ABSTRACT
        The purposes of this paper are to: (1) describe the
general linguistic situation in Alaska, (2) describe the bilingual
education situation, and (3) discuss the effectiveness of the
bilingual education programs and give an idea of the potential of
bilingual education as a social force in Alaska. Much of the
information is summarized in a number of tables. Table 1 is a
classification of the 20 distinct Alaskan languages into major
linguistic families, with an approximate number of living speakers
per language. Three basic types of language communities are
distinguished (table 2): (1) monolingual native, including fluent
native language speakers of all ages; (2) bilingual, having few or no
native language speakers under age 10; and (3) monolingual English,
with few or no native language speakers under age 30. A short history
of the development of bilingual education programs in Alaska is
provided, and statistics are presented and discussed concerning the
numbers of school-age children receiving bilingual education and the
relative proportions of bilingual programming for the three types of
communities (tables 3 and 4). Various tools used for evaluating the
effectiveness of the program, including assessment of literacy,
numerical, and linguistic skills, are discussed and summarized in
four additional tables. Children in bilingual programs appear to
perform significantly better than children in nonbilingual programs.
(CLK)

AN OVERVIEW OF ALASKA NATIVE BILINGUAL EDUCATION

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My intention in this report is to give the reader an introduction to bilingual education (see Lester, 1974, for a general introduction) in Alaska. The reader's background is assumed to be the same as that of most non-Alaskans, comprising a predictable array of partial information about Alaska's size, its variability, and most important of all, its people, probably not unlike the checkered store of information I have about Australia, for example, or the Philippines. As an introduction, this report will treat three main topics. First, the general linguistic situation in Alaska is discussed, to provide a brief idea as to the number of languages spoken, and how many speakers there are of each. Second, the extent to which bilingual education is provided to native language speakers of school age is reviewed. And third, selected research on the effectiveness of Alaska's first two bilingual programs is presented, providing the reader with an idea as to the potential of bilingual education as a social force in Alaska.

Native Languages in Alaska

Linguists have identified twenty distinct languages spoken among native people of Alaska (Krauss, 1974). It would be presumptuous to present as my own an authoritative account of these languages. The classification has been done admirably well elsewhere (Krauss, 1973, 1974) so only a general summary will be attempted here. Table one shows Alaska native languages classified into their major linguistic families, with the approximate numbers of living speakers given for each. The geographical distribution of the major language groups places the Eskimo-Aleut group; Inupiaq, Central Yupik, and Sugestun, on the North, West and Southwest coastal areas, with Siberian Yupik and Aleut occupying St. Lawrence Island, and Aleutian chain respectively. The Athasbaskan-Eyak groups occupy the interior of Alaska extending into the Southcentral region and westward into Canada. Southeastern Alaska comprises the Tlingits, Haida and Tsimshian language groups, extending southeast from Cape Yakataga to the southeastern most tip of Alaska. A map[2] of Alaska Native peoples has been prepared and provides an accurate and comprehensive display of the geography of Alaska native languages.

As has been the fate of many language minorities throughout the world a number of Alaskan native languages have become disused, some to the point of extinction, during the years of contact with other cultures. Within Alaska, native languages exist in various stages of transition. The general pattern of language viability in each language family can be shown by classifying native communities according to the following types:

Type A. Monolingual Native: (fluent native-language speakers of all ages, including all or many children),

Type B. Bilingual: (few or no native language speakers under 10 years of age),

Type C. Monolingual English: (few or no native language speakers under 30 years of age).

Table 1
Alaska Native Languages and Populations[a]

Language Family	Language Name	Population	Number Speaking
Eskimo-Aleut:			
Aleut:	Aleut	2,000	700
Eskimo:	Sugpiaq	3,000	1,000
	Central Yupik	17,000	15,000
	Siberian Yupik	1,000	1,000
	Inupiaq	11,000	6,000
Tsimshian:	Tsimshian	1,000	150
Haida:	Haida	500	100
Tlingit:	Tlingit	9,000	2,000
Athabaskan-Eyak:			
Eyak:	Eyak	20	3
Athabaskan:	Ai tna	500	200
	Tanaina	900	250
	Ingalik	300	100
	Holikachuk	150	25
	Koyukon	2,100	700
	Upper Kuskokwin	150	100
	Tanana	360	250
	Tanacross	175	120
	Upper Tanana	300	250
	Han	65	20
	Kutchin	1,100	700

[a] Source: Map of Alaska Native Languages, Alaska Native Language Center, University of Alaska, Fairbanks, 99701.

