexical items like /iʃiʃ/ as being nouns (N) and lexical items like /ϕ-taʃ/ as being verbs (V). The knowledge which a person possesses in relation to the lexical items of his language is actually much more complex than this -- he knows much more than the part of speech to which individual lexical items belong; he knows in addition precisely how to use the lexical item in constructing and in understanding well-formed sentences. For example, one of the additional things the Navajo speaker knows about /ϕ-taʃ/ 'to kick' is that it can appear in structures which contain both a subject noun phrase and an object noun phrase, i.e., it can appear in transitive structures. And he knows that a verb like /ϕ-cha/ 'to cry' can appear in structures which contain a subject noun phrase, but it does not allow an object noun phrase -- it appears in intransitive structures only. To say that the Navajo speaker knows these things is to say, simply, that he knows that sentences like /iʃiʃ/ dzaanéez yiztaʃ./ and /dzaanéez iʃiʃ/ biztaʃ./ are grammatically correct, while sentences like */awéé/ iʃiʃ/ yicha/ and */iʃiʃ/ 'awéé' bicha/ are not, because verbs like /ϕ-taʃ/ can take objects while verbs like /ϕ-cha/ cannot.

The Navajo speaker also knows that the verb is in the appropriate form in the sentence -- it is in the third person. A first or second person verb form would be incorrect, since the subject is third person:

* dzaanéez iʃiʃ' sétaʃ.
* dzaanéez iʃiʃ' sinítaʃ.

Furthermore, the verb /biztaʃ/, with the prefix /bi-/, is in the appropriate form for sentences in which the subject follows the object:
OBJECT   SUBJECT   bi-VERB
dzaanéez   lììì'   biztal.

If the subject preceded the object, then the correct verbal prefix would be /yi-/

SUBJECT   OBJECT   yi-VERB
lììì'   dzaanéez   yiztal.

Finally, the Navajo speaker knows how to pronounce the sentence. What underlies this knowledge is a set of rules which convert an abstract phonological representation, or spelling, of each of the morphemes in the sentence into the sequence of sounds which is actually pronounced. One of the rules of Navajo phonology involved in this sentence is the rule which relates the two alternants of the si-perfective prefix. This prefix appears as /-z-/ when it immediately precedes the $\emptyset$-classifier and it appears as /-s-/ when it immediately precedes one of the other classifiers. Assuming, as I did in the first part of this work, that the underlying form of the prefix is /s-/, the rule would state that:

The si-perfective prefix /s-/ is replaced by /z-/ when it appears immediately before the $\emptyset$-classifier.

This rule applies regularly wherever its conditions are satisfied -- i.e., it is not limited to the verb /$\emptyset$-tal/, but it applies to all verbs which take the si-perfective and which have the $\emptyset$-classifier. Thus,
yi-s-taɁ
yi-s-loh
yi-s-tsah

all undergo the rule to become

yi-z-taɁ
yi-z-loh
yi-z-tsah.

I would like at this point to consider what the theory of Navajo grammar briefly introduced in the first part would say about the sentence /dzaaŋ\éez Ɂii' biztaɁ/. In particular, I would like to indicate how the theory would attempt to give an account of the various kinds of knowledge which the Navajo speaker has in relation to this sentence. This will provide an opportunity to discuss the overall design of a grammatical theory and to introduce certain aspects of the theory which I would like to discuss in greater detail in a later section of this paper. It should be understood, of course, that the grammatical sketch which I will present is only a beginning, only an indication of some of the things which a grammar must contain.

Let me begin by reviewing the part of the grammar which provides the deep structures for sentences of simple type I have been discussing -- I will refer to this part, following current linguistic usage, as the base component of the grammar. The base component consists of two subparts: (1) a set of phrase structure rules, and (2) a lexicon together with a lexical rule which inserts lexical items into the tree structures created by the phrase structure rules.
The phrase structure rules (or PS rules, for short) which I introduced earlier are the following:

PS Rule 1: \[ S \rightarrow NP \ (NP) \ V \]

PS Rule 2: \[ NP \rightarrow \{ (D) \ N \} \]

These rules allow for both transitive (2 noun phrases) and intransitive (1 noun phrase) structures, and they allow for noun phrases consisting of a noun alone (N), of a noun preceded by a determiner (DN), or of a pronoun alone (P). The rules apply to provide the basic structures of sentences (according to the principles of application outlined in Part I).

The basic structures provided by the PS rules are given substance by means of the lexical rule which inserts actual lexical items into the positions occupied by the grammatical category symbols N, V, D, and P. The lexicon consists of a list of nouns, verbs, determiners, and pronouns -- each entry contains the information needed to indicate precisely how it is to be inserted into the structural configurations provided by the PS rules. Thus, for example, the lexical entry for a noun includes not only its phonological representation, but also a symbol indicating its grammatical category, or part of speech -- i.e., the symbol N:

\[
N \\
\bigcap
\]

Similarly, the entry for a verb includes not only its phonological representation but its grammatical category (V) and the information as to whether it is transitive (i.e., capable of appearing in the frame \( NP \underbrace{NP \ldots} \)) or intransitive (i.e., capable only of appearing...
in the frame NP ____):

```
  V
 [NP  NP ___]
  |    |
 cl    stem
  |    |
 ø     -tał
```

The base component of the grammar defines the deep structures of sentences. I will turn now to consider how the base component just sketched develops a deep structure for the sentence /dzaanéez 1i1i biztał/. This is a transitive sentence, so in applying the first PS rule, two noun phrases are chosen. Thus, by PS Rule 1 we get the initial structure

```
  S
 / \|
NP NP V
```

Each of the noun phrases in the sentence consists of a noun alone.--that is to say, PS Rule 2 applies twice to the initial structure to give

```
  S
 / \|
NP NP V
 / \|
 N  N V
```

At this point, the lexical rule applies inserting /1i1i'/ for the first noun, /dzaanéez/ for the second, and /ø-tał/ for the verb. I will assume also, that the si-perfective prefix is also present in
the verb word at this stage (though I have not discussed how it should be introduced):

```
S
  /\                        /
 NP NP
  /  \\                     /\ \
 N N                       V
  /  \                    /  \ \
 i1i1i1 dzaanééz perf cl stem
  /    \                 /    \
 i1i1i1' yiztαl ϕ -tal.
```

This is the deep structure of /dzaanééz i1i1i1' biztαl/. But it is also the deep structure of /i1i1i1' dzaanééz yiztαl/. In other words, the theory of the base component proposed here claims that the two sentences have the same deep structure. What this proposal attempts to do is to account for one of the facts that we know about this pair of sentences (and other pairs like it) -- namely, that the two sentences are cognitively synonymous; they have the same meaning in the sense that /i1i1i1'/ is the logical subject in both and /dzaanééz/ is the logical object in both. The reason for constructing the grammar in this way has to do with the principles of linguistic theory-building I have alluded to in earlier discussions -- namely, the principle that linguistic facts should be expressed in the simplest and most general way possible; that is, statements in the grammar should apply to the most general class of linguistic elements. In this case, we want to say that in each of the sentences one of the noun phrases is the subject and one is the object; but we want to be able to say this in the simplest manner. This can be accomplished if the statement is made once for all transitive sentences. Suppose, for example, that we propose the following principle of interpretation:
The logical subject of a sentence is the initial noun phrase. In transitive sentences, the second noun phrase is the logical object.