Table two shows the number of communities of each type (A, B, or C) by language family. As can be seen from both tables the most viable languages are in the Eskimo-Aleut family, particularly the Central and Siberian Yupik Eskimo dialects. The languages of southwestern and interior Alaska are the least viable, many of which are extinct or at best moribund.

Table 2
Numbers of Alaskan Native
Communities by Language Group and Language Use

Language Use[a]	Language Group					
	Eskimo-Aleut	Athapascan-Eyak	Tsimshian	Haida	Tlingit	Total
Type A	31	5	0	0	0	36
Type B	40	7	0	0	0	47
Type C	54	39	1	2	13	109
Total	125	51	1	2	13	192

[a] A – All people speak the native language including children.
B – Some children speak the native language.
C – No children speak the native language.

A comprehensive account for why such patterns of viability have taken place is a complex sociolinguistic question. The necessary research has yet to be done, even if the proper questions were well enough formulated. The influences of dominant culture contact provides only part of the answer. Other factors, such as school policies toward native languages, or even indigenous cultural factors, also have played important roles. Furthermore, until recently, most Alaskan native languages had no written form, leaving them entirely to oral transmission for their survival. Today, however all twenty languages have a written form, constituting yet another factor in analyzing patterns of language survival. Whatever the case may be, substantial efforts to counteract the tendency toward native language loss are underway in Alaska, consistent with and perhaps reflective of the nationwide upsurge in interest in language and culture preservation. Bilingual education is the major focus of these efforts, and it is to this topic we now turn.

Bilingual Education in Alaska

Bilingual education is now a significant presence in Alaska's native educational program. Growing mainly from experimental Yupik Eskimo programs launched in 1970, in the Southwestern part of the state, increased consciousness now exists about the potential this innovative approach holds for education in Alaska. This increase in consciousness has grown from the thinking of small groups of education planners and developers within Alaska's educational agencies and now includes substantial numbers of citizens in local communities as well as leaders on the political and administrative fronts. The social and political ramifications of bilingual education are thus beginning to be sensed to their widespread implications for Alaska's future. Until recently, this bilingual education movement has progressed in a somewhat fragmentary fashion, gaining support and direction largely through the singular efforts of particular individuals within agencies, organizations and institutions. Actively interested in advancing the basic principals on which bilingual education rests, either as longstanding proponents or as recent converts, such individuals have been able to capitalize on a timely increase of Federal financial support. In 1970, these efforts came to life in two prototype bilingual educational programs developed by the Bureau of Indian Affairs, and shortly thereafter by the Alaska State-Operated School System, in concert with units of the University of Alaska. Since that time, the growth of bilingual education in Alaska has included expansion within its original

4

programs to bring in new schools and higher grades. However, the growth has also seen increased bilingual programming in other important ways. Added to the efforts of traditional education agencies, ASOSS and BIA, new structures have been created to bring new sources of input to bear on the solution of bilingual education problems; namely, the Eskimo Language Workshop, the Alaska Native Language Center and the Alaska Native Education Board.

Jointly funded by Federal grants to the U.S. Bureau of Indian Affairs and the Alaska State-Operated School System, the Eskimo Language Workshop was founded in 1970, to develop materials and train staff for the Yupik component of Alaska's first formal bilingual educational program. First located at the University of Alaska, Fairbanks, the workshop was moved in June, 1974, to the Kuskokwim Community College at Bethel to be in the heartland of the Yupik-speaking population. The Alaska Native Language Center (ANLC), of the University of Alaska, Fairbanks, is another new structure to have included service to bilingual education as part of its responsibility. Created in 1972 by the Seventh Alaska Legislature (AS 14.40.117), the ANLC was mandated to fulfill the following responsibilities:

1) "...to study languages native to Alaska;
2) develop literacy materials;
3) assist in the translation of important documents;
4) provide for the development and dissemination of native literature; and
5) train Alaska native language speakers to work as teachers and aides in bilingual classrooms."

While the function of ANLC includes, but is not limited to bilingual education, its type of scientific work in Alaskan native languages is a necessary step in developing any bilingual education program.

The Alaska Native Education Board (ANEB) grew out of concern for needed development of bilingual and bicultural curricula and materials in languages other than Yupik, the latter already having been well established. Located in Anchorage, the ANEB originally was funded in July, 1973, under Section B of the 1972 Indian Education Act. Since its incorporation in June, 1972, ANEB has received further funding under the Indian Education Act and the Johnson-O'Malley Act. Additionally, the Summer Institute of Linguistics (SIL) has had a longstanding commitment to Alaska native languages dating back to 1958. Having done work in eight languages, SIL workers have made numerous contributions to ASOSS bilingual education and their expertise has been valuable in numerous statewide efforts, such as in the ESL component of the Alaska Rural School Project, University of Alaska, Fairbanks, 1966-1972.

These special structures provided much of the leadership and expertise for administrators in Alaska's educational agencies to draw upon in order to realize their bilingual education goals. In fact, it might well be said that without such leadership and expertise bilingual education would have become underdeveloped in its infancy. For example, without the linguistic expertise of the Eskimo Language Workshop, its Yupik orthography capable of carrying the development of the necessary body of curriculum materials could not have been applied. And without the leadership of the workshop, the implementation of the orthography, materials, and the Yupik literacy training could not have been maintained. Also, without a similarly active partnership between educational agencies and the Alaska Native Education Board, expansion of bilingual education programs into other widely used Native languages would not have been realized. Nor would the Alaska Native Language Center have been created to attend to maintaining and developing, through systematic application of linguistic expertise, all Alaska Native languages, especially those in current danger of extinction.

Development of bilingual programs has depended so far on the timely, but by no means guaranteed appearance of funding external to the basic educational support of each agency, creating a sense of vulnerability, psychological as well as fiscal, among all concerned. Each effort has developed individually with a separate source of funding, within a separate agency or structure, under separate sets of guidelines and mandates. While the net effort has resulted in unprecedented innovations in understanding and commitment to deliver

5

Table 3

Numbers of School-age Speakers of Native Languages in
Alaska by School Agency and Bilingual Programming Status

	No. of School-Age Speakers	No. of School-Age Non-Speakers	Agency	Total	No. Speakers in Bil. Prog.	% Speakers in Bil. Prog.
Eskimo-Aleut						
Yupik	2,343	542	BIA	2,885	270	11.5
	1,096	929	ASOSS	2,025	283	25.8
Total Yupik	3,439	1,471		4,910	553	16.1
Inupiaq	862	1,011	BIA	1,873	180	20.9
	305	499	ASOSS	794	222	72.8
Total Inupiaq	1,167	1,500		2,667	402	34.4
St. Lawrence Island	218	0	BIA	218	89	40.2
Aleut	66	472	ASOSS	538	13	19.7
Total Eskimo-Aleut[a]	4,890	3,443		8,333	1,057	21.6
Tsimshian	0	300	b	300	0	
Haida	0	100	b	100	0	
Tlingit	0	2,800	b	2,800	0	
Athabaskan						
Ahtna	0	150	ASOSS	150	0	
Han	0	20	ASOSS	20	0	
Holikachuk	0	50	ASOSS	50	0	
Ingalik	0	75	ASOSS	75	0	
Koyukon	0	600	ASOSS[b]	600	0	
Kutchin	17	0	BIA	17	17	100.0
	86	129	ASOSS	215	57	66.3
Total Kutchin	103	129		232	74	71.8
Tanaina	15	250	ASSOS[b]	265	0	0.0
Tanana	0	100	ASOSS	100	0	
Tanacross	15	15	ASOSS	30	0	0.0
Upper Kuskokwim	25	0	ASOSS	25	25	100.00
Upper Tanana	15	10	BIA	25	15	100.00
	25	25	ASOSS	50	25	100.00
Total Upper Tanana	40	35		75	40	100.00
Total Athabaskan	32	10	BIA	42	32	100.00
	166	1,414	ASOSS	1,580	107	64.5
	198	1,424		1,622	139	70.2
Agency Totals	3,455	1,573	BIA	5,060	571	16.5
	1,633	6,504	ASOSS	8,137	625	38.3
Grand Total	5,088	8,077		13,165	1,196	23.5

a Exclusive of Sugpiaq, which is served by the Kenai Peninsula. Borough School Districts
b Served by various school districts as well as ASOSS

- 113 -

6

quality education to native children, this arrangement has thus far fostered an atmosphere of cautious cooperation, even occasional suspicion among participants, and unnecessarily fragmented leadership relative to what might emerge under a more coordinated effort. Recognizing this state of affairs, the agencies and institutions currently bearing the responsibility for bilingual education in Alaska have recently united in a series of inter-agency meetings to increase the effectiveness of their efforts in program components. Need for effective coordination of all bilingual education in Alaska is agreed to as essential at this point among all participants. To this end, the Alaska State Department of Education (DOE) has begun to take leadership within the state, and is now pulling together current sources of expertise and experience to produce an effective statewide effort in bilingual education.

Given this general resume of agency and institutional involvement in Alaskan bilingual education, an overview of the extent to whicn native children are being served by various efforts is in order. I present two sorts of data; one, the number of school-age speakers of native languages who are receiving bilingual education, either from the Alaska State-Operated School System (ASOSS) or from the Bureau of Indian Affairs (BIA), and the other, the distribution of bilingual education programs among native communities as classified by degree of language viability. Each sort of data gives a separate view of bilingual education coverage within Alaska. Table three shows the number of school-age speakers of each native language receiving bilingual education in some form. The kind of bilingual education program a child participates in varies generally with the source of funding each program receives, and I have not attempted in this report to distinguish among them. Some programs conform to strictly defined bilingual education models, for example, the BIA and ASOSS Yupik-language programs funded under Title's I and VII, of the Elementary and Secondary Education Act (ESEA) respectively. Other programs, however, particularly those in Type C communities, necessarily stretch most formal definitions of bilingual education to include native languages as subject matter rather than as mediums of instruction.

Table four gives the reader some idea of the relative proportions of bilingual programming for the three types of communities (A, B, and C). As can be seen, the BIA has concentrated more efforts in the Type A, high language viability community, whereas the ASOSS has distributed its effort proportionally across all three types with the largest

Table 4
Numbers of ASOSS and BIA Alaskan Schools by
1974 language situation and bilingual program status

	Language situation[a]							
	A		B		C			
Agency	Total	No. with Bil. Program[b]	Total	No. with Bil. Program	Total	No. with Bil. Program	Total	No. with Bil. Program
ASOSS	15	10	17	7	66	35	98	52
BIA	25	10	15	1	12	0	52	11
Total	40	20	32	8	78	35	150	63

[a] Source: Krauss, Alaska Native Language Center Report, Alaska Native Language Center, University of Alaska, Fairbanks, 1973.

[b] Source: Personal communications with Kathy Perrin, ANEB; Frank Berry, JOM; Baxter Wood, ASOSS; and cross reference of various agency directories.

effort, in absolute numbers, in Type C communities. It must be pointed out that the figures in tables three and four are based on general estimates and not on an accurate linguistic census, the cost of which would be prohibitive even though the pay-off in valuable information would be great. Nevertheless, the overall proportions of children reached by bilingual education at this time are probably accurate enough to warrant the general conclusion that throughout the state, no more than one fourth of all school-age speakers of native languages are participants in some form of bilingual education program.[3]

Effectiveness of Bilingual Education

Evaluating the effectiveness of bilingual education is a difficult task requiring control over a host of elusive situational variables in order to arrive at even the most generally valid of conclusions. As evaluator of Yupik-language bilingual programs for the ASOSS and BIA during their first three years of implementation, I was able to establish enough of an objectively based research design to warrant some conclusions about their general effectiveness relative to estimates of what would have happened under the traditional, non-bilingual approach. Because of space limitations, only a general overview of the methods, and conclusions can be given here, but a general idea of the potential of this kind of program nevertheless can be obtained.[4]

The programs evaluated took place in three BIA, and one ASOSS, lower Kuskokwim River day schools in the first operational year (1970). In 1971, four BIA, and five ASOSS day schools were added for a total of thirteen schools. Each village school entered the program at the first grade level only, adding an additional grade level in each of the next two years until the entire primary grades were taught bilingually. Yupik Eskimo was the first language in virtually all of the homes of the program children. The general structure of the program was for all academic subject matter to be taught in Yupik, by Yupik first-language instructors, specially trained for the program. English was taught as a second language (ESL), by the regular certified teacher, for one hour per day in first grade, increasing it by an hour per day in each subsequent grade level. It was assumed that by fourth grade the subject matter could be handled in English with Yupik instruction carried on as a subject for purposes of continued cultural enrichment.

One of my roles from the beginning of the program, and for its first three years, was that of external program evaluator. As such, my job was to provide for gathering objective performance data, on whatever dimensions I deemed suitable, in order to make judgments as to changes—particularly cognitive and linguistic changes, taking place in the children. Children in nearby village schools, considered culturally linguistically similar to those in the experimental bilingual program villages provided comparison data against which to assess changes. The comparison children became statistically our "best estimate" of what would have happened under a traditional, unilingual education program.

For the first year evaluation, it was decided to employ vocabulary acquisition as a general marker for whatever linguistic changes took place as a result of the new program. Special picture vocabulary tests were developed in Yupik and English through the cooperation of Yupik-speaking personnel and artists of the Eskimo Language Workshop at the University of Alaska. A team of first-language teachers were trained to administer the tests at the beginning and end of the school year. This procedure established two points of reference for assessing relative gains during the year. Briefly, the net results of the first year of program operations was for the bilingually taught children to have significantly outgained the comparison children, both in English as well as Yupik vocabulary. The greater gains shown by bilingually taught children in Yupik vocabulary was not so surprising as the greater gains in English vocabulary, since English teaching was reduced to only an hour per day in the bilingual program schools. This result was especially important in the light of concerns expressed by some Eskimo parents that they were afraid their children would get behind in English if taught primarily in Yupik.

Some methodological problems were encountered in implementing the evaluation design of the second year of the program causing the results to be inclusive, perhaps even equivocal.[5] Nevertheless, the same general trends, but with some exceptions were found in the second year of operations.

The evaluation design for the third year (1972-73), evolved from substantive as well as logistical findings of the first two years and incorporated a number of modifications. First, the number of performance skills measured was expanded to reflect the need for more specific information sought by program officials. Second, rather than attempt to test all of the children in seventeen target villages (ASOSS, BIA and comparison) a stratified random sample was selected to minimize the loss of classroom instruction time for testers as well as students. And third, the testing was limited to a single posttest period, since the degree of initial comparability of comparison and bilingual schools had been satisfactorily established in prior evaluation years. Because the third year results were based on a wider variety of performances, after considerably more program experience, they will be presented in considerably greater detail.

Instruments

The instruments used for the third year evaluation fell into two main categories: (1) academic - Yupik literacy skills, and numerical skills; and (2) linguistic - acquisition of grammar in Yupik and English and acquisition of meaning in Yupik and English.

The measurement of Yupik literacy skills was divided into three main categories: (1) prereading, (2) decoding, and (3) encoding. The measurement of prereading skills consisted of a composit of (a) recognition of initial letter sounds, (b) visual discrimination of symbols, and (c) reading phonemes.

The measurement of Yupik decoding skills consisted of a composite of (a) reading sight words, (b) decoding new words, (c) matching words with pictures, and (d) reading and following simple directions.

The measurement of encoding skills assessed three levels of written performance: (1) ability to write the alphabet (appropriate to Yupik or English), (2) ability to encode Yupik sounds and words, and (3) formal performance in which the pupil writes about himself.

Measurement of numerical skills consisted of two main components. The first focused on the ability of the children to count, and the second focused on the ability of the children to perform a variety of arithmetic calculations.

For the broad purpose of assessing relative linguistic skills, two subtests of the Illinois Test of Psycholinguistic Abilities (ITPA) (Kirk, S. A., McCarthy, J. J. and Kirk, W. D., 1968) were adapted, --The Grammatic Closure, and the Auditory Association subtests.

These two tests, as published, were designed to deal with verbal output at two different levels of language organization. By adapting the stimulus material to the familiar locale of the Eskimo child, and adapting by translation the verbal content of each test item, the relative effects of similar processes were measured in the presently discussed context. To be sure, the difficulty of achieving a perfect adaptation of both the visual stimulus material and the verbal item content is great and as many steps as possible were taken to assure appropriateness within this situation.

The test adaptations were made in conjunction with personnel of the Eskimo Language Workshop, whose task it was to modify test pictures to the local environment, translate item content into meaningful tests of grammatical structures, and provide back-translations for use in corresponding English language items. In most cases the English version was

not a direct literal translation of the Yupik, but was readapted to make the syntax meaningful as a test item.

For both the Grammatic Closure and Auditory Association tests, the Yupik and English versions were administered separately.

Table five summarizes the preceding description for quick reference by the reader. Included in table five are combinations of subtest components used in the final statistical analysis. In a number of cases, subtests were combined where it would ease the burden on statistical calculations, provided there was reasonable homogeneity of content. In cases where subtests were not combined it was felt the subtests either were measuring different skills, or used measurement scales too varied to permit combination without undergoing time consuming statistical scale transformations. Such transformations have the added disadvantage of being very difficult to understand, and this would lead to problems for any reader of the final evaluation report. The resulting combinations of tests and subtests summarized in table five provide a total of eleven units for statistical analysis.

Testing Procedures

All tests were administered by experienced Yupik bilingual teachers recruited from the ASOSS and BIA bilingual programs. Testers were selected according to four major criteria: (1) personal interest in the testing program, (2) recommendation by principal teachers involved in the program, (3) availability for travel to a training workshop, and (4) assent by the majority of bilingual aides. Of the eight selected, three had prior experience as testers in earlier evaluation activities.

The testers received the main portion of their training at a three day workshop held in early March, 1973, at the Bureau of Indian Affairs site in Bethel. During the three days, general testing concepts such as measurement and random sampling were assimilated as well as specific administration procedures. In addition, the testers gave substantial input into the final structure of the tests, developed scoring criteria, and laid the groundwork for the math test to be used in the program. With few exceptions the testing program was carried out satisfactorily. The few exceptions were the result of unforeseeable local conditions requiring immediate decisions by the particular tester out of communication with the evaluator. In one case (see Table five, footnote) there was a significant loss of data, but even the ability to draw data-based conclusions was not seriously jeopardized. The results of the statistical analysis are presented in three main sections: (1) literacy skills, (2) numerical skills, and (3) linguistic skills. In each section the general results are described, followed by a brief discussion of the overall patterns of the results taken in total.

Literacy Skills

Table six shows the results of the statistical analysis of performance in literacy skills for each grade level. The reader is reminded that the values for the t statistic are the best index of comparative performance since they indicate whether a particular mean difference between a bilingual and comparison group should be taken seriously, i.e., as representing a significant program difference. Negative t values indicate a higher comparison group mean.

Beginning with prereading skills the performance of the bilingual program children was substantially superior. This superiority was most marked in grades one and two. By level three, both bilingual and comparison groups were about equal but this may have been due largely to the test having a low ceiling, leaving no more room for improvement. The important result is that first grade performance was high, giving evidence of a good beginning in Yupik literacy, comparable to what might be expected by the third year in the traditional program where the children must rely on their ability to generalize from what

Table 5
Summary of Evaluation Tests by Grade Level

ABILITY TESTED INSTRUMENT INSTRUMENTS	NUMBER OF SUBJECTS BY GRADE LEVEL							
	LEVEL ONE			LEVEL TWO			LEVEL THREE	
	BIA	ASOSS	COMP	BIA	ASOSS	COMP	BIA	ASOSS[b] COMP
Literacy Skills:								
prereading								
initial letter sounds								
*visual discrimination								
of symbols								
*reading phonemes	31	30	19	31	30	19	15	15
Decoding:								
reading sight words			7					
with pictures								
*decoding new words								
*matching words with								
pictures								
*reading and following								
directions	31	30	19	31	30	19	15	15
Encoding:								
alphabet	31	30	19	31	30	19	15	15
sounds and words	31	30	19	31	30	19	15	15
free essay	31	30	19	31	30	19	15	15
Number Skills:								
Counting:								
oral counting								
*naming numbers								
*counting objects	31	30	19	31	30	19	15	15
Arithmetic:								
arithmetic	31	30	19	31	30	19	15	15
Linguistic Skills:								
Grammar Closure:								
Yupik	31	30	19	31	30	19	15	15
English	18[a]	30	19	18	29	19	15	15
Auditory Association:								
Yupik	31	30	19	31	30	19	15	15
English	18	30	19	18	30	19	15	15

[a] For some unaccountable reason, one tester did not administer English versions of the Gramrnatic Closure and Auditory Association Tests, reducing the number of subjects from 31 to 18 both in grades one and two in BIA schools.

[b] Level three classrooms were not added to ASOSS bilingual program school until 1973-74.

– 118 –

11

Table 6
Literacy Skills in Yupik

	Prereading Bil.	Comp	t	Decoding Bil.	Comp	t	Alphabet Bil.	Comp	t	Encoding Sounds Bil.	Comp	t	Open Essay Bil.	Comp	t
BIA Level One	15.20	9.70	3.20**	13.94	1.16	6.09**	65.39	70.94	-.57	31.65	1.26	4.44**	5.61	2.42	2.59*
ASOSS Level One	15.71		4.29**	14.12		4.66**	63.13		-.85	44.50		3.89**	5.13		2.02*
BIA Level Two	14.97	11.95	2.32*	17.45	1.53	6.03**	82.02	83.10	-.12	48.06	.26	5.33**	7.97	7.58	.28
ASOSS Level Two	17.42		4.84**	20.25		7.46**	84.84		.28	52.87		7.11**	10.77		2.17*
BIA Level Three	15.37	14.83	.99	18.73	4.07	4.25**	88.87	98.67	-3.45**	57.13	3.47	4.69**	8.00	14.10	-3.11*

* $p < .05$
** $p < .01$

they have learned in English literacy training. In Yupik decoding skills, the bilingual program children showed clear superiority at every grade level.

In encoding, a mixed picture of performance was chosen. While the ability of the bilingual program to establish the concept of the written alphabet was weak, (especially at level three) the ability of the children to encode Yupik sounds and words successfully was quite strong at every level. Relative skill at free written expression was strong among bilingual groups at levels one and two, but then appeared to fall clearly behind by level three. In fact, many of the level three children made no attempt to write anything at all.

The reader should bear in mind that the purpose of evaluation in this section was to assess the ability of the bilingual classroom to prepare Yupik speaking children to be literate in their first language. Using the traditional classroom as an estimate of what might have happened otherwise, makes relatively clear the general success in meeting this goal. The only exceptions are in areas in which children in comparison schools were not restricted by the tests from relying on English as a mode of written expression. In all other cases, virtually no generalization from English to Yupik was in evidence by children in the traditional program. It would, of course, be unfair to say that no literacy skills in English were being developed in the traditional schools since evidence in that domain was not gathered. There would be no way to support such a conclusion one side or the other.

It does seem certain that a concept of the alphabet is not necessary for other basic encoding operations, particularly in the accurate formation of sounds and words received au ally. The bilingual children do well without it and the traditionally taught children are at no apparent advantage possessing it. Perhaps teaching an alphabet is more for the reinforcement of the teacher than of the pupil and hence constitutes an unnecessary part of the curriculum. In fact, trying to establish an alphabet concept early may only lock the child into an ungeneralizable system which later the child is required to repudiate upon literacy training in a second language.

Numerical Skills

Table seven shows the test results for assessing comparative numerical skills. Two components were tested; a component comprising counting and number identification (naming) skills, and a component comprising common arithmetic calculations. In the former, counting, the comparison groups performed as well or significantly better than their bilingually taught counterparts at each of the three grade levels. However, in arithmetic calculations, the bilingual program children performed as well or better than the comparison school children.

Problems in establishing a Yupik math curriculum were present since the program's beginning. First of all, there existed no standard treatment of math throughout the bilingual program schools. For example, program schools varied in the time at which English names for numbers were introduced. Second, most Yupik counting systems are based on a metric other than the base ten, necessitating highly complex transformations into the English base ten system. For numbers below 20 or 30, there is generally no difficulty; but numbers greater than 30 begin to possess long and linguistically complex names mathematically different from their English equivalents.

Why then should arithmetic calculations pose no apparent problem to bilingually taught children given the difficulty they seem to have counting? One possible reason is that the arithmetic problems used in the present evaluation were, like most arithmetic operations, approachable by reduction to single integers. In fact, even into secondary school most math calculations are taught to be performed by reducing them to single digit operations. This may be why the children in the bilingual program can handle calculations reasonably well without apparent facility with large number concepts. However, it follows that when such concepts become necessary at some later time the children in the bilingual program may well have problems developing the necessary abstractions to go beyond simple arithmetic with any notable facility.

Table 7
Comparative Number Skills

| | Math Component Scores | | | | | |
| | Counting | | | Arithmetic | | |
	Bil.	Comp.	t	Bil.	Comp.	t
BIA Level One	31.00	40.08	−3.16**	2.50	2.10	.52
ASOSS Level One	38.70		− .63	6.50		3.78**
BIA Level Two	37.10	50.50	−5.40**	7.40	5.10	2.09*
ASOSS Level Two	48.00		−1.06	10.73		3.75**
BIA Level Three	34.50	56.30	−6.49**	10.70	10.90	− .10

* p < .05
** p < .01

Linguistic Skills

Linguistic skills in each language were measured in two ways, one stressing the acquisition of grammar and syntax, and the other stressing the understanding of meaning in the context of analysis, ranging from simple to relatively complex. Referring to Table eight, in Yupik, the quality of performance in grammatical use was clearly greater at grades one and two for the bilingual program students, with the trend carried, though more weakly, into grade level three. In their ability to deal with meaning in Yupik, the bilingual program children showed significantly better performance at all three grade levels.

In English grammatic development there was generally strong performance by bilingual program children in the first two grades which tapered off in later primary, so by level three the bilingual students were still holding their own but not showing the distinct advantage they began with. The development of facility with meaning in the English language was essentially equal for both groups until level three where the comparison students showed clear superiority.

The most striking pattern to emerge from the data taken in aggregate is the marked tendency for the level three performance to show a sizeable drop. The same tendency was shown in the second year of the program when the present level three students were at level two. An early theory was advanced that the phenomenon may have been due to a lag in program development when each new level was added. This theory may still hold. In fact, the greater strength of performance of level two children the following year lends support to this line of speculation since it now appears as though the level two curriculum had taken shape well enough to meet at least the immediate instructional goals. At the same time the newly added level, level three, showed the same evidence of tapering off that level two did when it was first added to the bilingual program design.

But a supplemental theory also warrants consideration. The performance drop could also be due to a relatively low ability level of the particular children comprising level three, caused directly by their being the vanguard of the new movement, so when a new grade level is added to the program, they are "it." That is, these children may be showing a cummulative effect of being in the experimental forefront of the bilingual implementation period. This theory should not be discounted in explaining the data patterns seen in the third program year.

Table 8
Comparative Linguistic Scores

| | Yupik | | | | | | English | | | | | |
| | Grammatic Closure | | | Auditory Association | | | Grammatic Closure | | | Auditory Association | | |
	Bil.	Comp.	t	Bil.	Comp.	t	Bil.	Comp.	t	Bil.	Comp.	t
BIA Level One	18.65	11.79	4.28**	15.32	8.32	4.05**	4.72	2.68	2.65**	5.22	5.40	.08
ASOSS Level One	16.47		2.10*	13.57		2.16*	8.46		10.70**	9.79		2.71**
BIA Level Two	19.26	14.21	3.63**	18.19	13.16	2.89**	6.11	4.53	1.34	9.06	8.74	.20
ASOSS Level Two	20.79		2.53**	19.27		2.50**	11.36		4.30**	14.72		3.42**
BIA Level Three	20.73	18.60	1.06	21.60	18.20	1.95*	8.47	8.53	-.04	12.27	16.60	-2.35**

* p < .05
** p < .01

15

Of course, there are other theories to account for these data, not the least of which is the possibility of sampling error. A random sample cannot guarantee a representative cross section of pupils selected for testing. It can only guarantee all pupils an equal chance of selection. With samples of a given size, the probability of selecting from the extreme low end of the distribution is greater than with larger samples. But, the probability is just as great for selecting from the top end, and with limited time and resources, these risks must be taken. While the sampling error theory is logically as sound as any other, it would be impractical to place great faith in it since it has no implications for program development. Of the two theories posed above, the one that demands consideration from a practical point of view is the first because it asks for program review by its developers and practitioners to help make sure the third level achieves a continuously sound functioning basis. A fourth theory, of course, is that the total concept of bilingual education is questionable and may not come through on its initial promise to provide a quality educational program for Yupik-speaking children. But such a theory is easily weakened by the remarkable performance of children in the early primary grades experiencing the bilingual classroom.

In summary, it seems apparent that the children in the Yupik bilingual program are gaining a sound basis in nearly all aspects of Yupik literacy, Yupik and English oral language proficiency, and academic performance. But, it would be unwise to generalize these relatively short-term results to all of the language situations and groups of Alaska. My purpose has been to offer the reader an introductory overview of bilingualism and bilingual education in Alaska. The variety of language patterns and educational needs constitutes one of Alaska's most basic facts. Our measure of such facts constitutes one of our most basic challenges.

FOOTNOTES

[1]Research funded in part by grants from the National Institute of Education, the U.S. Office of Education, the Ford Foundation, and the Alaska State Department of Education.

[2]The interested reader may write Dr. Michael Krauss at the Alaska Native Language Center, University of Alaska, Fairbanks, Alaska 99701, for further information regarding this map.

[3]Plans are underway for the BIA next year (1975-1976) to increase approximately three fold the number of Yupik-speaking communities with bilingual education.

[4]For a detailed account, the manuscript; Four Years of Bilingual Education: The Yupik Language Program in Southwestern Alaska, 1975, by James M. Orvik, Center for Northern Educational Research, University of Alaska, Fairbanks, Alaska 99701, is available on request.

[5]The report cited earlier (Orvik, 1975) discussed these problems in some detail.

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16

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(Continued From Page 96)

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17