Now if we want this principle of interpretation to apply correctly to all sentences, then we must construct the grammar in such a way that the principle will be true of all sentences. This can be done if we assume that sentences like /i1i1' dzaanéez yizta1/ and /dzaanéez i1i1' bizta1/ have the same deep structure

```
S
  /\  
NP  NP
     /\  
N    N
        /\  
  perf cl stem
     /\  
   i1i1' dzaanéez s- φ -ta1.
```

By applying the principle of interpretation to the deep structure, we account for the meaning of both sentences at the same time. This is simpler than interpreting the two sentences separately -- if we interpreted them separately, we would have to have a much more complicated set of principles:

(a) In intransitive sentences, the subject is the initial noun phrases.

(b) In transitive sentences in which the verb has the object prefix /yi-/, the first noun phrase is the subject and the second noun phrase is the object.

(c) In transitive sentences in which the verb has the prefix /bi-/, the first noun phrase is
the object and the second noun phrase is the subject.

This would fail to express the true relationship between the two kinds of transitive sentence, since it would treat them separately, as if there were no relationship at all between them. By proposing that they have the same deep structure, on the other hand, we can express the relationship in the simplest possible manner. To state this another way, our theory is able to provide an explanation of the fact that /dzaanéez ɬɬɬ' biztaɭ/ and /ɬɬɬ' dzaanéez yiztaɭ/ are cognitively synonymous -- they are synonymous because they have the same deep structure.

The interpretive principle suggested above is not a rule of the base component. It is in no way concerned with defining the structural form and constituency of sentences -- unlike the PS rules, the lexicon, and the lexical rule. Instead, it is concerned with providing a particular aspect of the meanings of sentences, i.e., the identification of the logical subject and object. Since it is concerned with an aspect of meaning, it is appropriate to think of it as pertaining to the semantic component.

If it is true that the deep structure of /dzaanéez ɬɬɬ' biztaɭ/ is of the form I have suggested (i.e., identical to that of /ɬɬɬ' dzaanéez yiztaɭ/), then something must be done to that deep structure in order to account for the fact that the sentence is actually spoken with the object first and the subject second, and with the object prefix /bi-/> in the verb. What is needed at this point is a new kind of rule, a rule which is capable of modifying a deep structure developed by the base component. Rules which modify deep structures belong to the transformational component of the grammar -- they operate on the deep structures of sentences and convert them into forms which directly underly what is actually spoken, i.e., into
'surface structures'. We propose that one of the transformational rules of Navajo is subject-object switch -- it may apply to certain transitive deep structures to convert the deep structure order SUBJECT OBJECT VERB into the inverted order OBJECT SUBJECT VERB. It is by means of this rule that our theory formally expresses the relationship between the two different forms in which transitive sentences appear.

The number of transformational rules in Navajo is, in all probability, extremely large. The transformational component is also responsible for ensuring that the verb is in the correct form -- in the case of sentences of the type under consideration here, the verb must have the correct object prefix, i.e., /yi-/ if the order of noun phrases is SUBJECT-OBJECT, /bi-/ if the order is OBJECT-SUBJECT.

The rules of the base component define a common deep structure for the sentences /i\^i\^/ dzaanéez yiztal/ and /dzaanéez li\^i\^/ biztal/. By applying the transformational rule of subject-object switch (together with the appropriate adjustment in the object prefix) to this deep structure, we derive the surface structure

![Tree diagram]

which directly underlies the inverted form of this transitive sentence. What remains to be done in order to convert this surface
structure into the form which is actually pronounced is to apply
the rules belonging to the phonological component of the grammar.
As mentioned earlier, one of the rules needed in this case is that
which turns the si-perfective prefix to /z-/.
In fact, however,
there are a number of other phonological rules involved in this
particularly sentence, although they cannot be discussed meaningfully
until certain general points about Navajo phonology are established --
in the next section, some aspects of Navajo phonology and phonetics
will be treated in detail.

In discussing the sentence /dzaanéez 111 bizta1/ the over-
all design of a grammatical theory has been outlined. The essential
features of this design can be represented in the form of a diagram
showing the functions of the various components and their interrela-
tionships. This can be thought of as a model of the mental apparatus
which relates sound (i.e., a phonetic representation) and meaning
(i.e., a semantic interpretation) in a human language; but the model
must be regarded as an extremely elementary one -- many years of
research (on the part of many people and involving many languages)
will be required to correct it and to fill in the details.
In the derivation of a given sentence, the base component defines its deep structure. The deep structure embodies the structural and lexical information sufficient to determine the basic semantic relationships which hold among the parts of the sentence. At this deep structure level, the semantic component operates to define these basic semantic relationships. For example, in the deep structure underlying /liši' dzaanéez yiztal/ and /dzaanéez liši' biztal/,
the semantic component would, among other things, identify /iʃiʃ '/
as the subject and /dzaanéez/ as the object of the transitive verb
/ʃ-taʃ/. Once the deep structure of a sentence is defined and in-
terpreted, the rules of the transformational component operate to
define a surface structure which can be related to the deep structure
by means of the transformational rules. In the case of transitive
sentences we have been discussing, the transformational rules would
define the surface ordering in /dzaanéez iʃiʃ biztaʃ/ as a possi-
able surface structure in relation to the deep structure ordering
/ʃiʃ ' dzaanéez ʃ-taʃ/. In the diagram above, I have indicated
that the semantic component operates on surface structures as well as
on deep structures - the reason for this is that, while certain as-
pects of the meaning of sentences can only be read off the deep
structure, certain other aspects must be read off the surface struc-
ture. The sentences /iʃiʃ ' dzaanéez yiztaʃ/ and /dzaanéez iʃiʃ '
biztaʃ/ have the same meaning with respect to the relations of sub-
ject and object -- so that aspect of their meaning must be defined
at the deep structure, i.e., at the level where the two sentences
are identical in structure. However, there is a difference in
meaning between the two sentences. This is something I am not
entirely sure of, since I am not a native speaker of Navajo -- but
I will make an attempt to characterize the difference. My feeling
is that in the first sentence the noun phrase /iʃiʃ '/ is the topic
of the sentence (i.e., /iʃiʃ '/ 'horse' is what the sentence is mostly
about), while in the second, the noun phrase /dzaanéez/ is the topic.
If this is true, then this aspect of the meaning of the sentences
must be read off the surface structure. The principle of inter-
pretation which defines the topic is, roughly: 'the initial noun phrase
is the topic of the sentence' -- and if the initial noun phrase
/iʃiʃ '/ is the topic in the first sentence and the initial noun phrase
/dzaanéez/ is the topic in the second, it is only at the surface
level that the rule can apply; at the deep structure level /iʃiʃ/ is the initial noun phrase for both sentences. In other words, there is a sense in which the two sentences mean the same thing, and there is a sense in which they differ in meaning -- the sense in which they are the same is a deep structure matter, and the sense in which they differ is a surface structure matter.

Given the surface structure of a sentence, as defined by the transformational rules, the phonological component operates to define the pronunciation. It does this by relating the abstract phonological representations of morphemes to a phonetic representation (sequence of sounds which directly underly the actual pronunciation) by means of phonological rules. I will turn now to a detailed consideration of some of the properties of the phonological component.

We have proposed that the lexicon in a grammar of Navajo, or any other language for that matter, consists of a list of morphemes and morpheme combinations. Each lexical item is composed of a complex symbol indicating its grammatical properties (i.e., part of speech, and so on) and a phonological representation. In addition, we have proposed that some linguistic elements which have phonological constituency are introduced into sentence structures by the transformational rules (e.g., the object prefixes /yi-/ and /bi-/ in transitive verbs). And we have dealt to a limited extent with the question of how lexical items and other grammatical formatives should be represented phonologically. In particular, we have discussed the necessity for an abstract representation of verbs which will reveal their underlying structure. Among other things, we suggested an abstract representation for various forms of the verb /na-1-nish/ 'to work', e.g.: