DOCUMENT RESUME

ED 244 748 RC 014 549

AUTHOR	Leap, William L.; And Others
TITLE	Dimensions of Math Avoidance among American Indian Elementary School Students. Final Report.
INSTITUTION	American Univ., Washington, D.C.
SPONS AGENCY	National Inst. of Education (ED), Washington, DC.
PUB DATE	82
GRANT	NIE-G-79-0086
NOTE	464p.; Tables are marginally legible.
PUB TYPE	Reports - Research/Technical (143)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	*American Indian Culture; *American Indian Education; American Indian Reservations; American Indians; *Comparative Analysis; Computation; Elementary Education; Grade 3; Grade 4; Mathematics Achievement; *Mathematics Anxiety; *Number Concepts; Predictor Variables; Research Methodology; Sex Differences; *Student Attitudes; Teacher Attitudes; Tribes
IDENTIFIERS	Northern Ute Reservation UT; Oneida Indian Reservation WI

ABSTRACT

Using a cross-cultural perspective, researchers studied the "math avoidance syndrome," which has reached crisis proportions among American Indians, at two elementary schools on Utah's Northern Ute Reservation and Wisconsin's Oneida Indian Reservation in 1980. Researchers gathered data by observing math instruction at the schools and by interviewing parents, teachers, tribal officials, and a group of students from third and fourth grade classrooms. They also discussed with tribal elders each tribe's style of computation and problem solving. Results showed that, contrary to widely held beliefs, neither degree of traditionality nor sex of student served as an accurate predictor of student math attainment or interest in math. Perceived conflicts between school and home regarding function and purpose of education, social organization of math lessons, incompatibility of classroom management styles, student-preferred patterns of self-dependence, familiarity with the tribe's traditional enumeration system, and other factors were found to be more significant variables. What emerged from the study was not a listing of causes for Indian student math avoidance, but a configuration of behavioral and attitudinal dimensions, each working with the other, that encourage or inhibit math learning. Implications for future research and for classroom policy are given. (Author/SB)

DIMENSIONS OF MATH AVOIDANCE AMONG AMERICAN INDIAN ELEMENTARY SCHOOL STUDENTS

National Institute of Education Grant Number NIE-G-79-0086

Final Report

William L. Leap

with

Charles McNett, Jr., Joel Cantor, Robert Baker,
Laura Laylin, and Ann Renker

The American University
Washington, D.C.

1982

ABSTRACT

In the fall of 1979, faculty and students associated with the Department of Anthropology at The American University (Washington, D.C.) received funding from the Teaching and Learning Division of the National Institute of Education, to support a study of the "math avoidance syndrome" as found among elementary school aged students within two Indian Tribes. Math avoidance has reached crisis proportions within elementary school classroom all across Indian country. Yet until the beginning of this project, no attempt had been made to move beyond the symptoms, to identify the specific factors (or groups of factors) which inhibit math learning within American Indian classrooms, or to clarify how those factors individually or jointly contribute to the maintenance of math avoidance among Indian students.

The project began by using HRAF materials to place our interests in "Indian math" into broader, cross-cultural perspective. The county elementary school on the Northern Ute reservation (Fort Duchesne, UT) served as the site for the first part of the in-field research. The Tribally-controlled Elementary and Secondary school on the Oneida Indian Reservation (Wisconsin) functioned as the second site. Field research was carried out in January (Northern Ute) and in May and June (Oneida), 1980. Data gathered included classroom-based observations of math instruction at the schools and interviews to discuss math learning problems and general educational issues with teachers, parents, and Tribal officials. Students from third and fourth grade classrooms were interviewed, asking a series of questions probing student attitudes, values, Tribal identification, interests in education, as well as basic math skills. Students were also interviewed in depth by field workers. Discussions were also held with members of each Tribal community, to clarify styles of computation and problem-solving traditional to the students' Tribal cultures.

Analysis showed that, contrary to widely held belief, neither degree of "traditionality" nor sex of student serves as an accurate predictor of student math attainment or interest in math within the project sample. Perceived conflicts between school and home regarding function and purpose of education, the social organization of math lessons, incompatibility of classroom management styles and student-preferred patterns of self-dependence; familiarity with the Tribe's traditional enumeration system, and other factors are found to be more significant variables. What emerged from the study was not a listing of *causes* for Indian student math avoidance, but a configuration of behavioral and attitudinal *dimensions*, each working with the other, to encourage or inhibit math learning within the students the project surveyed. Implications for future research and for classroom policy are explored.

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PREFACE

This report summarizes the cutcome of several years of data-gathering, analysis and interpretation. Staff participating in the project's activities included: Dr. William L. Leap, project director; Dr. Charles McNett, Jr., project co-director; Dr. Joel Cantor, senior research assistant; Mr. Robert Baker and Ms. Laura Laylin, research assistants; and Ms. Ann Renker, field research assistant. All members of the project staff contributed materials to be included within this report. Chapter Three was prepared by Dr. McNett and Mr. Baker. Mr. Baker also supplied summaries of in-field activities at Oneida for Chapter Four, preliminary tabulations of field instrument responses for Chapter Seven, and invaluable assistance with the factor analysis and interpretation of the results summarized later in that Chapter. Ms. Laylin contributed a summary of her in-field activities at Northern Ute for Chapter Four; drafted a preliminary comparison of the Ute and Oneida parental responses to the field instruments for Chapter Six; and prepared a detailed description of the factor analysis process and the information it provided for Chapter Seven. Ms. Renker supplied background materials on her fieldwork at Oneida for Chapter Four, along with anecdotal comments and observations to enrich the content of Chapters Five, Six, Seven, and Eight. Dr. Cantor, who supervised the selection of the field instruments used during in-field data-gathering, drafted descriptions of those instruments and summarized the analysis of the Semantic Differential responses for Chapter Seven. He coordinated and summarized the analysis of the classroom materials recorded on audiotape during fieldwork at both sites. Dr. Leap prepared the summary of the comparative linguistic analysis in Chapter Two and otherwise took responsibility for the integration of the research findings into a coherent set of arguments and for the drafting of the text of the Final Report.

The materials discussed in Chapter Two have already been published in a recent issue of the Journal of the Linguistics Society of the South and Southwest. A partial summary of project findings was included in a paper prepared by Dr. Marla R. Brassard (Department of Educational Psychology, University of Utah) and Larry Szaraniec (Psychological Counselor, Duchesne County Public Schools, UT) which will soon be published in School Psychology International. Papers summarizing findings of the project have been presented to the Conference on American Indian Languages at the annual meetings of the American Anthropological Association, to Tribal Education meetings on the Northern Ute reservation, and at numerous Indian Education Conferences. The project director has been invited to present a report on the materials in Chapters Seven and Eight at a symposium to be held at the 1983 International TESOL Convention in Toronto, Ontario. Dissemination of project findings, as promised in the original proposal, is already well underway.

Project staff would like to acknowledge the continuing interest and support given to this project by several individuals: Forrest Cuch, Education Director for the Northern Ute Tribe, Fort Duchesne, UT: Earl Allred, the Principal of Todd Elementary School during the time of our research there; Jerry Hill, Principal of the Oneida Tribal School during the research at that site; Bill Golnick, who helped mediate the discussion which resulted in the selection of Oneida as the second site for this project; Maurice Middleburg, formerly of The American University's Research Development Office; and Donna Longo and Tom Kavanaugh, who supplied muchly needed review of literature and data to help place project findings into broader perspective. Students, teachers and parents at Todd Elementary and Oneida Tribal Schools, particularly those who were interviewed or otherwise participated in the project, will not be listed by name here according to our agreement. But we want them to know that project staff still remember their many kindnesses to us. We thank the children of Northern Ute and Oneida, especially. And to them we dedicate the report and the findings its chapters detail.

William L. Leap
Associate Professor
The Department of
Anthropology
The American University
Washington, D.C.

Chapter One : The Project in Overview

This is a report on research conducted under NIE grant NIE-G-75-0086 awarded to William Leap and Charles McNett, Department of Anthropology, The American University, Washington, D.C. As the title of the report suggests, the grant was awarded to support an inquiry into "math avoidance" problems found among American Indian elementary school students. Research was carried out within two school contexts: Todd Elementary School, Fort Duchesne, UT, a public school services students for the Unitah-Ouray Tribe of Ute Indians, as well as students from the non-Indian towns surrounding the Ute reservation; and Oneide Tribal School, Oneida, Wisconsin, a tribally controlled alternative school serving elementary and secondary school-aged students from the four Indian communities on Oneida lands. To try and guarantee some in the student population served, it was decided to focus in-field observation, interviews and analysis solely on students in two of the schools' classrooms. Because grades 3 and 4 are often sensitive to math avoidance and math "anxiety" issues, inquiry was further restricted to students in those grades.

We had orginally planned to build the research around the in-class student performance during mathematics instructions, following a lead from the research of Cicourel and others which holds that much of the problem in American education can be traced to the difficulties in communication, information exchange, and "turn-taking" which are presented to students and teachers within the classroom context. In brief, we assumed that we could find an association between student style of performance and participation during school-based math instruction and level of evidenced student mathematics attainment; and , therefore, that we could distinguish between students with higher levels of "math anxiety" and "math avoidance" by reference to each stud   s position within that association.

We also recognized that, having ranked students in terms of their evidenced level of math avoidance , it would be necessary to determine in some sense the elements which have led to each students' ranking. Attitudes toward school, toward teachers, toward education; self-esteem and self-image, as both student and as Indian in predominantly non-Indian society; level of support for education by home and family; and degree of tradionality vs. assimilation in student background were all recognized, again from previous studies, as elements which could independently or jointly impact on student in-school performance and educational advancement. One aspect of the latter element (traditionality vs. assimilation) proved to be especially intriguing from the outset of the study. Leap has shown (1978, 1980, *passim*) how knowledge of Indian language grammar -- however implicit and covert the competence, can directly impact on student ability to form and comprehend standard English sentences. We argued by analogy that student knowledge of Indian numerical skills -- again however implicit that competence might be -- might impact in a similar way on student ability to perform computations in "standard math". Thus we were interested in determining whether student knowledge of his/her tribe's traditional system of mathematics, enumeration and measurement would show itself to be a relevent variable affecting student math achievement or math avoidance.

It seems appropriate to begin the study by gathering some background data on traditional mathematics systems as used in American Indian societies. We already knew that some studies of non-Western country systems had been carried out, showing that traditional math systems were still in use in some tribal societies (see discussion in chapter 3). Few of these involved studies of traditional math among Indian tribes. And of the few studies which dealt with Indian themes, most were linguistic in nature, of the listing the words used for counting purpose without providing any analysis of the system of organization which allowed the words to be used for computational purposes. Many of these linguistic studies grouped the Indian numbers words in sequences of ten, implying a direct parallel between tribal math and the Western base-ten system and disregarding the possibility that the tribe's mathematics might have been organized in terms of some other system.

Clearly some interpretation of the literature available on Indian math was going to be necessary. The available literature hardly contained sufficient information to guide that analysis. However, a basis for such an interpretation could be developed through cross-cultural analysis: identifying, comparing and contrasting features characteristic of mathematics systems in a randomly selected sample of cultures; then generalizing as to the parameters which could be informing the design on any tribe's mathematics system on the basis of the clustering of variables the cross-cultural analysis revealed.

The cross-cultural analysis was carried out during the period September - December, 1979. We used the data from the Human Relations Area Files (HRAF) provided at the Library of the University of the District of Columbia as the basis for the study, augmented by discussion of Indian mathematics terminologies as found in Indian language grammars and dictionaries , language teaching materials, or in other, less widely available publications. Leap had already established a working relationship with the Northern Ute's Education Division. And during his several site visits to Fort Duchesne that fall, he was able to gather information about counting processes in Ute culture. One of the project's student researchers (Ann Renker was familiar with comparative Iroquoian through previous studies at Hunter College, NYC; Renker combined literature and unpublished field materials to produce a similar background statement describing mathematics in Oneida culture.

The fall of 1979 was also the time when the on-site research methodology was more fully detailed. We had already decided to use the procedures for describing in-class teacher-student interaction developed by Bellack (1963) and further field-tested and modified by Fey (1970): This involved , in essence, verbatim transcription of teacher and student verbal statements, then classification of teacher and student statements in terms of the implicit behavioral presupposition. Bellack-Fey provided a list of labels for such utterance types, based on the kind of response or follow-up each utterance was designed to elicit. We planned, therefore, to tape record in-class math lessons, to transcribe the verbal context, and classify the utterance, then to draw judgements about student classroom performance based on where in the classified "flow chart" individual students participation was evidenced. The context of that participation -- response to teacher question, request for clarification, "dodge" of teacher request, and the like -- we also to be noted , in hopes that a "flow" of student-participation patterns would be developed to match up with the scheme of teacher-participation which Bellack-Fey analysis would more directly supply.

We also knew we would need background information in several areas relented to student personal profile, family context, attitudes toward education, place within the tribal's political and cultural community, and the like. Similar questions had been asked of students, parents, teachers and school officials during a nine-site Indian education needs assement in the Pacific Northwest, conducted by the Advocates for Indian Education (Spokane,WA) under funding from the U.S. Office of Indian Education (Misiaszck et al., 1977). We proposed the use of the same questionnaires, augmented by a semantic-differential attitudinal measure, developed by Dr. Cantor with specific reference to values and priorities which were held to be particularly salient to Ute and to Oneida tribal traditions. We also decided, given that parents and school officials were critical actors in Indian education <u>even if</u> their influence was not directly attested in the classroom, to follow the lead of the Advocates' study and gather background and attitudinal information from parents and school officials along with data from students and teachers at both of the sites.

Field research at Todd Elementary School began in early January, 1980. Ms. Laura Laylin (and her two elementary school-aged sons) set up headquarters at the Ute tribe's Bottle Hollow resort and began the process of on-site observation and interviewing as soon as access to the classrooms had been secured. A new principal had been assigned to Todd Elementary School as of January, 1980. The new principal shared tribal concerns about student math problems, and expressed willingness to cooperate with the project. However, he stressed that he could not require faculty cooperation, and that we would have to secure permission for the on-site, in-class research from individual teachers under our own initiatives.

Dr. Leap and Ms. Laylin met with the 3rd and 4th grade teachers, described the project, explained what would be expected if we worked in a particular classroom, and then gave teachers time to weigh the alternatives and decide which option made them the most comfortable. In truth, we had more cooperation from teachers than we could possibly have used: access to almost <u>every</u> classroom was volunteered teachers expressed their willingness to stay after school hours or to set aside time during the weekends to discuss project-related issues in detail. And in the 3 classes ultimately selected for intensive observation and analysis, teacher acceptance, tolerance, and support for the inquiry was nothing short of superb. It is true that, while she was in the classrooms, Ms. Laylin volunteered to serve as a teacher-aide, and often assumed part of the responsibility for follow up instructions in mathematics while students were completing their seat-work assignments. This greatly enchanced rapport with students (to say nothing about the further validation this gave to her presence at the school) and helped repay teachers for their cooperation, at least in part. But the presence of an outsider in <u>any</u> classroom inescapably creates disruptions, and it was to the project's benefit that the participating teachers endured this disruption with grace and tempered enthusiasm.

A total of four weeks were spent on-site at Northern Ute, following the time-plan outlined on page 84. In all, twelve student interviews, six parent interviews, and seven teacher interviews were completed during this period. Eighteen mathematics classes were observed, seven of which were tape-recorded for later analysis. Written response to the Advocates' teacher questionnaires were also obtained from thirteen teachers <u>not</u> otherwise interviewed during the on-site research, to place into context the more detailed comments given by the teachers directly participating in the research effort.

All of this information was subjected to detailed analysis at The American University during the period January - April , 1980. The background function to be played by teacher, school officials, and partial data was recognized from the outset. In those cases, simple tabulation and comparison of response frequencies and response content proved to be sufficiently enlightening, where project purposes were concerned.

The data from the student interviews proved more complex and the analysis proved to be somewhat more demanding , primarily because of the abundance of information gathered on each student, the variety of responses given by students to each question in the interview, and the magnitude of correlations which could be drawn with any single issue recurring throughout the aggregate responses. To make the data more workable, we decided to convert the student response data into a format suitable for processing under the SPSS package. The benefits accruing from the computer-assisted analysis of student responses became immediately apparent, especially when comparisons with the responses from the Oneida student interviews began to be drawn.

Fieldwork at the Oneida Tribal School began in early May, 1980. Robert Baker and Ann Renker both graduate research assistants for the project, were in charge of the in-field inquiry at OTS. The instructions and the in-field timetable employed during the investigation at Todd Elementary School guided the work at this site. Having two fieldworkers did allow a larger number of classes, and classrooms, to be covered during the four week research period. On one level, the OTS sample was somewhat richer that the data gleaned from Todd Elementary School. But factors worked in the other direction, to bring the samples back into closer alignment. First, the fieldwork at OTS was carried out in the final weeks of the school year. In-class activities inescapably were shorter, student attention-span was briefer, and the performance objectives of each class meeting were more compactly stated - all as a result of the time of year. Second, there was an unfortunate bout of tape recorder difficulty which rendered parts of many of the student interviews almost totally inaudible upon replay. (The liabilities of using a built-in microphone when carrying out interviews in the out of doors came as a complete surprise to all members of the project staff.) Both considerations forced us to rely more heavily on the Northern Ute data as focus for analysis, using conclusions drawn from that data as a basis for analysis and interpretation in the (less consistently available) Oneida materials. The consequences of this decision will be seen throughout discussion in this report.

Analysis of the Oneida data began in June, 1980 and continued throughout the summer. We had originally scheduled the work at the second site to occur immediately after the work at the first school site was completed. Our decision to postpone the research at the second site until later in the spring meant, in turn, that the data analysis period had to be extended into the fall, 1980. This delayed the preparation of any summative statement of analysis until the first part of 1981. An overview of project findings was presented to members of the Northern Ute tribal community at a reservation - wide Education Workshop on March 17, 1981. Parents and tribal officials were very interested in the comments we had to make about student math avoidance and factors reinforcing it. Greater interest was expressed in the ways in which the math avoidance findings indexed what clearly were larger components of education for Indian students at Todd Elementary School. It was clear that the factors promoting student math performance were also affecting student performance in other areas of the school's curriculum; in that sense, the math avoidance syndrome was not a math syndrome at all, but reflects facets of the more general issues of educational equity of Indian students in non-Indian educational environments.

Parents were particularly concerned about the insights into school functioning which the study had revealed. While it was not our intent to identity bias, assumption, or other factors which might be influencing teacher assessments of student potential or parental assessments of TES' commitments in education, it was impossible for the study to ignore the overall dialectic between school and tribe and the ways in which relationships at that level impact on school success and schooling effectiveness.

We have been reluctant to bring closure to the project and its analysis, primarily because of this issue: If Ute student problems in math learnirg are to be traced to any single issue, that issue would be based in the frequently evidenced distancing behavior which separates (and keeps separate) teacher awareness of Tribe, tribal background, and tribal identity; and student/family/tribal awareness of school, school function, and schooling expectation. It is not the case that teachers and Tribe do not "know" about each other. Rather, it is what they know (and don't know) and the impact that has on expectation and involvement in Indian education which is at issue in this problem. Student attitudes about mathematics and education in general confound this problem even further.

We had assumed, given that OTS was a tribally controlled school, that such conflicts between school and home would not play so great a part in defining the context of education for Oneida students in our sample. As it turned out, it was useful to be able to draw contrasts between TES and OTS situations precisely for this reason. Still we found evidence of "math anxiety" and disinterest in mathematics education within the Oneida students. And the areas where Northern Ute and Oneida students contrast on these points proved to be very insightful where project purposes are concerned.

In darker moments, project staff began to wonder whether we were dealing with anything which was uniquely math-relented at all, since math issues readily became interpreted as subsets of larger political/value/cultural questions ranging far beyond the domain of mathematics competency. A more tempered perspective sees this linkage as quite remarkable. No facet of any student's educational experience can be understood outside of the larger climate of attitude and opinion which shapes the experiences to begin with. Our original research purpose was to identify some of the dimensions underlying math avoidance amongst American elementary students. By demonstrating that many of these dimensions overlap other problems across in Indian education, we have fulfilled the goal we set for this inquiry. We have also made it clear that, for future inquiry, more concentrated analysis of specific factors -- individual student knowledge of tribal math systems, for example, is necessary that is to be preferred over the more global and synthetic "in-gathering" approach we employed here. Comments on the specific tasks which need to be carried out within such a tightly found framework are detailed in the final section of this report.

Chapter II : Does Indian Math (Still) Exist?*

It is important to begin this report by paying attention to what we already knew about "math avoidance" and its impact on the school achievement of American Indian students. This chapter will lay a foundation for both lines of inquiry by reviewing data which show (1) that Indian math systems were organized differently from those more familiar to Western educations; (2) that the organization of those systems was expressed, linguistically, in terms of surface structure quite distinct from the "counting vocabularies" used in Western math systems; and (3) that, given the differences, it _is_ reasonable to suspect -- as this report would hold -- that Indian student math problems _may_ be the result of the presence of an alternative (i.e., traditional) set of mathematics skills, and _not_ to the absence of _any_ skills in mathematics altogether. That math achievement is a significant problem in Indian education has been demonstrated through a variety of sources. The GAO report on the adequacy of educational services provided by the Bureau of Indian Affairs to Indian children notes, for example,

> The proportion of Indian children with special needs in mathematics rises from 32 percent in second grade to 41 percent in fourth grade (and) to 46 percent in sixth grade.
>
> (GAO 1977:11)

Fuchs and Havighurst noted evidence of the same percentage increase in the National Study of American Indian Education. Data they assembled for the final report on that study ' ... place Indian pupils just below the national average

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* Adapted from the essay of the same title, originally published in _Native Languages of the Americans_, a special issue of the Journal of the Linguistic Association of the Southwest, vol. IV, no. 2, July 1981, pp. 196-213.

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during the first four school years, and they drop substantially" (1977:123; see also Table 10, page 124). The problem is not restricted solely to the early years of the Indian students' educational experiences. The U.S. Civil Rights Commission, in its inquiry into issues affecting tribes in the Southwest, found evidence to show that

> The difference between the performance of American Indians and that of white students widens with each succeeding year, especially between grades ten and twelve. The pattern was most pronounced in mathematics (where) American Indians are 2.4 years behind white students in the sixth grade and 1.7 years behind the norm, but at grade twelve, American Indians are 4 years behind white students and 3 years behind the national norm.
>
> (U.S. Civil Rights Commission 1973:24)

The consequences of this situation both for individual and tribal economic self-determination are clear: Dillon Platero, former director of education for the Navajo nation, noted before a Congressional committee in 1977:

> You have about 2,500 Navajo students graduating each year, approximately 600 of these high school graduates find their way to colleges, to post-secondary education and vocational education, or on-the-job training. What happens to the other (1,900)? The other (1,900), in most cases, ninety percent do not have any skills with which to obtain a job. That (1,900) each year adds to the 50 out of 100 Navajo people who are unemployed, so they join those ranks.

But even a student's entrance into a college or vocationally related training program offers no guarantee that the negative encounter with mathematics education will end. As Reyna Green noted in her summary of the AAAS study of the problems in Indian student mathematics education,

> Many students drop math courses they need for future work, courses they need for basic skills, courses that would lead to a greater level of achievement, and courses that could prepare them for certain careers before they fail. They think twice and sometimes quite finally about certain careers in scientific and technical fields because of a perception of themselves as hopelessly incompetent in the math skills needed for the career. Sometimes, as in my case and the case of the Occupational Therapy major who stayed out of the field for several years because she'd been told she'd need a lot of math, their sense of the mathematics competence they need is erroneous.

> Some students' fear and loathing of math carried into their elementary education majors and on into schools where they transmit that feeling to students. And if they teach Indian students, another generation continues the pattern.
>
> (Green 1978:5)

A growing number of Indian educators are recognizing the existence of this problem within their own reservation and are eager to see steps taken to correct it. There have been attempts in recent years to advance explanations and suggestions to that end. But as a review of these studies will show, the findings do not paint a consistent picture of the Indian math avoidance 'problem'. There seems to be no agreement on the causes of this problem. Vernon (1969) argues that '... the general maladjustment of the tribal cultures' may be one of the reasons Indian students score poorly on standardized mathematics achievement tests. Feldman, et al. (1974) suggest that the variety of English used by native students may be inadequate for the kinds of abstract reasoning processes required in mathematical thinking. John-Steiner and Osterreich (1975) argue that the strong emphasis on visual rather than verbal-based acquisition of knowledge in Pueblo Indian societies may have a significant impact on educational achievement of Indian students within the verbally oriented schooling context. Werner (1968) and others argue that Indian learning styles are generally distinct from those of Western culture and that those contrasts will further intensify the effects of that impact.

This leads Zimilies, et al. (1976) and others to call for increased efforts at 'early childhood intervention' programming, so that Indian students can develop adequate foundations for mathematics learning before they enter elementary school. Others argue that it is the schools which must be changed. Some Indian leaders call for tribal control over all phases of the Indian education process since without this control, Indian students are doomed to educational failure. Perel (1978) argues, more cautiously, in favor of a bilingual-bicultural approach to mathematics instruction under such circumstances. Phillips' data from Warm Springs, on the other hand, cautions that too 'Indian' an orientation in the schooling process may produce more harm than benefit, since programs which make such adjustments '... are avoiding teaching the Indian children how to communicate in precisely the contexts in which they are least able but most need to learn if they are to do "well in school" ' (1972:383).

The current state of understanding of the Indian student math avoidance 'problem' is well summarized in Recommendation Six of the AAAS Conference on Mathematics in American Indian Education:

> In spite of the consistency with which some problems and solution appear in discussions on Indian mathematics education, a careful scrutiny of the state of the art has not yet been undertaken. Such an examination ought to be made.
> (Green 1978:12)

Comments made during state-wide hearings on Indian education by a spokesperson for the Minnesota Chippewa tribes strike more closely at the heart of the matter:

> At present, there is no accurate data collected in public schools and post-secondary education programs which would identify specific needs areas, both the symptoms and the source, and assist with the development of programs to meet these needs.
> (Jones 1976:107)

It is surprising, given all the attention that has been paid to the cultural issues affecting Indian education, that detailed analyses of the interaction between Indian mathematical skills and western mathematics learning have not been widely attempted. But there are several reasons this has remained the case, at least within the North American Indian tribal context.

First, there is the widely held assumption that Indian tribal cultures no longer exist in any viable form; hence there is nothing truly 'Indian' remaining within the contemporary tribal context which can be studied directly. A second issue - - and one I think lies closer to the heart of the matter in this case - - has to do with the assumption widely reinforced in the literature that most Indian tribes simply did not possess mathematical skills, or, if they did , had only a rudimentary sense of computation. Jenness' comments on the counting skills of the Copper Eskimo of Coronation Gulf (Northwest Territories, Canada) offers one illustration of this attitude.

> Compared with the Eskimos of Alaska, these natives were astonishingly primitive. Their language contained no word for any number beyond six ... Very few of the natives, however, know the word for six and in ordinary conversation any number above three is 'many' ... The intellectual inertia of the natives is apparent in their counting. A woman wanted to tell me that I had six cartridges. She held up three fingers and said *pingahut* 'three', and then again held them up and said 'three'. I tried to make her count consecutively. She began on her fingers 'one, two' , then tried for the third finger and said 'one' again and on being corrected 'three'. For the fourth finger she was quite at a loss, but another native volunteered 'four'. Beyond this, neither of them had any numerals, though there are words for both 'five' and 'six'. Very few of the natives, however, know the word for six and in ordinary conversation any number above three is 'many'.
>
> (Jenness 1959:46; 1922:229)

At the same time, we find comments of the following sort made in reference to the same group of Eskimo:

> In the Mackenzie district a band of caribou seen is usually reported by exact number if there are less than ten; over that number careful estimates are let suffice, e.g., 'over twenty', 'less than forty', etc. It is, in fact, usually exceedingly difficult to count caribou correctly if the band is over ten animals.
>
> (Stefánsson 1913:290)

Indeed, Jenness himself writes, after noting the 'astonishingly primitive' nature of their mathematical knowledge:

> Yet they were not so primitive as to be easily shortchanged in any transaction, for they could separate a pile of articles into groups of three or four and count them with tolerable accuracy.
>
> (Jenness 1959:46)

It seems clear from both Stefansson's and Jenness' examples that, whatever 'limitations' may seem to be imposed on the Copper Eskimo by their counting vocabulary, those 'limitations' in no way restrict the ability of individual members of the group to perform enumerative-related tasks when cultural context or social purpose requires it. Discussions of Indian mathematics competency or attempts to assess the 'adequacy' of the mathematics skills used by any tribe must start with a detailed analysis of these skills.

Most frequently in the literature (if the subject is dealt with at all), scholars attempt to explore Indian numeracy by focusing exclusively on a tribe's counting vocabulary. Such discussions can be useful for present purposes, provided they include more than a mere listing of the translation equivalents of English vocabulary items or more than a tentative set of claims about the grammatical function served by the counting terms within syntactic-level constructions. It is the organization of the underlying counting system and not the morphemic properties of the words used to express that system which needs to be highlighted if the mathematical system characteristic of a tribe's traditional culture is best to be described.

As the discussions of Indian language counting vocabularies presented in the following paragraphs will show, careful analysis of the terms used for enumeration and computation can reveal much about the organization of these underlying systems. The limitations of such data, where understanding of the system is concerned, and the need to have access to details from outside the vocabulary's linguistic structure will also be made clear by these examples.

There are instances where surface-level morphemic details hint at the organizational properties of the underlying computational system quite directly. Such is the case, for example, in the language of Zuni pueblo, New

Mexico. The terms of number units, one through ten, are

1. *do:ba / dobinde*
2. *kwi:li / kwili*
3. *ha:'i / ha'i*
4. *a:wide / a:widen*
5. *apde / apden*
6. *dobalekk'ya*
7. *kwilelekk'ya*
8. *ha'elekk'ya*
9. *denalekk'ya*
10. *asdemɨa*

(Erachio 1978)

The symmetry found within these terms is clear: The term for 'one' serves as the base for the term for 'six', 'two' as the base for 'seven', 'three' for 'eight' ; the term for 'nine' has the same, second-set suffix (*lekk'ya*) found on the preceding numbers of this set; and the boundary of each symmetrical set is denoted by using morphemically distinctive terms for 'five' *apde* and 'ten' *asdemɨi*.

The terms for the number units, eleven to twenty, show similar patterning.

11. *asdemɨan doba yaɨdo'*
12. *asdemɨan kwili yaɨdo'*
13. *asdemɨan ha'i yaɨdo'*
14. *asdemɨan a:widen yaɨdo'*
15. *asdemɨan apden yaɨdo'*
16. *asdemɨan dobalekk'ya yaɨdo'*
17. *asdemɨan kwilelekk'ya yaɨdo'*
18. *asdemɨan he'elekk'ya yaɨdo'*
19. *asdemɨan denalekk'ya yaɨdo'*
20. *kwilik'ya asdemɨa*

'Eleven' is formed by combining 'ten' with suffix with 'one' followed by a third, coordinating element. 'Sixteen' departs from this pattern - - 'ten', suffix, 'one' , *lekk'ya*, and coordinator, but for reasons seen in the preceding decade. 'Twenty' departs from the patterns in a second, now familiar fashion - - 'two', suffix, 'ten' , suffix.

We could argue from these data that Zuni counting system is organized in terms of an underlying base-ten system, given the pivotal marking contained in the terms for 'ten', 'twenty', and beyond. Saying this, however, ignores the fact that within each of these decades, the same sort of 'thresholding' is used to keep the 'one' to 'five' / 'eleven' to 'fifteen' sequences separate from the 'six' to 'ten' / 'sixteen' to 'twenty' sequences. To refer to this as a base-five system may bring us closer to the enumerative reality of the Zuni counting system. To note that Zuni numbers seem to allow items to be grouped into sets of five, and not to be counted individually in continuous series, seems to come even closer to that reality. Either way, the contrast with western styles of enumeration - - and the amount of cultural code-switching required if a speaker is to shift from Zuni to English-language enumerative styles - - is strikingly apparent from an inspection of these terms.

A sense of the organizational principles underlying a tribe's counting system may not always be so readily identifiable. Number terms used by speakers of Ponca (a Siouan language currently spoken in north central Oklahoma) reflects such a situation:

1. *wi*	6. *shape*
2. *namba*	7. *pe namba*
3. *thabthe*	8. *pe thabthe*
4. *duba*	9. *shonka*
5. *sata*	10. *gtheiba*

(Leap 1977)

The presence of the added *pe* element in 'six', 'seven', and 'eight' seems to resemble the use of *-like* in the Zuni terms. There are some significant contrasts, however. First, *pe* is in second position in 'six' but word initial in 'seven' and 'eight'. Next, 'nine' bears no relationship to the pattern established by the preceding two numbers. More critical is the Ponca term for twelve: *shape namba* 'six - two'. Eleven, in contrast, is *agthi wi* 'ten - one' (as interpreted by speakers). Twelve does not follow that pattern, but thirteen and subsequent terms in the decade do. Hence, *agthi thabthe* 'ten - three', *agthi duba* 'fourteen' and the like. We are left with the need to explain the 'intrusive nature' of the twelve terms. The best explanation may be an historical one. If Ponca speakers originally counted in terms of groups of <u>six</u>, we could understand why *shape* 'six' and *shape namba* 'twelve' bear the similarity they do: under such circumstances, 'twelve' would literally be a 'second six'. Subsequent reworking of the terms (under the influence of western trade and commerce or other factors) brought about the surface-level semblance of a decimal system, and with it the marking of 'seven' as the 'second' *pe* , and 'eight' as the 'third' *pe* - - e.g., the second and third terms in the *pe* sequence.

A comparable situation of historical reworking appears also to have arisen within the counting vocabulary used by speakers of Arikara, a Caddoan language spoken (today) in North Dakota. The Arikara number words from 'one' to 'ten' are

1.	*àxkUx*	6.	*tshaàpis*
2.	*pitkUx*	7.	*taWIshaapiswaàNa*
3.	*tawit*	8.	*taWIshaàpis*
4.	*chiiti'Ish*	9.	*nooxiniiwaàNa*
5.	*shihUx*	10.	*nooxini'*

(Parks & Beltran 1976)

Here, by literal translation, 'eight' *taWIshaàpis* is 'three - six', while 'seven' is 'eight' - *waàna* , the same pattern connecting 'ten' *nooxini'* and preceding 'nine' *nooxìniiwaàna*.

That the overall system now operates in terms of decimal principles can be seen from the extreme regularity of the terms from 'eleven' *nooxinii na àxkUx* to 'nineteen' *nooxinii na nooxiniiwaàna*. That the number words from one to ten reflect only a glimpse of an earlier state of affairs can be seen when the Arikara terms are compared with the number words of Pawnee, another language in the Caddoan family. The Pawnee numbers from 'one' to 'five' are similar enough to confirm the linguistic relationship. That makes the number words from 'six' to 'ten' all the more interesting. Consider (Parks 1976):

Arikara	Pawnee	
tshaapis	*skikis saapits*	6
taWIshaapiswaana	*pikusiks saapits*	7
taWIshaapis	*taawit saapits*	8
nooxiniiwaana	*tihuks siri waara*	9
nooxini'	*tihuks wiri*	10

The Pawnee data show that *saapits*, the Pawnee equivalent of Arikara *tshaapis*, is the marker identifying several of the numbers in the six-ten grouping; it is not used as the term for 'six' exclusively. Assuming the same thing held for Arikara at an earlier time allows us to interpret Arikara 'eight' *taWIshaapis* , <u>not</u> as 'three-six', but as 'the third word in the six-to-ten sequence' - - compare with Pawnee *taawit saapits*, 'three-*saapits*'. Pawnee show the same pattern for 'seven' - - 'two-*saapits*', but marks 'nine' as 'ten-*waara*'. Arikara has extended the older nine/ten relationship to mark 'seven' as well - - a change which is not unreasonable given that Arikara is reworking the whole of the denotation of this series.

In spite of the changes, Arikara still retains a critical characteristic from the older system. The number words from 'eleven' to 'nineteen' may reflect a high degree of similarity to western, decimal counting - - e.g., *nooxiinii na axhUx* 'eleven', *nooxiinii na pitkUx* 'twelve',*nooxiinii na taWit* 'thirteen' , and so on. But after nineteen, the direct resemblances to the western decimal system cease. The Arikara term for 'twenty' *wiita'u* and for 'thirty' *Nasaawiu* bear little resemblance to the terms for 'two' or 'three', or to 'twelve' or 'thirteen' for that matter, nor can they be accurately translated as 'two-ten' or 'three-ten', respectively. Forty likewise does not parallel the English pattern. 'Fifty' , on the other hand, appears to be composed of 'forty' and 'ten'; 'sixty' bears direct relationship to 'forty'. 'Seventy', 'eighty', and 'ninety' follow the respective patterns as well.

Arikara (and with it, apparently, Pawnee) appears to be operating in terms of grouping principles, in a fashion similar to Zuni and to Ponca. Though the inclusiveness of the groupings is somewhat different, for here, groups of twenty elements are being demarcated, not groups of five (as in Zuni) or six (as hypothesized for Ponca). Attention has to be paid in this case to comparative and historical data, as well as to surface level morphemic details and to other factors, before a full sense of the Arikara system can be obtained.

The counting terms used in other Indian languages likewise reflect the influence of factors and processes based outside of the computational system per se. Boas (1911:396-398) reports that there are several sets of number words (he refers to them as 'numerals' - - again, the equation of <u>term</u> and concept!) in Tsimshian, the use of which depends on the 'class' of the object which is being counted inthe particular situation. Abstract nouns require one set of number words. Flat objects use the same set as do the abstract nouns, except for a unique term for 'eight'. Round objects also use the abstract set, except for unique terms for 'one', 'two', 'three', and 'ten'. There is a set of number words used in reference to long objects. All words in the set show a *-sxan* suffix; several of the base forms show a resemblance to numbers in the abstract set, though the resemblance is not as clear as in the instance of the flat and round object terms. The counting of human beings requires an additional set of number words, all of which show a common (*-al* or variant) suffix; similarity with the abstract numbers could be drawn, but again the correlations are far from precise. Canoes require an additional set of number words, again with resemblance to the abstract set, again with suffix (of the form *-tk/-sk*) to identify the particular 'class' of the reference. Counting of measures, onthe other hand, seems more closely related to the 'round object' terms than to the 'abstract' terms directly; here, as in other instances, a particular suffix, *on* , is used to mark the specifics of the reference.

Of course, it is linguistically interesting to be able to show that many of the items in these lexically defined number 'sets' can be derived from a common, underlying word form. Boas' discussion, in fact, demonstrates this. What is of interest for our purposes is the nature of the lexical focus underlying each set. The distinctions between 'flat', 'round', 'long', 'human beings', 'canoes', and 'measures' found in the counting system do not have a wider grammatical or syntactical significance in these languages. Plural reference, for example, does not highlight these distinctions, nor are such contrasts marked through the selection of affix forms within the verb structure. The cultural significance of the categorization - - given the Tsimshian people's location on the northwest coast, their interests, and those of the neighboring tribes - - is apparent, though there are other, equally salient components to the Tsimshian people's life style which have not been highlighted through number word contrasts. An effective analysis of the Tsimshian counting system would have to explain why these cultural foci (and not other, equally plausible emphases) are given formal representation within the system's terminology.

The reverse of the Tsimshian situation is equally possible. Just because a language has come to highlight certain classifications within its lexicon does not automatically imply that these points of emphasis will be reflected within the counting system.

The four-way 'gender' distinction found in Oneida and other Iroquoian languages (Lounsbury 1953:51) is well-known to linguists, and the significance of these distinctions within the lexical system of these languages is clear from grammatical descriptions. Contrasts between 'neuter', 'feminine zoic', 'masculine', and 'feminine-indefinite' references are not made within the number system of these languages. The number words, as we know them, are uniform across all four 'genders'. The absence of these distinctions may be merely fortuitous, or may point to some larger reality about the nature of counting and enumeration in Oneida culture. (The fact that numbers ordinarily thought of as nouns may take on the syntactic attributes of verbs in this language would need to be examined in terms of the same, alternative possibilities. Either way, the linguistic description would need to address the point; more is at stake here than the terms and the references denoted by them.

There are instances where noun class distinctions and number-word forms show more direct association . Abenaki (an Algonquian language spoken in northern Vermont and adjacently in Canada) reflects this trend, in part. Reference from 'one' to 'five' can be made in three ways, depending on whether the item being counted is 'animate', 'inanimate', or 'abstract' in reference. The nature of the system is apparent from inspection of the data.

abstract	animate	inanimate	reference
pazekw	*pazego*	*pazegwan*	one
nis	*nisoak*	*nisnol*	two
naw	*nloak*	*nhenik*	three
iaw	*iawak*	*iawnol*	four
nolan	*nonnoak*	*nonnenol*	five

After 'five', only one number form is employed, regardless of the reference 'class'. Here, if the close linguistic association between semantic grouping and number work distinction is to be noted, the analysis must also explain why the association is maintained in only the first five items. Linguistic as well as nonlinguistic factors may be at the base of this patterning.

All of the examples reviewed up to this point have demonstrated how a sense of the structure underlying a tribe's counting system can be obtained through careful analysis of the tribe's counting terminology. It would be fair to say that language data themselves have certainly been helpful in the analysis of the organizational issues and structural principles which are relevant tothe counting system in each instance. But too much would be made of this 'relevance' if we concluded, based on these data, that Indian mathematics is merely a linguistic phenomenon which needs only to be understood in linguistic terms. The language data have, in each of the instances here examined, highlighted certain facts about the tribe's styles of enumeration; yet other components of the enumerative style have been less directly identified in these data and features which might, for external reasons, seem to be expectable components of the underlying system may or may not be given any such recognition by the forms at all. We can therefore conclude from these data that, in these cases as well as elsewhere, some sort of computational 'logic' must underlie the tribes' counting terminologies, and then must return to the point stressed in the opening paragraphs of this paper: the 'logic' of these underlying systems - - not merely the surface level details of the forms which are used to express those systems - - has to be described before the reality of Indian mathematical skills can be fully appreciated by non-Indian educators, policymakers, and linguists.

The significance of this observation is particularly apparent when the use of Indian language mathematics terminologies in specific enumerative situations is described. One of Leap's earliest encounters with 'Indian math' (and one which still holds fascination but for additional reasons) came when he tried collecting recipes for 'Indian bread' at Isleta pueblo, New Mexico. Having long admired and enjoyed the particular thick, white, crusty bread which comes out of the adobe ovens, Leap asked a friend from the pueblo if she would explain in Isletan Tiwa (the pueblo's ancestral language) how she baked her bread. ' You start,' she explained, 'with a twenty-five pound bag of flour; and, when the process is ended, you get thirty-two loaves of Indian bread.' Leap asked if it were possible to reduce the recipe and bake fewer loaves. 'Certainly,' she replied (again in Tiwa), 'start with half as much flour, and you get half as many loaves.' 'What adjustment would you have to make,' Leap asked, 'if you wanted to bake only two or three loaves?' This question produced a thoughtful silence, and finally a comment: 'Why would you want to do that?'

Some additional facts need to be introduced here. Isletan Tiwa has terms for 'half' but does not have terms for other fractional units. In some instances, this is not a problem - - one-fourth is described as 'half and half again'. One-third, one-sixth, and the like, on the other hand, are not expressions given direct translation in Tiwa; relative approximations - - 'just a little bit', 'not quite that much', 'almost that amount' and the like are commonly employed. (This may seem imprecise, but most cooks talk in these same terms, especially when giving out favorite recipes, regardless of cultural background!)

It would have been possible for this woman to reduce the recipe without violating the constraints placed on calculations in this culture. But she did not go any further with the discussion and was puzzled at my requesting she do so - - and for what, on later reflection, was very good reason. Traditionally, baking bread carried with it certain social responsibilities and obligations. A woman takes pains to guarantee that there would be enough loaves to distribute to friends, neighbors, and relatives. These people, in turn, would return bread to you when they baked. Two goals were accomplished here. First, families always had fresh bread for the meals, as the responsibility of baking shifted from one household to the next within each of these groups. Second, the linkages already established between the participating families was reinforced and reiterated, as loaves of bread moved along these network ties.

Linguistically, it would be possible to reduce the recipe and adjust the quantities so that two or three loaves of bread could be produced. Culturally, such a mathematical operation made no sense; producing such a limited yield would be in total conflict with the traditional social reality of this community.

Amy Zaharlick (personal communication) encountered this same interaction between the linguistically possible and the culturally real when gathering some basic information on Picuris pueblo's counting system. She did this at Leap's request, after warning him that previous attempts to elicit anything more than 'the words from one to ten' had always proved to be unsuccessful. But with cooperative native speakers available, she agreed to try again. And information on the counting system did emerge. Her report to Leap listed, in addition to the number words, terms for various geometrical shapes, translations for various fractional amounts (though the use of approximations as found at Isleta pueblo did show up in these expressions, as well), terms to explain the results of counting by groups (e.g., 'by two', 'by three', etc.), along with Picuris descriptions for simple addition, subtraction, and division processes. Terms for multiplication or terms to use for more complex purposes of division could not be elicited. The precision and detail given to the references which were elicited suggest quite convincingly that such terms do not exist in the functional lexicon of the speakers Zaharlick consulted.

Zaharlick followed her summary of these data with this statement:

> Ethnographic note - - Taboo against counting people, animals killed on the hunt, loaves of bread, cookies, and the like. Earlier, people were not even allowed to take a census of the village.

The two sentences left one question still unanswered (at least in part): What level of cultural reality has been captured in these data? It does no good, and it yields little purpose, to attempt to describe the mathematical system of Picuris simply by reference to linguistic data if non-linguistic constraints are going to pre-empt the use of the terms (and the concepts to which the terms refer) in so many different domains. Part of knowing Picuris Indian math, then, involves knowing when not to count. Computational 'silence', in such instances, does not reflect the inadequacy of the mathematical system or the incompetence of its users, but it does stress the importance of viewing non-Western mathematics in terms of the larger cultural whole in which such systems function, and it points to the dangers inherent in any attempts to isolate mathematical facts from behavioral domains under these circumstances.

This chapter began with a discussion of some of the issues inherent in 'traditional' Indian mathematics as an entry-point in to a larger question: What impact, if any, might knowledge of the mathematical system and computational style traditional to an Indian student's tribal culture have on the student's mastery of Western mathematics within the formal schooling context. Already it is clear that a broad range of competencies might be at stake in such a situation, since Indian mathematics (in the sense explored here) is influenced by any number of elements from the tribe's cultural and social inventory. That an understanding of computational style traditional to a tribe could, in fact, conflict with the development of mastery over Western mathematical thinking is suggested by the following data: Again, the example comes from Leap's earlier fieldwork in the Puebloan Southwest.

During the summer of 1974, in conjunction with a project supported by the Johnson-O'Malley program at an elementary school serving one of New Mexico's Pueblo Indian communities, a group of Indian parents began preparation of an Indian language mathematics workbook for use, as a resource booklet, in the school's basic skills program. Leap's role in the process was simple: to assist in the use of the newly introduced spelling system and otherwise to provide linguistic input, as required. Because the parent's wanted to make the mathematics learning as they could - - and since the intent of the effort was to strengthen Western mathematics skills, not to develop Indian math facility - - the preparation of the workbook centered on developing Indian language translations of the English language word problems from several of the school's math textbooks.

One of the problems so considered was this:

> Gasoline costs $0.42 a gallon. What would
> be the cost of 15.4 gallons of gasoline?

The problem gives the students practice in multiplication and in the proper treatment of decimal fractions during multiplication. The Indian language translation of the word-problem comes out like this:

Be gasoline xom'an wien-ti wisi centavos wib
galon, yo'a pur'u nawanhe ti p'ando galon ayti?

And, as the reader has noted, the 'Indian language translation' borrows heavily both from Spanish and from English lexicon for its expression: e.g., *gasoline, centavos, galon*. Additional facts about the translation and its 'meaning' can be gleaned when the Indian language problem is translated back into English, word by word and morpheme by morpheme.

Be	*gasoline*	*Ø-*	*-xom-*	*-Ø-*	*-'an*	*wien-*	*-ti*	*wisi*	*centavos*
It	gasoline	it-	costs	-present tense	if	four	ten	two	cents

wi-	*-b*	*galon*	*, yo'a*	*pur'u*	*Ø-*	*-nawan-*	*-he*	*ti*
one	for	gallon	, how	little bit	it	come to	would	ten

p'ando	*galon*	*ay-*	*-ti*	*?*
five	gallon	at	in future	?

First, note that the decimal fractions have been eliminated, even though their presence is so critical to the purpose of the English language version of the problem: the dollar-related value of the $0.42 has also disappeared. On the other hand, the Indian language statement does make explicit the 'if/then' relationship between the two English sentences. The Indian syntax combines both English expressions into a single sentence, with the 'if'-ness of the first sentence marked, as required, with the appropriate post-clausal position syntactic classifier, *-'an*. This, in turn, introduces another complication. The presence of a clausal-level classifier inthis position, for this language, makes the preceding clause syntactically dependent on the clause which follows it. Note that this is exactly the opposite of the dependency order which is applied to these two sentences in English. In the Indian language version, the second sentence is the 'main' clause whose action is required before the meaning of the preceding clause can be understood. In English, it is the initial clause which sets the stage for the reference of the following statement.

There are more contrasts to be dealt with here. The meaning of the preceding subordinate clause identifies a condition contrary to fact. Syntactically, this requires that the 'causal' verb in the main clause likewise be marked for non-definite reference. The morphemic gloss above translates the tense/aspect verb suffix as 'would'; that does not fully capture the speculative quality of this expression. Use of this suffix signals to the hearer that the speaker is dealing with a variety of 'unknowns', so many, in fact, that no specific point in space or time can be assigned to the action and no credibility should even be associated with the comment. This non-definiteness of the reference of this second, 'main' clause is further underscored by the addition of the *-ti* in post-position to the already non-definite *-ay* post-position accompanying the goal NP in this clause. *galon ay* would be the reference required, if the verb were *nawana* 'it does come to, right now', or *nawamban* 'it did come out'. *nawanhe*, on the other hand, requires less precise goal marking since the verb action governing its functioning in this reference is itself far from precise.

Consider now what the English language problem 'means' when translated into Indian language terms. A highly sensible, pragmatic act becomes rewritten as a topic of senseless speculation. This alone may explain why, even though students were initially enthusiastic about using these problems as a basis for enriching their mathematical skills, they soon showed disinterest in the problems and in the prospect of seeing them assembled into a formal workbook format. Note further, that even if a student tried to solve the problem as expressed in Indian language terms, the problem-solving skills the student would be mastering would transfer most unproductively into the Western problem-solving context. The reversal of the 'if/then' relationship would be only one of the points of mis-analysis that the Indian-based solution to the English language problem could generate.

The math avoidance project encountered several instances of such unproductive transfers of Indian mathematical perspective to English language problem-solving during several phases of our in-field inquiry. At both of our field sites (Northern Ute and Wisconsin Oneida), investigators asked elementary school-aged Indian students to work a series of number problems and word problems, and then to explain <u>how</u> they approached the solution of those problems. Frequently, these discussions gave way to more general probing of student understanding of 'basic mathematical concepts'. Since we knew that fractions were a particular problem for students at both sites, the investigators approached the discussion of fraction-related issues with consideration care.

The following interchange, transcribed literally from the tape recording of the discussion, illustrates the understanding of fractions and addition of fractions on the part of one elementary school student from Northern Ute:

Investigator: Can you draw half an apple for me?
Student: (Sounds of drawing)
Investigator: That is a beautiful half an apple. Okay, can you draw a whole apple?
Student: (Sounds of drawing)
Investigator: Okay, can you draw another whole apple?
Student: (Sounds of drawing)
Investigator: Okay, how many apples do you have on your page now?
Student: Two.
Investigator: And ...

Student:	Three. (Pause.) Third.
Investigator:	Two and a ...
Student:	Third. Two. Third and a half. Third. Third two ...
Investigator:	Right, you have two whole apples and one half apple. Right? Now, supposing I had, in my arms here, ten more that I was going to give you. How many would you have in all?
Student:	Thirteen.
Investigator:	Close. You would have ten here, this would make number eleven.
Student:	Twelve.
Investigator:	Twelve and ...
Student:	Ten half.
Investigator:	Twelve and a half, right?
Student:	I was just going to say that.

It should be noted that in the child's ancestral language (and this student was a first-language speaker of Northern Ute), 'halves' would be given the same status as 'wholes', where purposes of additive enumeration are concerned. That is, the question 'How many apples do you have on your page' is an additive, not a quantitative question, and it calls for an additive, not a quantitative response. And for good reason: In this language, items may be counted in isolation or in sets, depending on the reference context. This particular context calls for a counting by items in sets. This is the kind of response the student makes when the answers appear to 'alternate' between 'three' and 'third' in the dialogue with the interviewer. Such a persistent alternation between English 'unit' and English 'fraction' makes no sense within this context unless the corresponding perspective from the student's tribal mathematical system is introduced. Doing so makes it clear that the student is responding to the question in terms of logical principles different from the principles the question was designed to have employed. The school is going to need to take such differences into account if the students' mathematical problem-solving skills are to be effectively addressed by the mathematics curriculum of the school. Errors in Indian student mathematics problem-solving may be due to student use of 'alternative', Indian math-based problem solving strategies, and not to inaccurate mastery of Western mathematical skills at all.

It would do no good to conclude this chapter by trying to venerate the Indian students' use of Indian mathematics within these contexts. Appeals for cross-cultural sensitivity on the part of the local school system for greater reliance on bilingual and bicultural teaching techniques, for more appreciation of the Indian child as a true human being often give the impression that the researchers have nothing more on their minds than an argument that minority children have a right to be different and that schooling programs should not suppress that right. We agree with that position, but we also agrees with the principles of tribal sovereignty as affirmed by the treaties and trust agreements and as reiterated in Public Law 93-638, the Indian Self-Determination and Educational Assistance Act of 1975. We does not see how true self-determination can be obtained by any tribe unless its young people have mastered the skills which the American society-at-large deems 'essential' and 'basic' for all of its citizens. Basic competency in mathematics - - Western mathematics - - is one of those skills. Mastery over skills in these areas is probed in test after test, interview after interview, job after job, and career after career. And as the data introduced at the beginning of this chapter have shown, Indian students are not emerging from those encounters with the highest degree of success.

To be sure, implicit knowledge of the mathematical system (in even the counting vocabulary) which has characteristic of an Indian student's tribal background is not the _only_, and may not necessarily be even the _primary_, cause for the student's poor mathematics achievement. Other factors are at work here, including classroom context, teacher attitudes and home/tribal priorities. The discussion in the following chapters will highlight many of these factors and will explore how they contribute, individually and jointly, to the creation and maintenance of math avoidance conditions in Indian schooling. Hopefully the insights from these discussions will help place in proper context the influence traditional mathematics knowledge brings to Indian student math avoidance. Indian educators cannot be expected to make accurate measurement of Indian student classroom performance unless the knowledge base off of which that performance is being generated has _already_ been detailed.

Chapter Three : The Cross-Cultural Perspective

It was clear from the linguistic evidence (of the sort viewed in Chapter Two) that the counting and enumeration systems used by American Indian tribes differed quite widely from the system commonly used in modern-day American society, (just as, of course, the systems differed, one tribe to the next). Published information on the counting systems ancestral to the two tribes involved in the Math Avoidance study - Northern Ute and Wisconsin Oneida - proved to be quite limited. So, in order to get the project oriented toward the types of computation principles which *might* be evidenced during student in-school math-learning at these sites, it seemed best to begin project activities by paying attention to the various forms which counting systems actually do take when considered on a more generalized, multi-cultural basis.

The *cross-cultural* (or comparative) *method* long used by anthropologists when testing propositions about cultural variability and the data in the *Human Relations Area Files* (HRAF), amassed by George Peter Murdock and associates specifically for purposes of systematic, cross-cultural comparisons, offered an ideal means for exploring these interests. So time was scheduled during the first months of the project for a thorough review of the HRAF materials relevent to project computational interests; and then for a statistical analysis of the patterns of correlation and variability which those data contained.

The remainder of this chapter is a report on that investigation and its findings. The reader not familiar with cross-cultural studies may be made uneasy by some of the terminology used in the report. The stress on "needs" of a culture, and on the specifics of a mathematical system developed in response to a culture's "needs", may seem too mechanical or "functional" to be accepted at face value, for example. It is worth remembering that cross-cultural studies often use terms like "need" (as well as "simple culture", "aberrant type" , and "cultural complexity") to summarize what often is a whole range of associations between identified variables. As will become clear in the final pages of this chapter, it is the fact that these associations can be drawn, and not the terminology ultimately closer to express those findings, which ultimately came to be of interest to the purposes of this project.

CROSS-CULTURAL METHOD

The cross-cultural method has seen widespread use in political science, psychology, and anthropology. It owes its modern development to the pioneering work of George Peter Murdock, while the method was refined by modern practitioners such as Raoul Naroll and Melvin Ember, to name only two of the most important.

While most anthropological methods are comparative in some sense of the word, the cross-cultural method goes beyond the others in making comparisons on a world-wide sample of cultures in order to determine regularities in cultural behavior. Sometimes called the hologeistic method, it is defined by Naroll et al. as

> a method for the empirical testing of theories which attempt to explain some general characteristics of human existence. The method measures theoretical variables in a large, worldwide sample of human cultures and examines statistical correlations among those variables to determine whether the intervariable relationships are as predicted by the theory [1974: 121].

In addition, the method may be used to develop insights--hypotheses that can be tested against the data.

In preparing the proposal for this project, we found that anthropologists had virtually ignored the systematic study of non-Western mathematics knowledge and practice and, as a result, literature was virtually nonexistent. At the same time, we felt that it was absolutely necessary to understand, on a world-wide basis, the underlying parameters of variation in math practices in order to understand the traditional math systems among American Indian tribes.

It was therefore decided to conduct an insightful conducting such a study may be found in Naroll, Michik, and Naroll (1976), while brief but thorough and rigorous guidelines appear in Rohner et al. (1978). The latter was coauthored by a number of the leading practitioners of the method and offers advice on conducting both "quicker" and "safer" studies.

In the first place, according to the guidelines, variables must be adequately defined, with either conceptual or operational definitions, and they must be both transculturally equivalent and have worldwide applicability. Moreover, if testing hypotheses, the hypotheses should be explicitly stated.

With regard to the sample to be used, the units should be well defined with an adequate worldwide distribution. In addition, the sample should use techniques of probability sampling and sampling bias should be measured, including the effects of Galton's problem and regional variation.

The coding procedure should also be methodologically rigorous. Thus, the scales should explicitly state the kind of scale used and the definition of scale points, while the codes for each society in the sample should be published. With regard to the coding process itself, code sheets should be used, categories should be pretested, and there should be two coders, one of whom is naive with regard to the proposition being investigated. Both raters should be well trained, however, and discrepancies between the two coders should be carefully studied. If the coding is determined to be reliable, disprepancies may then be averaged.

The guidlelines for data analysis assume that hypotheses will be tested. Since the project was conducting an insightful study, the guidelines had to be modified to meet the situation. As stated in the guidelines it is recommended that hypotheses be evaluated by tests of significance and measures of association, using multivariate statistical techniques for large numbers of variables. There should also be tests of data bias and of group significance in the case of large numbers of correlations. Finally, deviant case analysis should be conducted.

In what follows, the methodology used by the project to conduct our cross-cultural study is described, and then an assessment is made of how well the project's efforts measure up to the guideline standards.

TRAITS STUDIED

The main impetus behind modern cross-cultural studies has been the development of the Human Relations Area Files at Yale. Founded by Murdock, the HRAF files were set up as a precomputer data storage and retrieval system. Each reference to a culture chosen for inclusion in the files is read by one or more coders, who enter a code number for each and every trait discussed in the text directly on the page. The standardized code numbers are taken from the Outline of Cultural Materials (Murdock et al. 1971), which lists 631 different index categories for cultural material, each cross-indexed to similar categories. Thus, all are transculturally equivalent and have world-wide applicability.

Unfortunately, a number of problems were raised with the cross-cultural method, especially during ...

years, which may lead the unwary critic, unfamiliar with more recent literature, astray. All have now been successfully solved.

The relevant one at this point is sometimes called the functionalist argument. Persons raising this question usually phrase it in terms of the specific culture in which they have done field work, holding that matrilineality, say, in "my culture" is quite different from that in any other due to the unique functional network of traits which does not exist anywhere else. While certainly true, the cross-cultural method is

> concerned with examining relationships between specific variables.
> . . . To put the issue simply, if our intent is to examine the relationship between volume and weight in "fruit", it does not matter one whit that we are dealing with "apples" and "pears" or even "watermelons" [Ember 1964:296].

Following this line of reasoning, use of the categories as defined by Murdock will assure that the data are comparable throughout the world-wide sample to be used. The categories chosen to be searched for this project were:

153. Modification of Behavior -- specific evidence concerning the mechanisms of conditioning and habit formation . . .; data on type of problem solution . . .; evidence as to specific mechanisms in verbal or symbolic learning; results of aptitude and intelligence tests; data bearing upon conscious mental processes . . .; etc.

801. Numerology -- symbolic and mystical significance of numbers; ritual; and pattern numbers . . .; lucky and unlucky numbers; etc.

803. Mathematics -- arithmetical calculations . . .; use of calculating machines; higher mathematical knowledge . . .; mathematical theory, statistics . . .; etc.

804. Weights and Measures -- methods of measurement . . .; customary and standardized units. . .; complex techniques of measurement . . .; governmental

supervision of weights and measures; etc.

805. Ordering of Time -- sense of time; conception of a minimal unit of time. . . .; divisions of the day and night . . .; divisions of the year. . .; longer time spans; solar, lunar, and stellar reckoning of time; methods of dating; calendar and calendrical knowledge; use of aids to measure the passage of time . . .; etc.

811. Logic -- prevailing canons and criteria of validity in thought and demonstration; prevalence of nonlogical methods of reasoning . . .; degree of acceptance of precise principles of definition, classification, and use of terms; notions of correct predication; formal principles of logic; development and use of symbolic or mathematical logic; etc.

A copy of each coded page is made by HRAF for each code number appearing on it, and all the resulting slips are filed numerically under the culture. To use the file, the researcher determines the code number of interest, goes to the file for the culture(s) desired (over 200 have been coded), and pulls the pages containing the data sought.

The result is a manual Key Word in Context index that has proven extremely valuable to researchers in many fields.

For this project, the HRAF paper files at the University of the District of Columbia were searched for the categories indicated, and Xerox copies of each page were made and filed for ready reference.

Afte reviewing the material gathered from the seven categories for the 60 cultures, ten traits were selected for coding. The ethnographic information was translated into numeric codes reflecting the cross-cultural variation of the trait. During this first procedure an ordinal scale was used, with the lowest rank always being zero and the higher ranks denoted by higher numbers. When ever there was not enough ethnographic information available for a society on a trait, the trait for that society was given the value 9.

Coding rules were written to distinguish differing values for each variable. The rules are in the form of short statements that enable any coder to produce similar translations of ethnographic information into numbers.

Significance Attached to Certain Numbers.

(0) No significance attached to numbers.

(1) Significance is attached to certain numbers. Significance includes: trends towards the use of certain numbers or their multiples, ritual or pattern numbers used, lucky or unlucky numbers present, or ritual interest in numbers

(9) Not enough information about the significance attached to numbers.

Concepts of Measurement = Standardized Units.

(0) Standardized units not used in measurement of length, capacity, distance, weight, or time.

(1) Standaridized units are used in measurement of length, capacity, distance, weight, or time.

(9) Not enough information about concepts of measurement.

Concepts of Measurement = Comparison.

(0) Comparisons are not used in measurement tasks. No use of proportional differences or relative measures (i.e., parts of the body).

(1) Comparisons are used in measurement tasks. Use of proportional differences or relative measures.

(9) Not enough information about concepts of measurement.

Digit Counting.

(0) Digits are not used to count or tally.

(1) Fingers are used to count or tally, but not toes.

(2) Both fingers and toes are used to count or tally.

(9) Not enough information about digit counting.

Finger and Gesture Counting.

(0) Fingers or gestures are not used in counting.

(1) Fingers or gestures are used in counting but without using a base system.

(2) Fingers or gestures are used in counting based on a quinary system. A quinary system is based on five. Commonly in quinary systems the finger gestures start with one hand and counting from six to nine commences with the second hand.

(3) Fingers or gestures are used in counting based on a equal system. An equal system works on the principle of two approximately equal terms, or a composition system using a subtractive principle. An equal system is in the manner of the Shambaa.

(4) Fingers or gestures are used in counting based on the Hima system. The Hima system uses some representations similar to the quinary and other representations similar to the equal system.

(5) Fingers or gestures are used in counting based on a five-ten system. A five-ten system is based on five with ten as a secondary base.

(6) Fingers or gestures are used in counting based on a

five-twenty system. A five-twenty system is based on five with twenty as the secondary base.

(9) Not enough information about finger and gesture counting.

Man Complete.

(0) The words for five, ten, twenty have no relation to parts of the body. No mention of number words refering to the body.

(1) No term for the number five.

(2) The term for the number five means hand. or the term for the number ten means "two hands", or the term for the number twenty refers to man" "man complete", or "two hands and two feet".

(9) Not enought information on the meanings for five, ten, twenty.

Higher Mathematics.

(0) No evidence of the use of higher mathematics. Division and multiplication not used, no concept of zero, numeral notation system not present.

(1) Evidence of the use of higher mathematics. Division and multiplication used. Concept of zero. Numeral notation system present.

(9) Not enought information about higher mathematics.

Mnemonic Devices.

(0) Mnemonic devices are not used.

(1) Mnemonic devices used. Most commonly used devices are markers such as grain, shells, rocks in piles, or

objects placed in bags or boxes.

(2) Mnemonic devices used. Most commonly used devices are knotted string or stick counters.

(3) Nmemonic devices used. Most commonly used devices are tally strings with markers or peg boards.

(4) Mnemonic devices used. Most commonly used devices are marks on sticks, walls or ground.

(5) Mnemonic devices used. Most commonly used devices are pictographs or ideographs (notation).

(9) Not enough information on mnemonic devices.

Stages of Number Systems.

(0) One-two differentiation. Numerals for "one" and "two" accompanied by no further number words. Use of a "dual" language form.

(1) One-two-many. "One," "two," and many" or a word form meaning "more than two." Or the use of "two-one" for three, "two-two", for four and so on.

(2) Limited use of tallying or comparison of sets of objects in a one-to-one correspondence.

(3) Widespread use of tallying.

(4) Set of number words used as adjectives.

(5) Ideographs used. Use of symbols for numbers with number words being either objective or descriptive .

(6) Mysticism in the use of numbers. Number words have strong objective meanings and are of interest.

(7) Written number systems.

(8) Operations with numerals.

(9) No information on number systems.

Numbers.

(0) No concept of numbers.

(1) Use of markers, pebbles, notches only.

(2) Sign language for numbers, use of fingers, other parts of the body.

(3) Use of both markers and sign language.

(4) Gestures and markers equal status with numbers.

(5) Spoken numeral, names for numbers prefered.

(6) Written signs for numbers present.

(9) Not enough information on numbers.

In addition to the indexed cross-cultural material, there are also a number of precoded data files which have been developed since the advent of the computer era. The largest of these is the Ethnographic Atlas which contains data on 96 traits for 1170 cultures around the world. It was also developed by Murdock, and a version exists which is set up as a fully labelled Statistical Package for the Social Sciences system save file.

One of the disadvantages of the precoded data is that one is restricted to categories chosen by the coder. While there are a wide variety of coded variables, it is obviously impossible to anticipate future research needs completely, and the coded data may not entirely meet the needs of a specific problem. One solution to this problem, adopted by this project, is to use the HRAF files for the data not coded in a computer file and supplement it with readily available variables from the computerized Ethnographic Atlas.

The following variables were then extracted from the SPSS version of the Ethnographic Atlas:

* Continent
* Gathering Wild Plants and Small Fauna
* Hunting
* Fishing
* Animal Husbandry
* Agriculture
* Community Organization
* Intensity of Agriculture
* Principal Crop
* Settlement Pattern
* Mean Community Size
* Local Hierarchy
* Types of Games
* Predominant Animal
* Subsistence Economy
* Sex Specialization-Weaving
* Age Specialization-Weaving
* Class Stratification-Main Type
* Political Integration
* Primary Environment

THE SAMPLE

The simplest sample to use for a cross-cultural study is the Probability Sample Files subset of the Human Relations Area Files. Not only are the data readily available as documented above, but the resultant sample is a "stratified random sample of a bibliographically defined universe" (Naroll 1967).

To draw the cultures making up the Probability Sample Files, Murdock stratified the HRAF cultures into the 60 culture areas of the world, and a culture was randomly drawn from each. The basic criteria was that all cultures in the list should have been described by at least two professional anthropologists. If there were no such cultures in the area, an alternative list of all cultures that had been described by one professional anthropologist was used. Lagace (1977) describes the 60 cultures and presents a wealth of other data, including coded data quality control variables.

This approach to sampling does not produce a sample that meets the requirements of equal probabilities, but it does produce a sample that adequately reproduces the cultural universe, and is suitable for use with statistical tests without unduly damaging the assumption of equal probability underlying the tests. For this project, descriptive statistics are used primarily, so that adequate representation of all cultural types is the sole important requirement.

CULTURES IN THE SAMPLE

The following brief descriptions of the 60 cultures in the sample is extracted from Naroll, Michik and Naroll (1976:5-7). Full summaries of each culture may be found in Lagace (1977).

The Amhara are an agricultural people from Ethiopia.

The Andamanese are a hunting-gathering people from the Andaman Islands in the Indian Ocean.

The Aranda are a hunting and gathering culture from the Central Desert of Australia.

The Ashanti are an agricultural people from Ghana.

The Aymara are an agricultural people from Bolivia and Peru.

The Azande are an agricultural people from western Sudan, Congo-Kinshasha, and the Central African Republic.

The Bahia Brazilians are an agricultural people from Brazil.

The Bemba are an agricultural people from Zambia.

The Blackfoot are a hunting culture from southern Alberta and northern Montana.

The Bororo are a horticultural people from Brazil.

The Bush Negroes are a horticultural people from Surinam, French Guiana, and Guyana.

The Cagaba are an agricultural people from Colombia.

The Chukchee are from Siberia.

The Copper Eskimo are hunters and fishers who live in Canada.

The Cuna are a horticultural and fishing people from Panama.

The Dogon are an agricultural people from Mali.

The Ganda are an agricultural people from Uganda.

The Garo are a horticultural people from Assam in India.

The Guarani are an agricultural people from Brazil, Paraguay, Uruguay, and Argentina.

The Hausa are an agricultural people from Nigeria and Niger.

The Highland Scots are a farming, sheepherding, and fishing culture from northwestern Scotland.

The Hopi are an agricultural people from Arizona.

The Iban are a horticultural people from Sarawak, East Malaysia.

The Ifugao are an agricultural people from Luzon in the Phillipines.

The Iroquois are an agricultural people from New York State and Ontario.

The Kanuri are an agricultural people from Nigeria.

The Kapauku are a horticultural people from West New Guinea.

The Khasi are a horticultural people from India.

The Klamath are a hunting and gathering culture from southern Oregon.

The Koreans are an agricultural people from North and South Korea.

The Kurds are an agricultural and pastoral people from Iran, Iraq, Syria, and the USSR.

The Lapps are a reindeer herding and fishing people from Scandinavia.

The Lau are a horticultural and fishing people from southern Fiji.

The Lozi are an agricultural people from Zambia.

The Masai are a pastoral people from Kenya and Tanzania.

The Mataco are a hunting, fishing and gathering culture from Argentina.

The Ojibwa economy is based upon hunting, fishing, gathering, or horticulture in the western Great Lakes region of the US and Canada.

The Ona are a hunting and collecting culture from Tierra del Fuego in South America.

The Pawnee are a horticultural people from Oklahoma, Kansas, and Nebraska.

The Mbuti Pygmies are a hunting and gathering culture from Congo-Kinshasha.

The Santal are an agricultural people from India.

The Senussi are an important religious sect of the Libyan Bedouin from Egypt and Libya.

The Serbs are an agricultural people from Yugoslavia.

The Shluh are an agricultural people from Morocco.

The Sinhalese are an agricultural people from Ceylon (Sri Lanka).

The Somali are a pastoral and agricultural people primarily from Somalia.

The Taiwan Hokkien are an agricultural people from Taiwan.

The Tarahumara are an agricultural people from Chihuahua, Mexico.

The Central Thai are an agricultural people from Thailand.

The Tikopia are a horticultural people from the British Solomon Islands.

The Tiv are an agricultural people from Central Nigeria.

The Tlingit are a fishing culture from Alaska.

The Toradja are an agricultural people from the Celebes.

The Trobrianders are a horticultural people from the Trobriand Islands.

The Trukese are a horticultural and fishing people from the Eastern Caroline Islands.

The Tucano are a horticultural people from Brazil and Colombia.

The Tzeltal are an agricultural people from Mexico.

The Wolof are an agricultural people from Senegal and Gambia.

The Yakut are a pastoral culture from Siberia.

The Yanoama are a horticultural people from Venezuela and Brazil.

GALTON'S PROBLEM

Galton's Problem was considered vexing at one time. It was initially raised at the turn of the century by Sir Francis Galton, who questioned a paper by Tylor using cross-tabulations of a world-wide sample. Galton simply wanted to know how many of the cases were independent, ie., not due to diffusion. This is essentially a statistical problem, since anthropologists know very well that most traits diffuse. But according to statistical theory, they may not diffuse within the sample tested or the test may not be valid. Naroll and others have developed a number of tests for Galton's Problem, but more recent work by Ember (1971, see also Straus and Orans 1978) indicates that Galton's Problem, in fact, tends to deflate correlations, while the small sample size in most cross-cultural studies means that the cultures will be widely separated and thus not likely to be subject to diffusion. Since the project was conducting an insightful study, it was decided that it was unnecessary to test for Galton's Problem.

With regard to the guidelines for analysis, since this study was insightful, the majority of analytic techniques used were descriptive rather than inferential in nature. These included table displays of data, cross-tabulations, factor analysis, Guttman scaling, and cluster analysis. All of these techniques are discussed in the analysis sections below.

Again, since we were conducting an insightful study, tests of data bias were not performed, nor were group tests of significance, which were obviated by the nearly universal findings of significance as well as the relatively small number of correlations used. Deviant case analyses, however, are presented where relevant.

In assessing the degree to which the project's cross-cultural study conformed to the guidelines, it should be evident that all elements of the "quicker" study appropriate to insightful research were present. Indeed, all but tests of Galton's problem and data bias quality control were present from the "safer" study usually employed to test hypotheses.

We conclude that the cross-cultural analysis presented below is methodologically sound and highly valid from the point of view of the usual criteria for judging cross-cultural studies. Moreover, the data analysis speaks for itself--there are virtually no exceptions to the

ANALYSIS

Following resolution of any discrepencies between coders by discussion, the data were keypunched on computer cards in a form suitable for analysis by SPSS. The first step in the analysis was to print all of the data, both for the total sample of cultures (Table 1) collected from the HRAF and also the data from the Ethnographic Atlas (Table 2).

As a second step, four of the variables which appeared to vary with some regularity in the data were dichotomized for further analysis. These were:

1. Significance attached to certain numbers or not.
2. Stages of Number Systems--count with numbers or only the concept of one-two-many.
3. Higher math or not.
4. Standard units or not.

The dichotomies were then used in a principal components factor analysis (Nie _et al_ 1975:468-514). Put as succinctly as possible, the factor analysis seeks to determine the minimum number of dimensions that are necessary to account for the variation in the data. Two results may be expected to accrue from such an analysis. In the first place, the researchers will know if the variables are related in a unilinear fashion, or whether several dimensions of variation in the data base must be taken into account. If the latter is true, the variables that behave in approximately the same way will be grouped together onto the same factor, thus reducing the complexity of the data, and aiding in its interpretation.

It was determined, following the criterion of retaining all factors with an eigenvalue greater than or equal to one, that two factors accounting for 92.3% of the variance were all that was required.

TABLE 1.

HRAF DATA

LEVEL	CULTURE	STANDARDIZATION USED	HIGHER MATH	STAGES OF NUMBER SYSTEMS	SIGNIFICANCE ATTACHED TO CERTAIN NUMBERS
NONE					
	AMHARA	STANDARD UNITS	NO INFORMATION	NO INFORMATION	SIGNIFICANCE
	AYMARA	NO INFORMATION	NO INFORMATION	NUMBERS	SIGNIFICANCE
	AZANDE	NO INFORMATION	NO INFORMATION	NUMBERS	NO INFORMATION
	BAHIA	STANDARD UNITS	NO INFORMATION	NO INFORMATION	NO INFORMATION
	BEMBA	STANDARD UNITS	NO INFORMATION	NO INFORMATION	NO INFORMATION
	BLACKFOT	STANDARD UNITS	NO INFORMATION	NO INFORMATION	SIGNIFICANCE
	BORORO	NO INFORMATION	NO INFORMATION	ONE-TWO-MANY	NO INFORMATION
	BUSH NEG	NO INFORMATION	NO INFORMATION	NO INFORMATION	SIGNIFICANCE
	CAGABA	NO INFORMATION	NONE	NUMBERS	SIGNIFICANCE
	CHUKCHEE	NO INFORMATION	NO INFORMATION	NUMBERS	NONE
	CUNA	NO INFORMATION	HIGHER MATH	NUMBERS	SIGNIFICANCE
	GANDA	STANDARD UNITS	NO INFORMATION	NUMBERS	SIGNIFICANCE
	GUARANI	NO INFORMATION	NO INFORMATION	NO INFORMATION	NO INFORMATION
	HAUSA	STANDARD UNITS	NO INFORMATION	NUMBERS	NO INFORMATION
	HIGH SCH	STANDARD UNITS	NO INFORMATION	NO INFORMATION	SIGNIFICANCE
	HOPI	NO INFORMATION	NONE	NUMBERS	SIGNIFICANCE
	IBAN	STANDARD UNITS	NO INFORMATION	NUMBERS	SIGNIFICANCE
	IFUGAO	NO INFORMATION	NONE	NUMBERS	NO INFORMATION
	IROQUOIS	NO INFORMATION	NONE	NUMBERS	SIGNIFICANCE
	KANURI	STANDARD UNITS	NO INFORMATION	NO INFORMATION	NO INFORMATION
	KHASI	STANDARD UNITS	NO INFORMATION	NO INFORMATION	SIGNIFICANCE
	KURD	NOT USED	NO INFORMATION	NO INFORMATION	NO INFORMATION
	LAU	STANDARD UNITS	NO INFORMATION	NO INFORMATION	NO INFORMATION
	LOZI	NO INFORMATION	NO INFORMATION	NO INFORMATION	NO INFORMATION
	MATACO	NO INFORMATION	NO INFORMATION	NO INFORMATION	NO INFORMATION
	PYGMIES	NO INFORMATION	NO INFORMATION	NO INFORMATION	NO INFORMATION
	SENUSSI	NO INFORMATION	NO INFORMATION	NO INFORMATION	NO INFORMATION
	SERBS	STANDARD UNITS	NO INFORMATION	NO INFORMATION	SIGNIFICANCE
	SULUH	NO INFORMATION	NO INFORMATION	NO INFORMATION	SIGNIFICANCE
	TAIWAN H	NO INFORMATION	NO INFORMATION	NO INFORMATION	NO INFORMATION
	TIKOPIA	NO INFORMATION	NO INFORMATION	NO INFORMATION	NO INFORMATION
	TIV	NO INFORMATION	HIGHER MATH	NUMBERS	NO INFORMATION
	TROBRIAN	NO INFORMATION	NO INFORMATION	NO INFORMATION	NO INFORMATION
	TRUK	NO INFORMATION	NO INFORMATION	NO INFORMATION	NO INFORMATION
CASES		13	6	13	15

HAP PROJECT

TABLE 1.

HRAF DATA

LEVEL	CULTURE	STANDARDIZATION USED	HIGHER MATH	STAGES OF NUMBER SYSTEMS	SIGNIFICANCE ATTACHED TO CERTAIN NUMBERS
MATH 1					
	ANDAMANS	NOT USED	NO INFORMATION	ONE-TWO-MANY	NONE
	ARANDA	NO INFORMATION	NONE	ONE-TWO-MANY	NONE
	COPPER E	NO INFORMATION	NO INFORMATION	ONE-TWO-MANY	NONE
	ONA	NOT USED	NONE	ONE-TWO-MANY	NONE
	YANOMA	NOT USED	NONE	ONE-TWO-MANY	NONE
CASES		3	3	5	5
MATH 2					
	KLAMATH	NOT USED	NONE	NUMBERS	SIGNIFICANCE
	PAWNEE	NOT USED	NONE	NUMBERS	SIGNIFICANCE
	TORADJA	NOT USED	NONE	NUMBERS	SIGNIFICANCE
	TUCANO	NOT USED	NONE	NUMBERS	NO INFORMATION
	TZELTAL	NOT USED	NONE	NUMBERS	SIGNIFICANCE
CASES		[illegible]	[illegible]	[illegible]	[illegible]
MATH 3					
	ASHANTI	NOT USED	HIGHER MATH	NUMBERS	SIGNIFICANCE
	GARO	NOT USED	HIGHER MATH	NUMBERS	NO INFORMATION
	LAPPS	STANDARD UNITS	NONE	NUMBERS	NO INFORMATION
	OJIBWA	STANDARD UNITS	NONE	NUMBERS	NO INFORMATION
	SANTAL	STANDARD UNITS	NONE	NO INFORMATION	SIGNIFICANCE
	SOMALI	STANDARD UNITS	NONE	NO INFORMATION	SIGNIFICANCE
	TARAHUMA	STANDARD UNITS	NONE	NUMBERS	SIGNIFICANCE
	YAKUT	NOT USED	HIGHER MATH	NUMBERS	NO INFORMATION
CASES		8	8	6	4

MAP PROJECT

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TABLE 1.

LEVEL	CULTURE	STANDARDIZATION USED	HIGHER MATH	STAGES OF NUMBER SYSTEMS	SIGNIFICANCE ATTACHED TO CERTAIN NUMBERS
MATH 4					
	DOGON	STANDARD UNITS	HIGHER MATH	NUMBERS	SIGNIFICANCE
	KAPAUKU	STANDARD UNITS	HIGHER MATH	NUMBERS	SIGNIFICANCE
	KOREANS	STANDARD UNITS	HIGHER MATH	NUMBERS	SIGNIFICANCE
	MASAI	STANDARD UNITS	HIGHER MATH	NUMBERS	NO INFORMATION
	SINHALES	STANDARD UNITS	HIGHER MATH	NO INFORMATION	SIGNIFICANCE
	THAI	STANDARD UNITS	HIGHER MATH	NO INFORMATION	SIGNIFICANCE
	TLINGIT	STANDARD UNITS	HIGHER MATH	NUMBERS	SIGNIFICANCE
	WOLOF	STANDARD UNITS	HIGHER MATH	NUMBERS	SIGNIFICANCE
CASES		8	8	6	7

MAP PROJECT

TABLE 2.

ETHNOGRAPHIC ATLAS

LEVEL	CULTURE	CONTINENT	GATHERING WILD PLANTS SMALL FAUNA	HUNTING	FISHING	ANIMAL HUSBANDRY	AGRICU
0							
	AZANDE	AFRICA	6-15%	16-25%	6-15%	0-5%	56-65%
	BEMBA	AFRICA	6-15%	6-15%	6-15%	0-5%	66-75%
	GANDA	AFRICA	0-5%	6-15%	6-15%	6-15%	66-75%
	LOZI	AFRICA	6-15%	16-25%	6-15%	16-25%	36-45%
	MASAI	AFRICA	0-5%	6-15%	0-5%	86-100%	0-5%
	PYGMIES	AFRICA	56-65%	26-35%	6-15%	0-5%	0-5%
	TIV	AFRICA	6-15%	16-25%	6-15%	6-15%	46-55%
	AMHARA	CIRCUM-MEDITERRANEAN	0-5%	0-5%	6-15%	26-35%	56-65%
	BAHIA	CIRCUM-MEDITERRANEAN	0-5%	6-15%	6-15%	16-25%	56-65%
	HAUSA	CIRCUM-MEDITERRANEAN	6-15%	0-5%	0-5%	26-35%	56-65%
	KANURI	CIRCUM-MEDITERRANEAN	6-15%	0-5%	6-15%	16-25%	56-65%
	KURD	CIRCUM-MEDITERRANEAN	0-5%	0-5%	6-15%	36-45%	46-55%
	LAPPS	CIRCUM-MEDITERRANEAN	0-5%	16-25%	16-25%	56-65%	0-5%
	SENUSSI	CIRCUM-MEDITERRANEAN	0-5%	0-5%	0-5%	56-65%	36-45%
	SERBS	CIRCUM-MEDITERRANEAN	0-5%	0-5%	0-5%	36-45%	56-65%
	SHLUH	CIRCUM-MEDITERRANEAN	6-15%	0-5%	0-5%	26-35%	56-65%
	SOMALI	CIRCUM-MEDITERRANEAN	0-5%	0-5%	0-5%	86-100%	6-15%
	ANDAMANS	EAST EURASIA	36-45%	16-25%	36-45%	0-5%	0-5%
	CHUKCHEE	EAST EURASIA	0-5%	16-25%	26-35%	46-55%	0-5%
	GARO	EAST EURASIA	0-5%	0-5%	6-15%	6-15%	76-85%
	KHASI	EAST EURASIA	6-15%	6-15%	6-15%	16-25%	46-55%
	SANTAL	EAST EURASIA	0-5%	6-15%	6-15%	6-15%	66-75%
	SINHALES	EAST EURASIA	0-5%	0-5%	6-15%	26-35%	56-65%
	THAI	EAST EURASIA	0-5%	0-5%	16-25%	6-15%	66-75%
	YAKUT	EAST EURASIA	6-15%	16-25%	16-25%	36-45%	6-15%
	ARANDA	INSULAR PACIFIC	56-65%	36-45%	0-5%	0-5%	0-5%
	IBAN	INSULAR PACIFIC	0-5%	0-5%	16-25%	16-25%	56-65%
	IFUGAO	INSULAR PACIFIC	0-5%	16-25%	6-15%	6-15%	56-65%
	LAU	INSULAR PACIFIC	0-5%	0-5%	36-45%	6-15%	46-55%
	TAIWAN H	INSULAR PACIFIC	0-5%	16-25%	6-15%	6-15%	56-65%
	TIKOPIA	INSULAR PACIFIC	0-5%	0-5%	46-55%	0-5%	46-55%
	TROBRIAN	INSULAR PACIFIC	6-15%	0-5%	26-35%	6-15%	46-55%
	TRUK	INSULAR PACIFIC	0-5%	0-5%	46-55%	0-5%	46-55%
	BLACKFOT	NORTH AMERICA	16-25%	76-85%	0-5%	0-5%	0-5%
	COPPER E	NORTH AMERICA	0-5%	36-45%	56-65%	0-5%	0-5%
	HOPI	NORTH AMERICA	6-15%	6-15%	0-5%	6-15%	66-75%
	IROQUOIS	NORTH AMERICA	6-15%	26-35%	16-25%	0-5%	36-45%
	OJIBWA	NORTH AMERICA	6-15%	36-45%	46-55%	0-5%	0-5%
	AYMARA	SOUTH AMERICA	0-5%	0-5%	6-15%	26-35%	56-65%
	BORORO	SOUTH AMERICA	36-45%	46-55%	6-15%	0-5%	0-5%

MAP PROJECT

ETHNOGRAPHIC ATLAS

EVEL	CULTURE	CONTINENT		GATHERING WILD PLANTS SMALL FAUNA	HUNTING	FISHING	ANIMAL HUSBANDRY	AGRICULTURE
	BUSH NEG	SOUTH AMERICA		6-15%	16-25%	16-25%	0-5%	46-55%
	CAGABA	SOUTH AMERICA		0-5%	0-5%	0-5%	16-25%	76-85%
	CUNA	SOUTH AMERICA		0-5%	6-15%	26-35%	0-5%	56-65%
	GUARANI	SOUTH AMERICA		16-25%	16-25%	6-15%	0-5%	46-55%
	MATACO	SOUTH AMERICA		16-25%	16-25%	36-45%	6-15%	6-15%
	TUCANO	SOUTH AMERICA		6-15%	6-15%	26-35%	0-5%	46-55%
	HIGH SCH		9	INSUFFICIENT	INSUFFICIENT	INSUFFICIENT	INSUFFICIENT	INSUFFICIENT
ASES			47	46	46	46	46	46

HAP PROJECT

LEVEL	CULTURE	CONTINENT	GATHERING WILD PLANTS SMALL FAUNA	HUNTING	FISHING	ANIMAL HUSBANDRY	AGRICULTURE
1							
	YANOMA	SOUTH AMERICA	26-35%	36-45%	6-15%	0-5%	16-25%

ASES

ETHNOGRAPHIC ATLAS

LEVEL	CULTURE	CONTINENT	GATHERING WILD PLANTS SMALL FAUNA	HUNTING	FISHING	ANIMAL HUSBANDRY	AGRICULTURE
2							
	PAWNEE	NORTH AMERICA	6-15%	36-45%	0-5%	0-5%	46-55%
	ONA	SOUTH AMERICA	6-15%	56-65%	26-35%	0-5%	0-5%
CASES		2	2	2	2	2	2

MAP PROJECT

ETHNOGRAPHIC ATLAS

LEVEL	CULTURE	CONTINENT	GATHERING WILD PLANTS SMALL FAUNA	HUNTING	FISHING	ANIMAL HUSBANDRY	AGRICULTURE
3							
	TORADJA	INSULAR PACIFIC	0-5%	16-25%	0-5%	16-25%	56-65%
	KLAMATH	NORTH AMERICA	26-35%	16-25%	46-55%	0-5%	0-5%
	TZELTAL	SOUTH AMERICA	0-5%	0-5%	6-15%	16-25%	66-75%
CASES			3	3	3	3	3

ETHNOGRAPHIC ATLAS

LEVEL	CULTURE	CONTINENT	GATHERING WILD PLANTS SMALL FAUNA	HUNTING	FISHING	ANIMAL HUSBANDRY	AGRICULTURE	
4								
	ASHANTI	AFRICA	0-5%	6-15%	16-25%	0-5%	66-75%	
	TARAHUMA	NORTH AMERICA	6-15%	6-15%	0-5%	26-35%	46-55%	
CASES			2	2	2	2	2	2

ETHNOGRAPHIC ATLAS

LEVEL	CULTURE	CONTINENT	GATHERING WILD PLANTS SMALL FAUNA	HUNTING	FISHING	ANIMAL HUSBANDRY	AGRICULTURE
5							
	DOGON	AFRICA	16-25%	0-5%	0-5%	16-25%	56-65%
	WOLOF	CIRCUM-MEDITERRANEAN	0-5%	0-5%	6-15%	26-35%	56-65%
	KOREANS	EAST EURASIA	0-5%	0-5%	16-25%	16-25%	56-65%
	KAPAUKU	INSULAR PACIFIC	0-5%	6-15%	6-15%	16-25%	56-65%
	TLINGIT	NORTH AMERICA	6-15%	26-35%	56-65%	0-5%	0-5%
CASES			5	5	5	5	5

Cases: 5

MAP PROJECT

ETHNOGRAPHIC ATLAS

LEVEL	CULTURE	COMMUNITY ORGANIZATION	INTENSITY OF AGRICULTURE	PRINCIPAL CROP	SETTLEMENT PATTERN	MEAN COMMUNITY SIZE
	CAGADA	AGAMOUS	EXTENSIVE OR SHIFTS	ROOTS OR TUBERS	SEMISEDENTARY	INSUFFICIENT INFOR
	CUNA	DEMES	EXTENSIVE OR SHIFTS	CEREAL GRAINS	PERMANENT COMPACT	50-99
	GUARANI	AGAMOUS	EXTENSIVE OR SHIFTS	ROOTS OR TUBERS	PERMANENT COMPACT	INSUFFICIENT INFOR
	MATACO	EXOGAMOUS	CASUAL	VEGETABLES	SEMINOMADIC	50-99
	TUCANO	CLAN-COMMUNITY	EXTENSIVE OR SHIFTS	ROOTS OR TUBERS	IMPERMANENT COMPA	LESS THAN 50
	HIGH SCH	INSUFFICIENT INFO	INSUFFICIENT INFOR	NONE DON'T KNOW	INSUFFICIENT INFO	INSUFFICIENT INFOR
CASES		45	46	36	46	37

MAP PROJECT

LEVEL	CULTURE	COMMUNITY ORGANIZATION	INTENSITY OF AGRICULTURE	PRINCIPAL CROP	SETTLEMENT PATTERN	MEAN COMMUNITY SIZE
	AZANDE	AGAMOUS	EXTENSIVE OR SHIFTS	CEREAL GRAINS	NEIGHBORHOODS	100-199
	BEMBA	AGAMOUS	EXTENSIVE OR SHIFTS	CEREAL GRAINS	IMPERMANENT COMPA	100-199
	GANDA	EXOGAMOUS	INTENSIVE	[illegible]	PERMANENT COMPACT	TOWN OF 5000-50000
	LOZI	AGAMOUS	INTENSIVE	CEREAL GRAINS	SEMISEDENTARY	50-99
	MASAI	AGAMOUS	ABSENT	NONE DON,T KNOW	FULLY MIGRATORY	50-99
	PYGMIES	AGAMOUS	ABSENT	NONE DON,T KNOW	FULLY MIGRATORY	LESS THAN 50
	TIV	CLAN-COMMUNITY	EXTENSIVE OR SHIFTS	ROOTS OR TUBERS	NEIGHBORHOODS	200-399
	AMHARA	EXOGAMOUS	INTENSIVE	CEREAL GRAINS	SEPARATE HAMLETS	CITY OF>50000
	BAHIA	AGAMOUS	INTENSIVE	CEREAL GRAINS	PERMANENT COMPACT	CITY OF>50000
	HAUSA	SEGMENTED NO EXOGA	INTENSIVE, IRRIGATIO	CEREAL GRAINS	PERMANENT COMPACT	CITY OF>50000
	KANURI	AGAMOUS	INTENSIVE	CEREAL GRAINS	PERMANENT COMPACT	TOWN OF 5000-50000
	KURD	DEMES	INTENSIVE, IRRIGATIO	CEREAL GRAINS	SEMISEDENTARY	INSUFFICIENT INFOR
	LAPPS	EXOGAMOUS	ABSENT	NONE DON,T KNOW	FULLY MIGRATORY	LESS THAN 50
	SENUSSI	INSUFFICIENT INFO	INTENSIVE	CEREAL GRAINS	SEMINOMADIC	INSUFFICIENT INFOR
	SERBS	SEGMENTED NO EXOGA	INTENSIVE	CEREAL GRAINS	COMPLEX	CITY OF>50000
	SHLUH	SEGMENTED NO EXOGA	INTENSIVE, IRRIGATIO	CEREAL GRAINS	SEPARATE HAMLETS	INSUFFICIENT INFOR
	SOMALI	CLAN-COMMUNITY	INTENSIVE	CEREAL GRAINS	FULLY MIGRATORY	LESS THAN 50
	ANDAMANS	AGAMOUS	ABSENT	NONE DON,T KNOW	SEMINOMADIC	LESS THAN 50
	CHUKCHEE	AGAMOUS	ABSENT	[illegible]	FULLY MIGRATORY	LESS THAN 50
	GARO	AGAMOUS	EXTENSIVE OR SHIFTS	CEREAL GRAINS	PERMANENT COMPACT	100-199
	KHASI	SEGMENTED NO EXOGA	EXTENSIVE OR SHIFTS	CEREAL GRAINS	PERMANENT COMPACT	50-99
	SANTAL	EXOGAMOUS	INTENSIVE, IRRIGATIO	CEREAL GRAINS	PERMANENT COMPACT	INSUFFICIENT INFOR
	SINHALES	AGAMOUS	[illegible]	[illegible]	PERMANENT COMPACT	CITY OF>50000
	THAI	AGAMOUS	INTENSIVE, IRRIGATIO	CEREAL GRAINS	PERMANENT COMPACT	CITY OF>50000
	YAKUT	CLAN-COMMUNITY	CASUAL	CEREAL GRAINS	SEMINOMADIC	50-99
	ARANDA	CLAN-COMMUNITY	ABSENT	NONE DON,T KNOW	FULLY MIGRATORY	LESS THAN 50
	IBAN	AGAMOUS	[illegible]	[illegible]	PERMANENT COMPACT	INSUFFICIENT INFOR
	IFUGAO	AGAMOUS	INTENSIVE, IRRIGATIO	CEREAL GRAINS	SEPARATE HAMLETS	100-199
	LAU	CLAN-COMMUNITY	HORTICULTURE	ROOTS OR TUBERS	PERMANENT COMPACT	50-99
	TAIWAN H	AGAMOUS	EXTENSIVE OR SHIFTS	CEREAL GRAINS	PERMANENT COMPACT	100-199
	TIKOPIA	AGAMOUS	[illegible]	[illegible]	SEPARATE HAMLETS	400-1000
	TROBRIAN	SEGMENTED NO EXOGA	HORTICULTURE	ROOTS OR TUBERS	PERMANENT COMPACT	100-199
	TRUK	SEGMENTED NO EXOGA	HORTICULTURE	TREE FRUITS	SEPARATE HAMLETS	100-199
	BLACKFOT	EXOGAMOUS	ABSENT	NONE DON,T KNOW	FULLY MIGRATORY	200-399
	COPPER E	DEMES	ABSENT	[illegible]	SEMINOMADIC	LESS THAN 50
	HOPI	AGAMOUS	INTENSIVE, IRRIGATIO	CEREAL GRAINS	PERMANENT COMPACT	200-399
	IROQUOIS	SEGMENTED NO EXOGA	EXTENSIVE OR SHIFTS	CEREAL GRAINS	PERMANENT COMPACT	200-399
	OJIBWA	CLAN-COMMUNITY	ABSENT	NONE DON,T KNOW	SEMINOMADIC	LESS THAN 50
	AYMARA	DEMES	[illegible]	[illegible]	PERMANENT COMPACT	400-1000
	BORORO	SEGMENTED NO EXOGA	ABSENT	NONE DON,T KNOW	SEMINOMADIC	INSUFFICIENT INFOR
	BUSH NEG	SEGMENTED NO EXOGA	EXTENSIVE OR SHIFTS	ROOTS OR TUBERS	PERMANENT COMPACT	INSUFFICIENT INFOR

ETHNOGRAPHIC ATLAS

LEVEL	CULTURE	COMMUNITY ORGANIZATION	INTENSITY OF AGRICULTURE	PRINCIPAL CROP	SETTLEMENT PATTERN	MEAN COMMUNITY SIZE
1						
	YANOMA	SEGMENTED NO EXOGA	CASUAL	ROOTS OR TUBERS	SEMINOMADIC	LESS THAN 50
CASES		1	1	1	1	

85 86

ETHNOGRAPHIC ATLAS

LEVEL	CULTURE	COMMUNITY ORGANIZATION	INTENSITY OF AGRICULTURE	PRINCIPAL CROP	SETTLEMENT PATTERN	MEAN COMMUNITY SIZE
2						
	PAWNEE	DEMES	EXTENSIVE OR SHIFTS	CEREAL GRAINS	SEMISEDENTARY	200-399
	ONA	EXOGAMOUS	ABSENT	NONE DON,T KNOW	FULLY MIGRATORY	50-99
CASES		2	2	1	2	2

ETHNOGRAPHIC ATLAS

LEVEL	CULTURE	COMMUNITY ORGANIZATION	INTENSITY OF AGRICULTURE	PRINCIPAL CROP	SETTLEMENT PATTERN	MEAN COMMUNITY SIZE
3						
	TORADJA	AGAMOUS	EXTENSIVE OR SHIFTS	CEREAL GRAINS	PERMANENT COMPACT	INSUFFICIENT INFOR
	KLAMATH	AGAMOUS	ABSENT	NONE DON,T KNOW	SEMINOMADIC	LESS THAN 50
	TZELTAL	AGAMOUS	INSUFFICIENT INFOR	NONE DON,T KNOW	INSUFFICIENT INFO	INSUFFICIENT INFOR
CASES		3	2	1	2	1

MAP PROJECT

ETHNOGRAPHIC ATLAS

LEVEL	CULTURE	COMMUNITY ORGANIZATION	INTENSITY OF AGRICULTURE	PRINCIPAL CROP	SETTLEMENT PATTERN	MEAN COMMUNITY SIZE
4						
	ASHANTI	AGAMOUS	EXTENSIVE OR SHIFTS	ROOTS OR TUBERS	PERMANENT COMPACT	TOWN OF 5000-50000
	TARAHUMA	DEMES	INTENSIVE	CEREAL GRAINS	NEIGHBORHOODS	INSUFFICIENT INFO
CASES		2	2	2	2	1

ETHNOGRAPHIC ATLAS

EVEL	CULTURE	COMMUNITY ORGANIZATION	INTENSITY OF AGRICULTURE	PRINCIPAL CROP	SETTLEMENT PATTERN	MEAN COMMUNITY SIZE
5						
	DOGON	SEGMENTED, EXOGAMY	INTENSIVE	CEREAL GRAINS	PERMANENT COMPACT	100-199
	WOLOF	CLAN-COMMUNITY	EXTENSIVE OR SHIFTS	CEREAL GRAINS	PERMANENT COMPACT	CITY OF>50000
	KOREANS	EXOGAMOUS	INTENSIVE, IRRIGATIO	CEREAL GRAINS	PERMANENT COMPACT	CITY OF>50000
	KAPAUKU	CLAN-COMMUNITY	EXTENSIVE OR SHIFTS	ROOTS OR TUBERS	PERMANENT COMPACT	50-99
	TLINGIT	CLAN-COMMUNITY	ABSENT	NONE NON, KNOW	SEMISEDENTARY	200-399
ASES			5		[illegible]	5

LEVEL	CULTURE	TYPES OF GAMES	PREDOMINANT ANIMAL	SUBSISTENCE ECONOMY	SEX SPECIALIZATION WEAVING
0					
	AMHARA	SKILL AND STRATEGY	BOVINE ANIMALS	INTENSIVE AGRICULT	MALES ALONE
	ANDAMANS	PHYSICAL SKILL	ABSENT OR NEARLY SO	FISHING	ACTIVITY ABSENT
	ARANDA	PHYSICAL SKILL	ABSENT OR NEARLY SO	GATHERING	ACTIVITY ABSENT
	AYMARA	SKILL AND CHANCE	BOVINE ANIMALS	EXTENSIVE AGRICULT	EQUAL-DIFFER
	AZANDE	ALL THREE TYPES	ABSENT OR NEARLY SO	EXTENSIVE AGRICULT	MALES ALONE
	BAHIA	INSUFFICIENT INFO	PIGS	INTENSIVE AGRICULT	IRRELEVANT
	BEMBA	INSUFFICIENT INFO	SHEEP AND-OR GOATS	EXTENSIVE AGRICULT	ACTIVITY ABSENT
	BLACKFOT	SKILL AND CHANCE	EQUINE ANIMALS	HUNTING	ACTIVITY ABSENT
	BORORO	PHYSICAL SKILL	ABSENT OR NEARLY SO	HUNTING	ACTIVITY ABSENT
	BUSH NEG	INSUFFICIENT INFO	ABSENT OR NEARLY SO	INCIPIENT AGRICULT	INSUFFICIENT DATA
	CAGABA	NO GAMES	PIGS	EXTENSIVE AGRICULT	MALES ALONE
	CHUKCHEE	SKILL AND CHANCE	DEER	FISHING	ACTIVITY ABSENT
	COPPER E	SKILL AND CHANCE	ABSENT OR NEARLY SO	FISHING	ACTIVITY ABSENT
	CUNA	NO GAMES	PIGS	EXTENSIVE AGRICULT	FEMALES ALONE
	GANDA	SKILL AND STRATEGY	BOVINE ANIMALS	INTENSIVE AGRICULT	ACTIVITY ABSENT
	GARO	NO GAMES	BOVINE ANIMALS	EXTENSIVE AGRICULT	FEMALES ALONE
	GUARANI	INSUFFICIENT INFO	ABSENT OR NEARLY SO	INCIPIENT AGRICULT	FEMALES ALONE
	HAUSA	INSUFFICIENT INFO	BOVINE ANIMALS	INTENSIVE AGRICULT	EQUAL-DIFFER
	HIGH SCH	INSUFFICIENT INFO	INSUFFICIENT INFO	0	INSUFFICIENT DATA
	HOPI	INSUFFICIENT INFO	SHEEP AND-OR GOATS	INTENSIVE AGRICULT	MALES ALONE
	IBAN	PHYSICAL SKILL	PIGS	EXTENSIVE AGRICULT	FEMALES ALONE
	IFUGAO	INSUFFICIENT INFO	PIGS	INTENSIVE AGRICULT	FEMALES ALONE
	IROQUOIS	SKILL AND CHANCE	ABSENT OR NEARLY SO	INCIPIENT AGRICULT	ACTIVITY ABSENT
	KANURI	INSUFFICIENT INFO	BOVINE ANIMALS	INTENSIVE AGRICULT	UNSPECIFIED
	KHASI	PHYSICAL SKILL	BOVINE ANIMALS	EXTENSIVE AGRICULT	FEMALES ALONE
	KURD	INSUFFICIENT INFO	BOVINE ANIMALS	INTENSIVE AGRICULT	MALES MORE
	LAPPS	PHYSICAL SKILL	DEER	PASTORAL	FEMALES ALONE
	LAU	PHYSICAL SKILL	PIGS	EXTENSIVE AGRICULT	ACTIVITY ABSENT
	LOZI	INSUFFICIENT INFO	BOVINE ANIMALS	INTENSIVE AGRICULT	ACTIVITY ABSENT
	MASAI	SKILL AND STRATEGY	BOVINE ANIMALS	PASTORAL	ACTIVITY ABSENT
	MATACO	SKILL AND CHANCE	SHEEP AND-OR GOATS	FISHING	FEMALES ALONE
	OJIBWA	INSUFFICIENT INFO	ABSENT OR NEARLY SO	FISHING	ACTIVITY ABSENT
	PYGMIES	INSUFFICIENT INFO	ABSENT OR NEARLY SO	GATHERING	ACTIVITY ABSENT
	SANTAL	INSUFFICIENT INFO	BOVINE ANIMALS	INTENSIVE AGRICULT	MALES ALONE
	SENUSSI	INSUFFICIENT INFO	CAMELS, ALPACAS, ETC	PASTORAL	INSUFFICIENT DATA
	SERBS	ALL THREE TYPES	BOVINE ANIMALS	INTENSIVE AGRICULT	FEMALES ALONE
	SHLUH	INSUFFICIENT INFO	BOVINE ANIMALS	INTENSIVE AGRICULT	INSUFFICIENT DATA
	SINHALES	INSUFFICIENT INFO	BOVINE ANIMALS	INTENSIVE AGRICULT	INSUFFICIENT DATA
	SOMALI	STRATEGY	CAMELS, ALPACAS, ETC	PASTORAL	MALES ALONE
	TAIWAN H	PHYSICAL SKILL	PIGS	EXTENSIVE AGRICULT	FEMALES ALONE

MAP PROJECT

ETHNOGRAPHIC ATLAS

CULTURE	TYPES OF GAMES	PREDOMINANT ANIMAL	SUBSISTENCE ECONOMY	SEX SPECIALIZATION WEAVING
THAI	ALL THREE TYPES	BOVINE ANIMALS	INTENSIVE AGRICULT	FEMALES MORE
TIKOPIA	PHYSICAL SKILL	ABSENT OR NEARLY SO	INCIPIENT AGRICULT	ACTIVITY ABSENT
TIV	SKILL AND STRATEGY	SHEEP AND-OR GOATS	EXTENSIVE AGRICULT	MALES ALONE
TROBRIAN	PHYSICAL SKILL	PIGS	EXTENSIVE AGRICULT	ACTIVITY ABSENT
TRUK	SKILL AND CHANCE	PIGS	INCIPIENT AGRICULT	FEMALES ALONE
TUCANO	NO GAMES	ABSENT OR NEARLY SO	INCIPIENT AGRICULT	ACTIVITY ABSENT
YAKUT	ALL THREE TYPES	BOVINE ANIMALS	HUNTING	MALES ALONE
	30	46	46	42

MAP PROJECT

ETHNOGRAPHIC ATLAS

CULTURE	TYPES OF GAMES	PREDOMINANT ANIMAL	SUBSISTENCE ECONOMY	SEX SPECIALIZATION WEAVING
YANOMA	INSUFFICIENT INFO	ABSENT OR NEARLY SO	HUNTING	FEMALES ALONE
	0	1	1	1

MAP PROJECT

ETHNOGRAPHIC ATLAS

CULTURE	TYPES OF GAMES	PREDOMINANT ANIMAL	SUBSISTENCE ECONOMY	SEX SPECIALIZATION WEAVING
ONA	PHYSICAL SKILL	ABSENT OR NEARLY SO	HUNTING	ACTIVITY ABSENT
PAWNEE	SKILL AND CHANCE	EQUINE ANIMALS	EXTENSIVE AGRICULT	ACTIVITY ABSENT
	2	2	2	2

MAP PROJECT

ETHNOGRAPHIC ATLAS

CULTURE	TYPES OF GAMES	PREDOMINANT ANIMAL	SUBSISTENCE ECONOMY	SEX SPECIALIZATION WEAVING
KLAMATH	SKILL AND CHANCE	ABSENT OR NEARLY SO	FISHING	ACTIVITY ABSENT
TORADJA	INSUFFICIENT INFO	BOVINE ANIMALS	EXTENSIVE AGRICULT	ACTIVITY ABSENT
TZELTAL	INSUFFICIENT INFO	ABSENT OR NEARLY SO	INTENSIVE AGRICULT	INSUFFICIENT DATA
	1	3	3	

MAP PROJECT

CULTURE	TYPES OF GAMES	PREDOMINANT ANIMAL	SUBSISTENCE ECONOMY	SEX SPECIALIZATION WEAVING
ASHANTI	SKILL AND STRATEGY	SHEEP AND-OR GOATS	EXTENSIVE AGRICULT	MALES ALONE
TARAHUMA	ALL THREE TYPES	BOVINE ANIMALS	INTENSIVE AGRICULT	FEMALES ALONE
	2	2	2	2

MAP PROJECT

LEVEL	CULTURE	TYPES OF GAMES	PREDOMINANT ANIMAL	SUBSISTENCE ECONOMY	SEX SPECIALIZATION WEAVING
5					
	DOGON	INSUFFICIENT INFO	BOVINE ANIMALS	INTENSIVE AGRICULT	INSUFFICIENT DATA
	KAPAUKU	INSUFFICIENT INFO	PIGS	EXTENSIVE AGRICULT	ACTIVITY ABSENT
	KOREANS	ALL THREE TYPES	BOVINE ANIMALS	INTENSIVE AGRICULT	FEMALES ALONE
	TLINGIT	SKILL AND CHANCE	ABSENT OR NEARLY SO	FISHING	FEMALES ALONE
	WOLOF	ALL THREE TYPES	BOVINE ANIMALS	EXTENSIVE AGRICULT	MALES ALONE
CASES		3	5	5	[illegible]

HAP PROJECT

ETHNOGRAPHIC ATLAS

CULTURE	AGE SPECIALIZATION WEAVING	CLASS STRATIFICATION MAIN-TYPE	POLITICAL INTEGRATION	PRIMARY ENVIRONMENT
AMHARA	CRACT	COMPLEX-CLASSES	INSUFFICIENT DATA	NOT CODED
ANDAMANS	NONE OR DON,T	ABSENCE	ABSENT	TROPICAL FOREST
ARANDA	NONE OR DON,T	ABSENCE	LOCAL COMMUNITY	DESERT GRASS & SHRUB
AYMARA	NONE OR DON,T	WEALTH DISTINCTIONS	DEPENDENT SOCIETIES	HIGH PLATEAU STEPPE
AZANDE	NONE OR DON,T	HEREDITARY ARISTOCRA	LITTLE STATES	TROPICAL GRASS
BAHIA	INDUSTIRAL	COMPLEX-CLASSES	DEPENDENT SOCIETIES	TROPICAL FOREST
BEMBA	NONE OR DON,T	HEREDITARY ARISTOCRA	STATES	TROPICAL GRASS
BLACKFOT	NONE OR DON,T	WEALTH DISTINCTIONS	INSUFFICIENT DATA	NOT CODED
BORORO	NONE OR DON,T	ABSENCE	LOCAL COMMUNITY	SUB-TROPICAL FOREST
BUSH NEG	NONE OR DON,T	ABSENCE	MINIMAL STATES	TROPICAL FOREST
CAGABA	NONE OR DON,T	WEALTH DISTINCTIONS	LOCAL COMMUNITY	SUB-TROPICAL FOREST
CHUKCHEE	NONE OR DON,T	WEALTH DISTINCTIONS	LOCAL COMMUNITY	TUNDRA
COPPER E	NONE OR DON,T	ABSENCE	INSUFFICIENT DATA	TUNDRA
CUNA	NONE OR DON,T	WEALTH DISTINCTIONS	MINIMAL STATES	TROPICAL FOREST
GANDA	NONE OR DON,T	HEREDITARY ARISTOCRA	STATES	TROPICAL FOREST
GARO	NONE OR DON,T	WEALTH DISTINCTIONS	MINIMAL STATES	TROPICAL FOREST
GUARANI	NONE OR DON,T	ABSENCE	INSUFFICIENT DATA	NOT CODED
HAUSA	NONE OR DON,T	COMPLEX-CLASSES	INSUFFICIENT DATA	NOT CODED
HIGH SCH	0	INSUFFICIENT DATA	INSUFFICIENT DATA	NOT CODED
HOPI	NONE OR DON,T	ABSENCE	INSUFFICIENT DATA	NOT CODED
IBAN	NONE OR DON,T	ABSENCE	LOCAL COMMUNITY	TROPICAL FOREST
IFUGAO	NONE OR DON,T	WEALTH DISTINCTIONS	ABSENT	SUB-TROPICAL FOREST
IROQUOIS	NONE OR DON,T	ABSENCE	INSUFFICIENT DATA	NOT CODED
KANURI	NONE OR DON,T	HEREDITARY ARISTOCRA	INSUFFICIENT DATA	NOT CODED
KHASI	CRACT	COMPLEX-CLASSES	MINIMAL STATES	SUB-TROPICAL FOREST
KURD	CRACT	HEREDITARY ARISTOCRA	INSUFFICIENT DATA	NOT CODED
LAPPS	NONE OR DON,T	WEALTH DISTINCTIONS	LOCAL COMMUNITY	TUNDRA
LAU	NONE OR DON,T	WEALTH DISTINCTIONS	MINIMAL STATES	TROPICAL FOREST
LOZI	NONE OR DON,T	HEREDITARY ARISTOCRA	STATES	TROPICAL GRASS
MASAI	NONE OR DON,T	ABSENCE	PEACE GROUPS	DESERT GRASS & SHRUB
MATACO	NONE OR DON,T	ABSENCE	LOCAL COMMUNITY	SUB-TROPICAL BUSH
OJIBWA	NONE OR DON,T	ABSENCE	LOCAL COMMUNITY	N. CONIFEROUS FOREST
PYGMIES	NONE OR DON,T	ABSENCE	LOCAL COMMUNITY	TROPICAL FOREST
SANTAL	CRACT	ABSENCE	MINIMAL STATES	MONSOON FOREST
SENUSSI	0	INSUFFICIENT DATA	INSUFFICIENT DATA	NOT CODED
SERBS	NONE OR DON,T	COMPLEX-CLASSES	STATES	TEMPERATE WOODLAND
SHLUH	NONE OR DON,T	ABSENCE	MINIMAL STATES	MEDITERRANEAN
SINHALES	NONE OR DON,T	COMPLEX-CLASSES	STATES	SUB-TROPICAL FOREST
SOMALI	CRACT	WEALTH DISTINCTIONS	LITTLE STATES	DESERT GRASS & SHRUB
TAIWAN H	NONE OR DON,T	ABSENCE	LOCAL COMMUNITY	TROPICAL FOREST

MAP PROJECT

ETHNOGRAPHIC ATLAS

CULTURE	AGE SPECIALIZATION WEAVING	CLASS STRATIFICATION MAIN-TYPE	POLITICAL INTEGRATION	PRIMARY ENVIRONMENT
THAI	NONE OR DON,T	COMPLEX-CLASSES	STATES	TROPICAL FOREST
TIKOPIA	NONE OR DON,T	HEREDITARY ARISTOCRA	LOCAL COMMUNITY	TROPICAL FOREST
TIV	NONE OR DON,T	ABSENCE	MINIMAL STATES	TROPICAL GRASS
TROBRIAN	NONE OR DON,T	HEREDITARY ARISTOCRA	MINIMAL STATES	TROPICAL FOREST
TRUK	NONE OR DON,T	ABSENCE	LOCAL COMMUNITY	SUB-TROPICAL FOREST
TUCANO	NONE OR DON,T	ABSENCE	LOCAL COMMUNITY	TROPICAL FOREST
YAKUT	CRACT	WEALTH DISTINCTIONS	LITTLE STATES	N. CONIFEROUS FOREST
	45	47	47	47

MAP PROJECT

ETHNOGRAPHIC ATLAS

CULTURE	AGE SPECIALIZATION WEAVING	CLASS STRATIFICATION MAIN-TYPE	POLITICAL INTEGRATION	PRIMARY ENVIRONMENT
YANOMA	NONE OR DON,T	ABSENCE	INSUFFICIENT DATA	NOT CODED
	1	1	1	

MAP PROJECT

ETHNOGRAPHIC ATLAS

CULTURE	AGE SPECIALIZATION WEAVING	CLASS STRATIFICATION MAIN-TYPE	POLITICAL INTEGRATION	PRIMARY ENVIRONMENT
OMA	NONE OR DON,T	ABSENCE	LOCAL COMMUNITY	TUNDRA
PAWNEE	NONE OR DON,T	HEREDITARY ARISTOCRA	MINIMAL STATES	TEMPERATE GRASS
	2	2	2	

MAP PROJECT

ETHNOGRAPHIC ATLAS

CULTURE	AGE SPECIALIZATION WEAVING	CLASS STRATIFICATION MAIN-TYPE	POLITICAL INTEGRATION	PRIMARY ENVIRONMENT
KLAMATH	NONE OR DON,T	WEALTH DISTINCTIONS	INSUFFICIENT DATA	NOT CODED
TORADJA	NONE OR DON,T	WEALTH DISTINCTIONS	LOCAL COMMUNITY	TROPICAL FOREST
TZELTAL	NONE OR DON,T	INSUFFICIENT DATA	LOCAL COMMUNITY	TEMPERATE FOREST
	3	3	3	3

MAP PROJECT

ETHNOGRAPHIC ATLAS

CULTURE	AGE SPECIALIZATION WEAVING	CLASS STRATIFICATION MAIN-TYPE	POLITICAL INTEGRATION	PRIMARY ENVIRONMENT
ASHANTI	CRACT	HEREDITARY ARISTOCRA	STATES	TROPICAL FOREST
TARAHUMA	NONE OR DON,T	WEALTH DISTINCTIONS	LOCAL COMMUNITY	TEMPERATE FOREST
	2	2	2	

MAP PROJECT

ETHNOGRAPHIC ATLAS

CULTURE	AGE SPECIALIZATION WEAVING	CLASS STRATIFICATION MAIN-TYPE	POLITICAL INTEGRATION	PRIMARY ENVIRONMENT
DOGON	NONE OR DON,T	WEALTH DISTINCTIONS	LOCAL COMMUNITY	TROPICAL GRASS
KAPAUKU	NONE OR DON,T	WEALTH DISTINCTIONS	PEACE GROUPS	TROPICAL FOREST
KOREANS	NONE OR DON,T	COMPLEX-CLASSES	STATES	TEMPERATE WOODLAND
TLINGIT	NONE OR DON,T	HEREDITARY ARISTOCRA	INSUFFICIENT DATA	NOT CODED
WOLOF	CRACT	COMPLEX-CLASSES	STATES	TROPICAL GRASS
	5	5	5	5

HAP PROJECT

Table 3 . shows the eigenvalues and Table 4 the rotated factors (using the Varimax procedure) resulting from the analysis. It is apparent that significance attached to certain numbers and stages of number systems, both highly and identically loaded on Factor One, are behaving in the same way in the data, while standarized measures and higher math, both loaded identically on Factor Two, behave in the same way, but are diametrically opposed to the relationship found in Factor One. The two factors are measuring two underlying dimensions relating to math practices.

Second, the factor analysis may be used to determine the factor scores for each of the cases. These are a measure of the importance of the factor for that particular case, and they are usually used to construct distances between the cases which may then be analyzed. Unfortunately, the matrix of correlations used in the factor analysis lacked a determinant, so that it was impossible to calculate distances between the cultures. Instead, a matrix of distances based upon the raw scores was used in the following analysis.

One of the major methods in anthropology to analyze a distance matrix of this sort is to perform a cluster analysis, which will group cases close together in the space defined by the distance matrix into the same group. In the case of the math avoidance project, a cluster analysis of distances based upon the raw scores will tell which cultures go together in the sense that their scores on the four dichotomized variables are similar. Put another way, the cluster analysis will determine which of the cultures have similar mean systems, and what these systems are.

Therefore, raw scores for the 13 cultures on which complete data are available were input to the NT-SYS program developed for cluster analysis by Robert Sokel, one of the pioneers in the field. Euclidean distances were calculated and the resulting distance matrix was clustered using the unweighted pair group method.

The results are shown in Figure 5 and indicate three major groups. The first of these is composed of two cultures, the Yanoama and Ona. The Klamath, Pawnee, Toradja and Tzeltal form a major subgroup in the second, while the Tarahumara are an outlier in it. The third major group consists of two subgroups, with the Dogon, Kapauku, Koreans, Tlingit and Wolof in one and the Ashanti in the other.

A comparison of the original distance matrix with the matrix used for the clustering indicates a correlation of .96 between the two, indicating that the cluster analysis has not seriously distorted the original distances. Another way of putting it is that the cluster analysis faithfully reproduces the original distance matrix.

To interpret the math systems represented by the cluster analysis groups, it was decided to try and see if the four variables would form a Guttman scale. Guttman scaling has been used a great deal in anthropology and is a method of forming an additive scale in which the simplest trait appears first, and is followed in turn by more complex traits. Cultures having the same number of traits are grouped together into the same scale type.

The SPSS Guttman Scaling routine was used, and the results are shown in Table 6 . Amazingly, essentially the same groups appear as those formed by the cluster analysis. This replication of results by two entirely different methods of analysis indicate that the groups of cultures have a high degree of validity.

Neither interpretation, cluster analysis or Guttman scaling, is incompatible with the other, since the differences are minor. The extra group from the Guttman scaling is made up of the Ashanti and Tarahumara, which were clustered into two existing groups by the cluster analysis. Looking at the raw data, both analyses are correct. In the cluster analysis, the Ashanti, who have higher math, but no standard measures, are placed in the highest group with cultures who have both. On the other hand, the Tarahumara have standard measures but lack higher math and are placed in the middle group of the cluster analysis with cultures having neither. The Guttman scaling simply creats an extra group for these cultures.

The simplest of the four groups consists of the cultures in which no significance is attached to numbers, counting does not go above one-two-many or a variation thereon, and there is no evidence of higher math or standardized units. Cultures in this group are the Ona and Yanoama. The second step in the scale occurs when a culture begins to count into the higher numbers and attaches significance to some of them. Cultures placed here by the Guttman scaling are the Klamath, Pawnee, Toradja, and Tzeltal. The third step reveals an interesting either-or situation. Thus cultures at the third step in the scale have either higher math or standard units, but not both. These cultures are the Tarahumara and Ashanti. The final, highest step in the Guttman scale consists of those cultures having all four of the more complex math traits-- significant numbers above one-two-many involving higher math and standardized units of measurement. These cultures are the Dogon, Kapauku, Koreans, Tlingit, and Wolof.

After the consitutent units of the math types had been worked out, it became possible to assign 13 cultures for which some data was missing to the math types. Data on the four traits for all cultures is shown in Table 1 , where those 26 assignable to type are listed under their proper level. The cultures assigned to type were also used to produce Table 2 , which shows the Ethnographic Atlas traits arranged by math type. Based upon the inspection of these tables and by referring to the raw data as necessary, the following four math types have been defined, based primarily on the Guttman scaling.

Math Type 1. This type consists of those cultures which can count only at a rudimentary level and is represented in the sample by the Andaman Islanders, the Aranda, the Copper Eskimo, the Ona, and the Yanoama. For instance, Chagnon (1967:20) reports great difficulty in determining data covering chronological events, since the Yanoama "can express only three numbers: one (in several forms), two, and more-than-two".

Looking at the common ethnographic variables for these cultures, it is seen that all are heavily dependent on mixed foraging (hunting, fishing and gathering), with little agriculture and no domesticated animals. Their games are simple, usually dependent upon skill, there is no specialization in weaving (if, indeed, it is practiced), and the people live in small seminomadic or fully migratory communities. There is no class stratification and low level political integration. There is, in short, very little reason in their lives to count or do more complex math. Cultures of this type occur in all parts of the world.

Math Type 2. This type occurs only in North America and the Pacific in the sample, and consists of the Klamath, Pawnee, Toradja, Tucano, and Tzeltal. These are cultures that can count reasonably well and attach significance to certain numbers. For instance, among the Klamath, Spier (1930:222-23, 229) relates that

> One to six, nine, and ten are individual stems, seven is based on two, and eight on three. This suggests a quinary and decimal basis. From twenty up the basic count is by ten. Intermediate integers are so many tens plus the units as in English.

In addition, five was an important ritual number and there was a calendar which consisted of ten months.

Cultures of Math Type 2 are rather mixed in subsistence practices, with some attaching importance to animal husbandry while others depend on agriculture or fishing. However, all still live in rather small communities, some of which are permanent. They play simple games, weaving is rare and lacks sexual specialization, there are social classes in about half the cultures, but political organization is still at the local level.

It appears that dynamics producing this math type revolves around an increasing need to count. Thus, all cultures are dependent on crops, fish, or the beginnings of animal domestication-- all activities that require a more complex numeration system. At the same time, it seems that the very fact of counting leads to an association of ritual significance with certain numbers. In the case of the Klamath, this was the number five associated with the whole hand.

Math Type 3. This math type is made up generally of more complex cultures who either have some form of higher math or standardized units, but not both. The cultures belonging to this math type are the Ashanti, Garo, Lapps, Ojibwa, Santal, Somali, and Tarahumara. As an example of this math type, "Garo men can add, subtract, and do a certain amount of multiplication and division in their heads" (Burling 1963:116). However, we are also told that "The Garo have no weights nor measures of quantity", according to Hunter (1879: 165). The former ability to do higher math is the result of operating in a cash economy, while the latter lack of standard units seems due to the peripheral nature of the Garo within the cash economy.

Gathering is not important among any of them, and only the Objiwa depend upon hunting for their subsistence. The bulk of them stress animal husbandry, fishing, or agriculture-- again all occupations that require an ability to count. Cereal grains are especially important and about half have permanent settlements. Settlement sizes run from large towns to small bands, the latter only among the pastoral and therefore migratory Lapps. Most have domesticated animals.

Games of strategy, often requiring counting, appear. There is sex specialization in weaving, and even some age specialization as well. All but two of these cultures have social classes, and most are organized as minimal states with some even more complex and organized into little states.

Math Type 4. The highest math type consists really of two rather disparate groups of cultures. The first of these is made up of the very complex cultures in the sample, many of them modern nations. These are the Dogon, Koreans, Sinhalese, Thai and Wolof. The other group is, on the whole, simpler, and consists of the Masai, a pastoral group, and the Kapauku and Tlingit, cultures with redistributive economies in which status is based upon the accumulation and distribution of wealth.

As an example of the former, the Wolof live in a cash economy (Berenger-Feraud 1879:21) and, according to the same source, are able to calculate with it. They also possess standard units (Adenson 1739:57; Ames 1953:68). The latter source also reports ritual numbers.

As an example of the second group, the Tlingit had standardized baskets (Jones 1914:87), while they could also count at least as high as 200 (Krause 1956:237). They also used the ceremonial number eight (Olson 1967:82).

All of these cultures attach very little importance to hunting and gathering. While fishing or animal husbandry remains of importance to a few, the bulk are agriculturalists with more than half practicing irrigation. Cultivation of cereal grains predominates, and only two cultures lack permanent settlements-- one of these is pastoral and the other is a fishing culture.

Settlement sizes vary from very small for the pastoralists to quite large (more than 50,000). All but one have strategy games and classes, while there is sex specialization in weaving. Political integration is above the local level, generally in the form of peace groups or states.

The importance of the need factor in the development of math systems is quite clear with this group. While the bulk of the cultures are quite complex, some rather simple cultures that one would expect to occur lower down in the scale of math types in fact have developed rather complex math systems to meet specific local needs.

Another way of getting at the structure in the cross-cultural data is to perform a multiple regression analysis. Again using SPSS, a stepwise procedure was used in which each predictor variable-- the variables from the Ethnographic Atlas-- is entered singly in the order in which they will best predict the math types. As seen in Table 7., three variables will account for 87% of the variance in the math types, and all of the calculated F ratios for the overall regression and the three predictor variables are significant.

The best predictor of math type is the importance of hunting for the culture, followed by the type of games played. The third predictor variable is gathering. Quite clearly, all three of the variables relate to the need to count. As the regression equation shows, a drop in the importance of hunting and gathering leads to a rise in the math type score. As pointed out above, both of these activities are practiced by simple cultures who generally practice sharing, called balanced reciprocity by anthropologists. In addition, food is collected in small quantities. In both cases, rigorous counting is not required.

On the other hand, a rise in the type of game will be marked by a rise in math type. Quite simply, games of strategy and chance require a degree of mathematical sophistication not found among simple cultures.

The project also took a look at the relationship between the math types and each of the individual variables, using the cross-tabulation procedure in SPSS. The strength of the relationship was assessed using Tau B and C, which are ordinal measures of association, and their associated levels of significance. The former is appropriate when the cross-tabulation table is a square table, the latter when it is rectangular (Nie et al. 1975:227:8).

Subsist1==Gathering: The same negative relationship shown by the multiple regression is seen in the cross-tabulation with a highly

FILE HRAF (CREATION DATE = 10/26/80)

VARIABLE	EST COMMUNALITY	FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT
SIGNIF	1.00000	1	2.64979	66.2	66.2
STAND	1.00000	2	1.04067	26.0	92.3
MATH	1.00000	3	0.30953	7.7	100.0
STAGE	1.00000	4	-0.00000	-0.0	100.0

Table 3

significant Tau C of -.36.

Subsist2--Hunting: An even stronger negative relationship (-.37) is shown between hunting and math type.

FILE HRAF (CREATION DATE = 10/26/80)

VARIMAX ROTATED FACTOR MATRIX

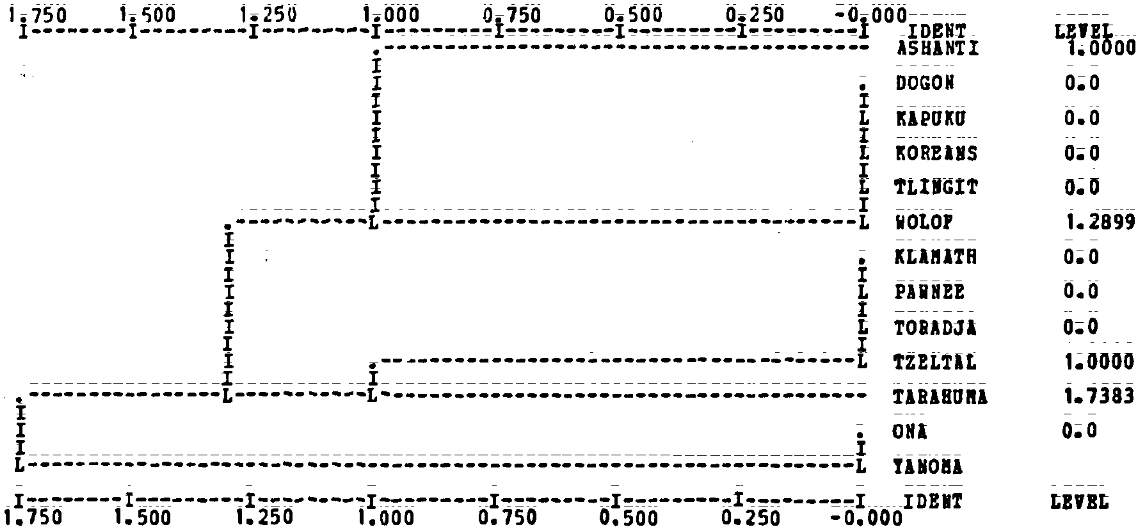
	FACTOR 1	FACTOR 2
SIGNIF	0.97548	0.22009
STAND	0.20235	0.89682
MATH	0.20235	0.89682
STAGE	0.97548	0.22009

TRANSFORMATION MATRIX

	FACTOR 1	FACTOR 2
FACTOR 1	0.76607	0.64276
FACTOR 2	-0.64276	0.76607

Table 4

PHENOGRAM FROM MATRIX CORR 00



**** ELAPSED TIME IN THIS STEP IS 0.0275 MINUTES. TOTAL ELAPSED SYSTEM TIME IS 0.1094 MINUTES (1, -9)

Table 5

FILE · HRAF (CREATION DATE = 10/17/80)

```
* * * * * * * * * *   G U T T M A N   S C A L E   ( M A T H S C A L )   U S I N G   * * * * * * * * * *
SIGNIF     SIGNIFICANCE ATTACHED TO CERTAIN NUMBERS    DIVISION POINT =     1.00
STAND      CONCEPTS OF MEASUREMENT-STANDARDIZED UNI    DIVISION POINT =     1.00
MATH       HIGHER MATH                                 DIVISION POINT =     1.00
STAGE      STAGES OF NUMBER SYSTEMS                    DIVISION POINT =     1.00
* * * * * * * * * * *  RESP = 1 FOR VALUES EQUAL TO DIVISION POINT AND ABOVE  * * * * * * * * * * *

ITEM.. STAND       MATH        SIGNIF      STAGE

RESP..  0      1 I  0      1 I  0      1 I  0      1 I TOTAL
-----I-ERR-----I-ERR-----I-ERR-----I-ERR-----I
M    I             I           I           I           I
A  4 I  0      5I  0      5I  0      5I  0      5I     5
T    I-------ERRI           I           I           I
H    I             I           I           I           I
S  3 I  1      1I  1      1I  0      2I  0      2I     2
C    I             I-------ERRI           I           I
A    I             I           I           I           I
L  2 I  4      0I  4      0I  0      4I  0      4I     4
     I             I           I-------ERRI           I
     I             I           I           I           I
   1 I  0      0I  0      0I  0      0I  0      0I     0
     I             I           I           I------ERRI
     I             I           I           I           I
   0 I  2      0I  2      0I  2      0I  2      0I     2
     I-----------I-----------I-----------I-----------I
SUMS    7      6    7      6    2     11    2     11      13
PCTS   54     46   54     46   15     85   15     85
ERRORS  0      1    1      0    0      0    0      0       2
```

60 CASES WERE PROCESSED
47 (OR 78.3 PCT) WERE MISSING

Table 6

STATISTICS..

COEFFICIENT OF REPRODUCIBILITY = 0.9615
MINIMUM MARGINAL REPRODUCIBILITY = 0.6923
PERCENT IMPROVEMENT = 0.2692
COEFFICIENT OF SCALABILITY = 0.8750

FILE ETHNOA (CREATION DATE = 10/26/80)

* M U L T I P L E R E G R E S S I O N * * * * * * * * * * * * * * VARIABLE LIST 1
REGRESSION LIST 1

DEPENDENT VARIABLE.. LEVEL2

VARIABLE(S) ENTERED ON STEP NUMBER 3.. SUBSIST1 GATHERING WILD PLANTS AND SMALL FAUNA

MULTIPLE R	0.94943
R SQUARE	0.90142
ADJUSTED R SQUARE	0.87184
STANDARD ERROR	0.40765

ANALYSIS OF VARIANCE	DF	SUM OF SQUARES	MEAN SQUARE	F
REGRESSION	3.	15.19535	5.06512	30.47988
RESIDUAL	10.	1.66179	0.16618	

------------------ VARIABLES IN THE EQUATION ------------------

VARIABLE	B	BETA	STD ERROR B	F
SUBSIST2	-0.2660971	-0.43580	0.07216	13.600
GAMES	0.1608335	0.39852	0.04512	12.703
SUBSIST1	-0.2334133	-0.36843	0.07566	9.519
(CONSTANT)	2.661108			

------------- VARIABLES NOT IN THE EQUATION -------------

VARIABLE	BETA IN	PARTIAL	TOLERANCE	F
SUBSIST4	0.15431	0.44140	0.80666	2.178
SUBSIST5	-0.09635	-0.24961	0.66162	0.598
CONORG1	-0.00189	-0.00570	0.89482	0.000
AGRI	-0.15210	-0.34962	0.52087	1.253
SETTLE	-0.09023	-0.22063	0.58947	0.461
MEANSIZE	-0.04972	-0.10258	0.41971	0.096
COMMHIER	-0.10203	-0.21374	0.43259	0.431
SUBECON	-0.06867	-0.13093	0.35833	0.157
WEAVE2	0.15037	0.41785	0.76125	1.904
CLASS1	-0.07160	-0.14576	0.40857	0.195
POLINT	-0.18198	-0.27289	0.22168	0.724

Table 7

CROSSTABUALTION

FILE HRAF (CREATION DATE = 10/26/80)

* * * * * * * * * C R O S S T A B U L A T I O N O F GATHERING WILD PLANTS AND SMALL FAUNA BY SUBSIST1 LEVEL2 * * * * * * * * * PAGE 1 OF 1

LEVEL2	COUNT / COL PCT	SUBSIST1 0-5% (0)	6-15% (1)	16-25% (2)	26-35% (3)	36-45% (4)	56-65% (6)	ROW TOTAL
MATH 1	1	1 7.1	1 14.3	0 0.0	1 50.0	1 100.0	1 100.0	5 19.2
MATH 2	2	2 14.3	2 28.6	0 0.0	1 50.0	0 0.0	0 0.0	5 19.2
MATH 3	3	5 35.7	3 42.9	0 0.0	0 0.0	0 0.0	0 0.0	8 30.8
MATH 4	4	6 42.9	1 14.3	1 100.0	0 0.0	0 0.0	0 0.0	8 30.8
	COLUMN TOTAL	14 53.8	7 26.9	1 3.8	2 7.7	1 3.8	1 3.8	26 100.0

RAW CHI SQUARE = 17.22496 WITH 15 DEGREES OF FREEDOM. SIGNIFICANCE = 0.3056
CRAMER'S V = 0.46993
CONTINGENCY COEFFICIENT = 0.63127
LAMBDA (ASYMMETRIC) = 0.27778 WITH LEVEL2 DEPENDENT. = 0.0 WITH SUBSIST1 DEPENDENT.
LAMBDA (SYMMETRIC) = 0.16667
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.23360 WITH LEVEL2 DEPENDENT. = 0.25207 WITH SUBSIST1 DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.24249
KENDALL'S TAU B = -0.41783. SIGNIFICANCE = 0.0075
KENDALL'S TAU C = -0.37870. SIGNIFICANCE = 0.0075
GAMMA = -0.57831
SOMERS'S D (ASYMMETRIC) = -0.45283 WITH LEVEL2 DEPENDENT. = -0.38554 WITH SUBSIST1 DEPENDENT.
SOMERS'S D (SYMMETRIC) = -0.41649
ETA = 0.65100 WITH LEVEL2 DEPENDENT. = 0.62726 WITH SUBSIST1 DEPENDENT.
PEARSON'S R = -0.55272 SIGNIFICANCE = 0.0017

NUMBER OF MISSING OBSERVATIONS = 34

FILE HRAF (CREATION DATE = 10/26/80)

* C R O S S T A B U L A T I O N O F * * * * * * * * * * * * * * * * * * *
LEVEL2 BY CONTINEN CONTINENT
* PAGE 1 OF 1

LEVEL2	COUNT / COL PCT	AFRICA 1	CIRCUM-MEDITERRA 2	EAST EUR ASIA 3	INSULAR PACIFIC 4	NORTH AMERICA 5	SOUTH AMERICA 6	ROW TOTAL
MATH 1	1	0	0	1	1	1	2	5
		0.0	0.0	14.3	33.3	16.7	50.0	19.2
MATH 2	2	0	0	0	1	2	2	5
		0.0	0.0	0.0	33.3	33.3	50.0	19.2
MATH 3	3	1	2	3	0	2	0	8
		33.3	66.7	42.9	0.0	33.3	0.0	30.8
MATH 4	4	2	1	3	1	1	0	8
		66.7	33.3	42.9	33.3	16.7	0.0	30.8
	COLUMN TOTAL	3	3	7	3	6	4	26
		11.5	11.5	26.9	11.5	23.1	15.4	100.0

RAW CHI SQUARE = 15.92498 WITH 15 DEGREES OF FREEDOM. SIGNIFICANCE = 0.3871
CRAMER'S V = 0.45185
CONTINGENCY COEFFICIENT = 0.61632
LAMBDA (ASYMMETRIC) = 0.22222 WITH LEVEL2 DEPENDENT. = 0.15789 WITH CONTINEN DEPENDENT.
LAMBDA (SYMMETRIC) = 0.18919
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.29566 WITH LEVEL2 DEPENDENT. = 0.23271 WITH CONTINEN DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.26043
KENDALL'S TAU B = -0.47473. SIGNIFICANCE = 0.0018
KENDALL'S TAU C = -0.48915. SIGNIFICANCE = 0.0018
GAMMA = -0.59048
SOMERS'S D (ASYMMETRIC) = -0.45255 WITH LEVEL2 DEPENDENT. = -0.49799 WITH CONTINEN DEPENDENT.
SOMERS'S D (SYMMETRIC) = -0.47419
ETA = 0.61473 WITH LEVEL2 DEPENDENT. = 0.65873 WITH CONTINEN DEPENDENT.
PEARSON'S R = -0.57916 SIGNIFICANCE = 0.0010

NUMBER OF MISSING OBSERVATIONS = 34

TABLE 6 - Cross-Tabulations

FILE HRAF (CREATION DATE = 10/26/80)

* * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * *
LEVEL2 BY SUBSIST2 HUNTING
* PAGE 1 OF 1

LEVEL2	COUNT / COL PCT	SUBSIST2 0-5% (0)	6-15% (1)	16-25% (2)	26-35% (3)	36-45% (4)	56-65% (6)	ROW TOTAL
MATH 1	1	0	0	1	0	3	1	5
		0.0	0.0	20.0	0.0	60.0	100.0	19.2
MATH 2	2	1	1	2	0	1	0	5
		12.5	16.7	40.0	0.0	20.0	0.0	19.2
MATH 3	3	2	3	2	0	1	0	8
		25.0	50.0	40.0	0.0	20.0	0.0	30.8
MATH 4	4	5	2	0	1	0	0	8
		62.5	33.3	0.0	100.0	0.0	0.0	30.8
	COLUMN TOTAL	8	6	5	1	5	1	26
		30.8	23.1	19.2	3.8	19.2	3.8	100.0

RAW CHI SQUARE = 21.63951 WITH 15 DEGREES OF FREEDOM. SIGNIFICANCE = 0.1176
CRAMER'S V = 0.52672
CONTINGENCY COEFFICIENT = 0.67397
LAMBDA (ASYMMETRIC) = 0.38889 WITH LEVEL2 DEPENDENT. = 0.27778 WITH SUBSIST2 DEPENDENT.
LAMBDA (SYMMETRIC) = 0.33333
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.34089 WITH LEVEL2 DEPENDENT. = 0.29223 WITH SUBSIST2 DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.31469
KENDALL'S TAU B = -0.56378. SIGNIFICANCE = 0.0003
KENDALL'S TAU C = -0.56805. SIGNIFICANCE = 0.0003
GAMMA = -0.69903
SOMERS'S D (ASYMMETRIC) = -0.54962 WITH LEVEL2 DEPENDENT. = -0.57831 WITH SUBSIST2 DEPENDENT.
SOMERS'S D (SYMMETRIC) = -0.56360
ETA = 0.76652 WITH LEVEL2 DEPENDENT. = 0.70718 WITH SUBSIST2 DEPENDENT.
PEARSON'S R = -0.66848 SIGNIFICANCE = 0.0001

NUMBER OF MISSING OBSERVATIONS = 34

CROSSTABUALTION

FILE HRAF (CREATION DATE = 10/26/80)

* C R O S S T A B U L A T I O N O F *
LEVEL2 BY SUBSIST3 FISHING
* PAGE 1 OF 1

LEVEL2	COUNT / COL PCT	SUBSIST3 0-5% 0	6-15% 1	16-25% 2	26-35% 3	36-45% 4	46-55% 5	56-65% 6	ROW TOTAL
MATH 1	1	1 14.3	1 14.3	0 0.0	1 50.0	1 100.0	0 0.0	1 50.0	5 19.2
MATH 2	2	2 28.6	1 14.3	0 0.0	1 50.0	0 0.0	1 50.0	0 0.0	5 19.2
MATH 3	3	2 28.6	2 28.6	3 60.0	0 0.0	0 0.0	1 50.0	0 0.0	8 30.9
MATH 4	4	2 28.6	3 42.9	2 40.0	0 0.0	0 0.0	0 0.0	1 50.0	8 30.8
	COLUMN TOTAL	7 26.9	7 26.9	5 19.2	2 7.7	1 3.8	2 7.7	2 7.7	26 100.0

RAW CHI SQUARE = 16.24997 WITH 18 DEGREES OF FREEDOM. SIGNIFICANCE = 0.5751
CRAMER'S V = 0.45643
CONTINGENCY COEFFICIENT = 0.62017
LAMBDA (ASYMMETRIC) = 0.22222 WITH LEVEL2 DEPENDENT. = 0.10526 WITH SUBSIST3 DEPENDENT.
LAMBDA (SYMMETRIC) = 0.16216
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.26650 WITH LEVEL2 DEPENDENT. = 0.20811 WITH SUBSIST3 DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.23371
KENDALL'S TAU B = -0.12727. SIGNIFICANCE = 0.2184
KENDALL'S TAU C = -0.13018. SIGNIFICANCE = 0.2184
GAMMA = -0.16098
SOMERS'S D (ASYMMETRIC) = -0.12222 WITH LEVEL2 DEPENDENT. = -0.13253 WITH SUBSIST3 DEPENDENT.
SOMERS'S D (SYMMETRIC) = -0.12717
ETA = 0.53742 WITH LEVEL2 DEPENDENT. = 0.24188 WITH SUBSIST3 DEPENDENT.
PEARSON'S R = -0.20349 SIGNIFICANCE = 0.1594

NUMBER OF MISSING OBSERVATIONS = 34

* * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * *
LEVEL2 BY SUBSIST4 ANIMAL HUSBANDRY
* PAGE 1 OF 1

LEVEL2 (COUNT / COL PCT)	SUBSIST4: 0-5% (0)	6-15% (1)	16-25% (2)	26-35% (3)	36-45% (4)	56-65% (6)	86-100% (9)	ROW TOTAL
1 MATH 1	5 / 45.5	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	5 / 19.2
2 MATH 2	3 / 27.3	0 / 0.0	2 / 40.0	0 / 0.0	0 / 0.0	0 / 0.0	0 / 0.0	5 / 19.2
3 MATH 3	2 / 18.2	2 / 66.7	0 / 0.0	1 / 33.3	1 / 100.0	1 / 100.0	1 / 50.0	8 / 30.8
4 MATH 4	1 / 9.1	1 / 33.3	3 / 60.0	2 / 66.7	0 / 0.0	0 / 0.0	1 / 50.0	8 / 30.8
COLUMN TOTAL	11 / 42.3	3 / 11.5	5 / 19.2	3 / 11.5	1 / 3.8	1 / 3.8	2 / 7.7	26 / 100.0

RAW CHI SQUARE = 22.14323 WITH 18 DEGREES OF FREEDOM. SIGNIFICANCE = 0.2257
CRAMER'S V = 0.53281
CONTINGENCY COEFFICIENT = 0.67819
LAMBDA (ASYMMETRIC) = 0.38889 WITH LEVEL2 DEPENDENT. = 0.13333 WITH SUBSIST4 DEPENDENT.
LAMBDA (SYMMETRIC) = 0.27273
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.37140 WITH LEVEL2 DEPENDENT. = 0.31027 WITH SUBSIST4 DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.33810
KENDALL'S TAU B = 0.46615. SIGNIFICANCE = 0.0024
KENDALL'S TAU C = 0.46154. SIGNIFICANCE = 0.0024
GAMMA = 0.59391
SOMERS'S D (ASYMMETRIC) = 0.46245 WITH LEVEL2 DEPENDENT. = 0.46988 WITH SUBSIST4 DEPENDENT.
SOMERS'S D (SYMMETRIC) = 0.46614
ETA = 0.66046 WITH LEVEL2 DEPENDENT. = 0.48540 WITH SUBSIST4 DEPENDENT.
PEARSON'S R = 0.43535 SIGNIFICANCE = 0.0131

NUMBER OF MISSING OBSERVATIONS = 34

CROSSTABUALTION

FILE HRAP (CREATION DATE = 10/26/80)

* * * * * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F *
LEVEL2 BY SUBSIST5 AGRICULTURE * * * * * * * PAGE 1 OF 1

LEVEL2	COUNT / COL PCT	SUBSIST5 0-5% (0)	6-15% (1)	16-25% (2)	46-55% (5)	56-65% (6)	66-75% (7)	76-85% (8)	ROW TOTAL
MATH 1	1	4	0	1	0	0	0	0	5
		44.4	0.0	100.0	0.0	0.0	0.0	0.0	19.2
MATH 2	2	1	0	0	2	1	1	0	5
		11.1	0.0	0.0	66.7	16.7	25.0	0.0	19.2
MATH 3	3	2	2	0	1	0	2	1	8
		22.2	100.0	0.0	33.3	0.0	50.0	100.0	30.8
MATH 4	4	2	0	0	0	5	1	0	8
		22.2	0.0	0.0	0.0	83.3	25.0	0.0	30.8
COLUMN TOTAL		9	2	1	3	6	4	1	26
		34.6	7.7	3.8	11.5	23.1	15.4	3.8	100.0

RAW CHI SQUARE = 29.44847 WITH 18 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0432
CRAMER'S V = 0.61445
CONTINGENCY COEFFICIENT = 0.72876
LAMBDA (ASYMMETRIC) = 0.50000 WITH LEVEL2 DEPENDENT. = 0.23529 WITH SUBSIST5 DEPENDENT.
LAMBDA (SYMMETRIC) = 0.37143
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.42767 WITH LEVEL2 DEPENDENT. = 0.34388 WITH SUBSIST5 DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.38122
KENDALL'S TAU B = 0.30032. SIGNIFICANCE = 0.0339
KENDALL'S TAU C = 0.30375. SIGNIFICANCE = 0.0339
GAMMA = 0.36842
SOMERS'S D (ASYMMETRIC) = 0.29167 WITH LEVEL2 DEPENDENT. = 0.30924 WITH SUBSIST5 DEPENDENT.
SOMERS'S D (SYMMETRIC) = 0.30019
ETA = 0.60952 WITH LEVEL2 DEPENDENT. = 0.51943 WITH SUBSIST5 DEPENDENT.
PEARSON'S R = 0.40049 SIGNIFICANCE = 0.0213

NUMBER OF MISSING OBSERVATIONS = 38

FILE HRAP (CREATION DATE = 10/26/80)

* C R O S S T A B U L A T I O N O F *
LEVEL2 BY CONORG1 COMMUNITY ORGANIZATION
PAGE 1 OF 1

LEVEL2	COUNT / COL PCT	IDEMES 1	SEGMENTED NO EXO 2	AGAMOUS 3	EXOGAMOUS 4	SEGMENTED, EXOGA 5	CLAN-COMMUNITY 6	ROW TOTAL
MATH 1	1	1	1	1	1	0	1	5
		33.3	100.0	11.1	25.0	0.0	12.5	19.2
MATH 2	2	1	0	3	0	0	1	5
		33.3	0.0	33.3	0.0	0.0	12.5	19.2
MATH 3	3	1	0	2	2	0	3	8
		33.3	0.0	22.2	50.0	0.0	37.5	30.8
MATH 4	4	0	0	3	1	1	3	8
		0.0	0.0	33.3	25.0	100.0	37.5	30.8
	COLUMN TOTAL	3	1	9	4	1	8	26
		11.5	3.8	34.6	15.4	3.8	30.8	100.0

RAW CHI SQUARE = 11.44721 WITH 15 DEGREES OF FREEDOM. SIGNIFICANCE = 0.7203
CRAMER'S V = 0.38309
CONTINGENCY COEFFICIENT = 0.55289
LAMBDA (ASYMMETRIC) = 0.16667 WITH LEVEL2 DEPENDENT. = 0.05882 WITH CONORG1 DEPENDENT.
LAMBDA (SYMMETRIC) = 0.11429
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.17116 WITH LEVEL2 DEPENDENT. = 0.15331 WITH CONORG1 DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.16174
KENDALL'S TAU B = 0.26348. SIGNIFICANCE = 0.0571
KENDALL'S TAU C = 0.26035. SIGNIFICANCE = 0.0571
GAMMA = 0.34737
SOMERS'S D (ASYMMETRIC) = 0.26190 WITH LEVEL2 DEPENDENT. = 0.26506 WITH CONORG1 DEPENDENT.
SOMERS'S D (SYMMETRIC) = 0.26347
ETA = 0.46782 WITH LEVEL2 DEPENDENT. = 0.33552 WITH CONORG1 DEPENDENT.
PEARSON'S R = 0.31953 SIGNIFICANCE = 0.0558

NUMBER OF MISSING OBSERVATIONS = 34

CROSSTABUALTION

FILE HRAF (CREATION DATE = 10/26/80)

* C R O S S T A B U L A T I O N O F *
LEVEL2 BY AGRI INTENSITY OF AGRICULTURE
* PAGE 1 OF 1

LEVEL2 (COUNT / COL PCT)	AGRI: ABSENT 1	CASUAL 2	EXTENSIVE OR SHI 3	INTENSIVE 5	INTENSIVE, IRRIG 6	ROW TOTAL
1 MATH 1	4 44.4	1 50.0	0 0.0	0 0.0	0 0.0	5 20.0
2 MATH 2	1 11.1	0 0.0	3 42.9	0 0.0	0 0.0	4 16.0
3 MATH 3	2 22.2	1 50.0	2 28.6	2 66.7	1 25.0	8 32.0
4 MATH 4	2 22.2	0 0.0	2 28.6	1 33.3	3 75.0	8 32.0
COLUMN TOTAL	9 36.0	2 8.0	7 28.0	3 12.0	4 16.0	25 100.0

RAW CHI SQUARE = 16.05157 WITH 12 DEGREES OF FREEDOM. SIGNIFICANCE = 0.1889
CRAMER'S V = 0.46262
CONTINGENCY COEFFICIENT = 0.62531
LAMBDA (ASYMMETRIC) = 0.29412 WITH LEVEL2 DEPENDENT. = 0.18750 WITH AGRI DEPENDENT.
LAMBDA (SYMMETRIC) = 0.24242
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.26937 WITH LEVEL2 DEPENDENT. = 0.24569 WITH AGRI DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.25698
KENDALL'S TAU B = 0.43387. SIGNIFICANCE = 0.0055
KENDALL'S TAU C = 0.42667. SIGNIFICANCE = 0.0055
GAMMA = 0.56180
SOMERS'S D (ASYMMETRIC) = 0.42918 WITH LEVEL2 DEPENDENT. = 0.43860 WITH AGRI DEPENDENT.
SOMERS'S D (SYMMETRIC) = 0.43384
ETA = 0.53450 WITH LEVEL2 DEPENDENT. = 0.52506 WITH AGRI DEPENDENT.
PEARSON'S R = 0.51779 SIGNIFICANCE = 0.0040

NUMBER OF MISSING OBSERVATIONS = 35

FILE HRAF (CREATION DATE = 10/26/80)

* * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * * *
LEVEL2 BY CROP PRINCIPAL CROP
* PAGE 1 OF 1

LEVEL2	COUNT / COL PCT	CROP: ROOTS OR TUBERS 5	CEREAL G RAINS 6	ROW TOTAL
MATH 1	1	1 / 25.0	0 / 0.0	1 / 6.3
MATH 2	2	1 / 25.0	2 / 16.7	3 / 18.8
MATH 3	3	1 / 25.0	5 / 41.7	6 / 37.5
MATH 4	4	1 / 25.0	5 / 41.7	6 / 37.5
	COLUMN TOTAL	4 / 25.0	12 / 75.0	16 / 100.0

RAW CHI SQUARE = 3.55555 WITH 3 DEGREES OF FREEDOM. SIGNIFICANCE = 0.3136
CRAMER'S V = 0.47140
CONTINGENCY COEFFICIENT = 0.42640
LAMBDA (ASYMMETRIC) = 0.0 WITH LEVEL2 DEPENDENT. = 0.25000 WITH CROP DEPENDENT.
LAMBDA (SYMMETRIC) = 0.07143
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.08593 WITH LEVEL2 DEPENDENT. = 0.18684 WITH CROP DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.11772
KENDALL'S TAU B = 0.27854. SIGNIFICANCE = 0.1238
KENDALL'S TAU C = 0.28125. SIGNIFICANCE = 0.1238
GAMMA = 0.50000
SOMERS'S D (ASYMMETRIC) = 0.37500 WITH LEVEL2 DEPENDENT. = 0.20690 WITH CROP DEPENDENT.
SOMERS'S D (SYMMETRIC) = 0.26667
ETA = 0.36116 WITH LEVEL2 DEPENDENT. = 0.47140 WITH CROP DEPENDENT.
PEARSON'S R = 0.36116 SIGNIFICANCE = 0.0847

NUMBER OF MISSING OBSERVATIONS = 44

CROSSTABULATION

FILE HRAF (CREATION DATE = 10/26/80)

* * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * *
LEVEL2 BY SETTLE SETTLEMENT PATTERN * * * * PAGE 1 OF 1

LEVEL2 (COUNT / COL PCT)	SETTLE: FULLY MIGRATORY 1	SEMINOMADIC 2	SEMISEDENTARY 3	IMPERMANENT COMP 4	NEIGHBORHOODS 5	PERMANENT CO PAC 7	ROW TOTAL
MATH 1 (1)	2	3	0	0	0	0	5
	40.0	50.0	0.0	0.0	0.0	0.0	20.0
MATH 2 (2)	0	1	1	1	0	1	4
	0.0	16.7	50.0	100.0	0.0	10.0	16.0
MATH 3 (3)	2	2	0	0	1	3	8
	40.0	33.3	0.0	0.0	100.0	30.0	32.0
MATH 4 (4)	1	0	1	0	0	6	8
	20.0	0.0	50.0	0.0	0.0	60.0	32.0
COLUMN TOTAL	5	6	2	1	1	10	25
	20.0	24.0	8.0	4.0	4.0	40.0	100.0

RAW CHI SQUARE = 21.49995 WITH 15 DEGREES OF FREEDOM. SIGNIFICANCE = 0.1216
CRAMER'S V = 0.53541
CONTINGENCY COEFFICIENT = 0.67997
LAMBDA (ASYMMETRIC) = 0.35294 WITH LEVEL2 DEPENDENT. = 0.20000 WITH SETTLE DEPENDENT.
LAMBDA (SYMMETRIC) = 0.28125
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.35407 WITH LEVEL2 DEPENDENT. = 0.31935 WITH SETTLE DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.33581
KENDALL'S TAU B = 0.44201. SIGNIFICANCE = 0.0049
KENDALL'S TAU C = 0.43093. SIGNIFICANCE = 0.0049
GAMMA = 0.55801
SOMERS'S D (ASYMMETRIC) = 0.44105 WITH LEVEL2 DEPENDENT. = 0.44298 WITH SETTLE DEPENDENT.
SOMERS'S D (SYMMETRIC) = 0.44201
ETA = 0.62733 WITH LEVEL2 DEPENDENT. = 0.57302 WITH SETTLE DEPENDENT.
PEARSON'S R = 0.54716 SIGNIFICANCE = 0.0023

NUMBER OF MISSING OBSERVATIONS = 35

* C R O S S T A B U L A T I O N O F *
LEVEL2 BY MEANSIZE MEAN COMMUNITY SIZE
* PAGE 1 OF 1

LEVEL2	COUNT / COL PCT	MEANSIZE LESS THA IN 50 (1)	50-99 (2)	100-199 (3)	200-399 (4)	TOWN OF 5000-500 (7)	CITY OF> 50000 (8)	ROW TOTAL
MATH 1	1	4	1	0	0	0	0	5
		44.4	25.0	0.0	0.0	0.0	0.0	22.7
MATH 2	2	2	0	0	1	0	0	3
		22.2	0.0	0.0	50.0	0.0	0.0	13.6
MATH 3	3	3	1	1	0	1	0	6
		33.3	25.0	50.0	0.0	100.0	0.0	27.3
MATH 4	4	0	2	1	1	0	4	8
		0.0	50.0	50.0	50.0	0.0	100.0	36.4
	COLUMN TOTAL	9	4	2	2	1	4	22
		40.9	18.2	9.1	9.1	4.5	18.2	100.0

RAW CHI SQUARE = 20.43147 WITH 15 DEGREES OF FREEDOM, SIGNIFICANCE = 0.1560
CRAMER'S V = 0.55639
CONTINGENCY COEFFICIENT = 0.69391
LAMBDA (ASYMMETRIC) = 0.35714 WITH LEVEL2 DEPENDENT. = 0.30769 WITH MEANSIZE DEPENDENT.
LAMBDA (SYMMETRIC) = 0.33333
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.43707 WITH LEVEL2 DEPENDENT. = 0.37232 WITH MEANSIZE DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.40210
KENDALL'S TAU B = 0.58435. SIGNIFICANCE = 0.0007
KENDALL'S TAU C = 0.57300. SIGNIFICANCE = 0.0007
GAMMA = 0.73239
SOMERS'S D (ASYMMETRIC) = 0.57459 WITH LEVEL2 DEPENDENT. = 0.59429 WITH MEANSIZE DEPENDENT.
SOMERS'S D (SYMMETRIC) = 0.58427
ETA = 0.69620 WITH LEVEL2 DEPENDENT. = 0.64336 WITH MEANSIZE DEPENDENT.
PEARSON'S R = 0.59693 SIGNIFICANCE = 0.0017

NUMBER OF MISSING OBSERVATIONS = 38

CROSSTABUALTION

FILE HEAP (CREATION DATE = 10/26/80)

* * * * * * * * * * * * * * * * * * C R O S S T A B U L A T I O N O F *
LEVEL2 BY COMMHIER LOCAL HIERARCHY * * * * * PAGE 1 OF 1

LEVEL2	COUNT / COL PCT	COMMHIER: TWO LEVELS 3	THREE LEVELS 4	FOUR LEVELS 5	ROW TOTAL
MATH 1	1	4 57.1	1 6.3	0 0.0	5 20.0
MATH 2	2	1 14.3	3 18.8	0 0.0	4 16.0
MATH 3	3	2 28.6	5 31.3	1 50.0	8 32.0
MATH 4	4	0 0.0	7 43.8	1 50.0	8 32.0
	COLUMN TOTAL	7 28.0	16 64.0	2 8.0	25 100.0

RAW CHI SQUARE = 10.51339 WITH 6 DEGREES OF FREEDOM. SIGNIFICANCE = 0.1046
CRAMER'S V = 0.45855
CONTINGENCY COEFFICIENT = 0.54410
LAMBDA (ASYMMETRIC) = 0.23529 WITH LEVEL2 DEPENDENT. = 0.33333 WITH COMMHIER DEPENDENT.
LAMBDA (SYMMETRIC) = 0.26923
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.18255 WITH LEVEL2 DEPENDENT. = 0.29073 WITH COMMHIER DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.22428
KENDALL'S TAU B = 0.50053. SIGNIFICANCE = 0.0030
KENDALL'S TAU C = 0.45600. SIGNIFICANCE = 0.0030
GAMMA = 0.74803
SOMERS'S D (ASYMMETRIC) = 0.60127 WITH LEVEL2 DEPENDENT. = 0.41667 WITH COMMHIER DEPENDENT.
SOMERS'S D (SYMMETRIC) = 0.49223
ETA = 0.59671 WITH LEVEL2 DEPENDENT. = 0.58095 WITH COMMHIER DEPENDENT.
PEARSON'S R = 0.56281 SIGNIFICANCE = 0.0017

NUMBER OF MISSING OBSERVATIONS = 35

FILE HRAF (CREATION DATE = 10/26/80)

* C R O S S T A B U L A T I O N O F *
LEVEL2 BY GAMES TYPES OF GAMES
* PAGE 1 OF 1

LEVEL2	COUNT / COL PCT	NO GAMES 1	PHYSICAL SKILL 2	STRATEGY 4	SKILL AND CHANCE 5	SKILL AND STRATE 6	ALL THREE TYPES 8	ROW TOTAL
MATH 1	1	0	3	0	1	0	0	4
		0.0	75.0	0.0	25.0	0.0	0.0	22.2
MATH 2	2	1	0	0	2	0	0	3
		50.0	0.0	0.0	50.0	0.0	0.0	16.7
MATH 3	3	1	1	1	0	1	2	6
		50.0	25.0	100.0	0.0	50.0	40.0	33.3
MATH 4	4	0	0	0	1	1	3	5
		0.0	0.0	0.0	25.0	50.0	60.0	27.8
COLUMN TOTAL		2	4	1	4	2	5	18
		11.1	22.2	5.6	22.2	11.1	27.8	100.0

RAW CHI-SQUARE = 20.57991 WITH 15 DEGREES OF FREEDOM. SIGNIFICANCE = 0.1508
CRAMER'S V = 0.61734
CONTINGENCY COEFFICIENT = 0.73037
LAMBDA (ASYMMETRIC) = 0.41667 WITH LEVEL2 DEPENDENT. = 0.38462 WITH GAMES DEPENDENT.
LAMBDA (SYMMETRIC) = 0.40000
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.48557 WITH LEVEL2 DEPENDENT. = 0.39321 WITH GAMES DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.43454
KENDALL'S TAU B = 0.49234. SIGNIFICANCE = 0.0067
KENDALL'S TAU C = 0.50206. SIGNIFICANCE = 0.0067
GAMMA = 0.59223
SOMERS'S D (ASYMMETRIC) = 0.47287 WITH LEVEL2 DEPENDENT. = 0.51261 WITH GAMES DEPENDENT.
SOMERS'S D (SYMMETRIC) = 0.49194
ETA = 0.74009 WITH LEVEL2 DEPENDENT. = 0.62428 WITH GAMES DEPENDENT.
PEARSON'S R = 0.60939 SIGNIFICANCE = 0.0036

NUMBER OF MISSING OBSERVATIONS = 42

CROSSTABUALTION

FILE HEAP (CREATION DATE = 10/26/80)

* C R O S S T A B U L A T I O N O F *
LEVEL2 BY ATYPE PREDOMINANT ANIMAL
* PAGE 1 OF 1

LEVEL2	COUNT / COL PCT	ATYPE: ABSENT O IN NEARLY 1	PIGS 2	SHEEP AND OR GOA 3	EQUINE A NIMALS 4	DEER 5	CAMELS, ALPACAS, 6	BOVINE A NIMALS 7	ROW TOTAL
MATH 1	1	5 50.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	0 0.0	5 19.2
MATH 2	2	3 30.0	0 0.0	0 0.0	1 100.0	0 0.0	0 0.0	1 9.1	5 19.2
MATH 3	3	1 10.0	0 0.0	1 100.0	0 0.0	1 100.0	1 100.0	4 36.4	8 30.8
MATH 4	4	1 10.0	1 100.0	0 0.0	0 0.0	0 0.0	0 0.0	6 54.5	8 30.8
	COLUMN TOTAL	10 38.5	1 3.8	1 3.8	1 3.8	1 3.8	1 3.8	11 42.3	26 100.0

RAW CHI SQUARE = 26.36621 WITH 18 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0917
CRAMER'S V = 0.58140
CONTINGENCY COEFFICIENT = 0.70957
LAMBDA (ASYMMETRIC) = 0.44444 WITH LEVEL2 DEPENDENT. = 0.46667 WITH ATYPE DEPENDENT.
LAMBDA (SYMMETRIC) = 0.45455
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.38424 WITH LEVEL2 DEPENDENT. = 0.38465 WITH ATYPE DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.38445
KENDALL'S TAU B = 0.57035. SIGNIFICANCE = 0.0004
KENDALL'S TAU C = 0.53254. SIGNIFICANCE = 0.0004
GAMMA = 0.73770
SOMERS'S D (ASYMMETRIC) = 0.60000 WITH LEVEL2 DEPENDENT. = 0.54217 WITH ATYPE DEPENDENT.
SOMERS'S D (SYMMETRIC) = 0.56962
ETA = 0.73454 WITH LEVEL2 DEPENDENT. = 0.66596 WITH ATYPE DEPENDENT.
PEARSON'S R = 0.63352 SIGNIFICANCE = 0.0003

NUMBER OF MISSING OBSERVATIONS = 34

FILE HRAF (CREATION DATE = 10/26/80)

* * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * *
LEVEL2 BY SUBECON SUBSISTENCE ECONOMY
* PAGE 1 OF 1

LEVEL2	COUNT / COL PCT	GATHERING 1	FISHING 2	HUNTING 3	PASTORAL 4	INCIPIENT AGRICU 5	EXTENSIVE AGRICU 6	INSTIVE AGRICULT 7	ROW TOTAL
MATH 1	1	1	2	2	0	0	0	0	5
		100.0	40.0	66.7	0.0	0.0	0.0	0.0	19.2
MATH 2	2	0	1	0	0	1	2	1	5
		0.0	20.0	0.0	0.0	100.0	33.3	14.3	19.2
MATH 3	3	0	1	1	2	0	2	2	8
		0.0	20.0	33.3	66.7	0.0	33.3	28.6	30.8
MATH 4	4	0	1	0	1	0	2	4	8
		0.0	20.0	0.0	33.3	0.0	33.3	57.1	30.8
	COLUMN TOTAL	1	5	3	3	1	6	7	26
		3.8	19.2	11.5	11.5	3.8	23.1	26.9	100.0

RAW CHI SQUARE = 22.16173 WITH 18 DEGREES OF FREEDOM. SIGNIFICANCE = 0.2249
CRAMER'S V = 0.53303
CONTINGENCY COEFFICIENT = 0.67835
LAMBDA (ASYMMETRIC) = 0.33333 WITH LEVEL2 DEPENDENT. = 0.15789 WITH SUBECON DEPENDENT.
LAMBDA (SYMMETRIC) = 0.24324
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.32773 WITH LEVEL2 DEPENDENT. = 0.25347 WITH SUBECON DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.28586
KENDALL'S TAU B = 0.42957. SIGNIFICANCE = 0.0043
KENDALL'S TAU C = 0.44181. SIGNIFICANCE = 0.0043
GAMMA = 0.53333
SOMERS'S D (ASYMMETRIC) = 0.41026 WITH LEVEL2 DEPENDENT. = 0.44980 WITH SUBECON DEPENDENT.
SOMERS'S D (SYMMETRIC) = 0.42912
ETA = 0.65300 WITH LEVEL2 DEPENDENT. = 0.62169 WITH SUBECON DEPENDENT.
PEARSON'S R = 0.53325 SIGNIFICANCE = 0.0025

NUMBER OF MISSING OBSERVATIONS = 34

CROSSTABULATION

FILE HRAP (CREATION DATE = 10/26/80)

* * * * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * * * *
LEVEL2 SEX SPECIALIZATION-WEAVING BY WEAVE1 PAGE 1 OF 1

LEVEL2	COUNT / COL PCT	WEAVE1: MALES ALONE 1	FEMALES MORE 5	FEMALES ALONE 6	ACTIVITY ABSENT 9	ROW TOTAL
MATH 1	1	0 0.0	0 0.0	1 16.7	4 36.4	5 21.7
MATH 2	2	0 0.0	0 0.0	0 0.0	4 36.4	4 17.4
MATH 3	3	4 80.0	0 0.0	3 50.0	1 9.1	8 34.8
MATH 4	4	1 20.0	1 100.0	2 33.3	2 18.2	6 26.1
COLUMN TOTAL		5 21.7	1 4.3	6 26.1	11 47.8	23 100.0

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RAW CHI SQUARE =    15.10456 WITH    9 DEGREES OF FREEDOM.  SIGNIFICANCE =  0.0870
CRAMER'S V =  0.46849
CONTINGENCY COEFFICIENT =  0.63010
LAMBDA (ASYMMETRIC) =  0.26667 WITH LEVEL2  DEPENDENT.        =  0.25000 WITH WEAVE1  DEPENDENT.
LAMBDA (SYMMETRIC) =  0.25926
UNCERTAINTY COEFFICIENT (ASYMMETRIC) =  0.27835 WITH LEVEL2  DEPENDENT.     =  0.32170 WITH WEAVE1  DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) =  0.29846
KENDALL'S TAU B = -0.38756.   SIGNIFICANCE =  0.0173
KENDALL'S TAU C = -0.35791.   SIGNIFICANCE =  0.0173
GAMMA = -0.51825
SOMERS'S D (ASYMMETRIC) = -0.41040 WITH LEVEL2  DEPENDENT.     = -0.36598 WITH WEAVE1  DEPENDENT.
SOMERS'S D (SYMMETRIC) = -0.38692
ETA =  0.52523 WITH LEVEL2  DEPENDENT.     =  0.66580 WITH WEAVE1  DEPENDENT.
PEARSON'S R = -0.43090   SIGNIFICANCE =  0.0200

NUMBER OF MISSING OBSERVATIONS =    37
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LEVEL2 BY WEAVE2 AGE SPECIALIZATION-WEAVING
* PAGE 1 OF 1

LEVEL2	COUNT / COL PCT	WEAVE2: ICRACT 3	NONE OR DON,T-KN 9	ROW TOTAL
MATH 1	1	0 / 0.0	5 / 23.8	5 / 19.2
MATH 2	2	0 / 0.0	5 / 23.8	5 / 19.2
MATH 3	3	4 / 80.0	4 / 19.0	8 / 30.8
MATH 4	4	1 / 20.0	7 / 33.3	8 / 30.8
COLUMN TOTAL		5 / 19.2	21 / 80.8	26 / 100.0

RAW CHI SQUARE = 7.49048 WITH 3 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0578
CRAMER'S V = 0.53675
CONTINGENCY COEFFICIENT = 0.47293
LAMBDA (ASYMMETRIC) = 0.16667 WITH LEVEL2 DEPENDENT. = 0.0 WITH WEAVE2 DEPENDENT.
LAMBDA (SYMMETRIC) = 0.13043
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.11795 WITH LEVEL2 DEPENDENT. = 0.32754 WITH WEAVE2 DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.17344
KENDALL'S TAU B = -0.16080. SIGNIFICANCE = 0.1901
KENDALL'S TAU C = -0.15385. SIGNIFICANCE = 0.1901
GAMMA = -0.31707
SOMERS'S D (ASYMMETRIC) = -0.24762 WITH LEVEL2 DEPENDENT. = -0.10442 WITH WEAVE2 DEPENDENT.
SOMERS'S D (SYMMETRIC) = -0.14689
ETA = 0.20930 WITH LEVEL2 DEPENDENT. = 0.53675 WITH WEAVE2 DEPENDENT.
PEARSON'S R = -0.20930 SIGNIFICANCE = 0.1524

NUMBER OF MISSING OBSERVATIONS = 34

CROSSTABULATION

FILE HRAP (CREATION DATE = 10/26/80)

* * * * * * * * * C R O S S T A B U L A T I O N O F * * * * * * * * *
LEVEL2 BY CLASS1 CLASS STRATIFICATION-MAIN TYPE PAGE 1 OF 1

LEVEL2 (COUNT / COL PCT)		CLASS1: ABSENCE 1	HEALTH DISTINCTI 2	HEREDITARY ARIST 4	COMPLES-CLASSES 5	ROW TOTAL
MATH 1	1	5	0	0	0	5
		55.6	0.0	0.0	0.0	20.0
MATH 2	2	1	2	1	0	4
		11.1	22.2	33.3	0.0	16.0
MATH 3	3	2	5	1	0	8
		22.2	55.6	33.3	0.0	32.0
MATH 4	4	1	2	1	4	8
		11.1	22.2	33.3	100.0	32.0
COLUMN TOTAL		9	9	3	4	25
		36.0	36.0	12.0	16.0	100.0

RAW CHI SQUARE = 20.83331 WITH 9 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0134
CRAMER'S V = 0.52705
CONTINGENCY COEFFICIENT = 0.67420
LAMBDA (ASYMMETRIC) = 0.41176 WITH LEVEL2 DEPENDENT. = 0.43750 WITH CLASS1 DEPENDENT.
LAMBDA (SYMMETRIC) = 0.42424
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.32777 WITH LEVEL2 DEPENDENT. = 0.34338 WITH CLASS1 DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.33539
KENDALL'S TAU B = 0.57282. SIGNIFICANCE = 0.0005
KENDALL'S TAU C = 0.54613. SIGNIFICANCE = 0.0005
GAMMA = 0.72727
SOMERS'S D (ASYMMETRIC) = 0.58447 WITH LEVEL2 DEPENDENT. = 0.56140 WITH CLASS1 DEPENDENT.
SOMERS'S D (SYMMETRIC) = 0.57271
ETA = 0.66884 WITH LEVEL2 DEPENDENT. = 0.65600 WITH CLASS1 DEPENDENT.
PEARSON'S R = 0.59606 SIGNIFICANCE = 0.0008

NUMBER OF MISSING OBSERVATIONS = 35

CROSSTABUALTION

FILE HRAP (CREATION DATE = 10/26/80)

* * * * * * * * C R O S S T A B U L A T I O N O F LEVEL2 BY POLINT POLITICAL INTEGRATION * * * * * * * * PAGE 1 OF 1

LEVEL2	COUNT / COL PCT	ABSENT 1	LOCAL COMMUNITY 2	PEACE GROUPS 3	MINIMAL STATES 4	LITTLE STATES 5	STATES 6	ROW TOTAL
MATH 1	1	1	2	0	0	0	0	3
		100.0	22.2	0.0	0.0	0.0	0.0	13.6
MATH 2	2	0	3	0	1	0	0	4
		0.0	33.3	0.0	33.3	0.0	0.0	18.2
MATH 3	3	0	3	0	2	2	1	8
		0.0	33.3	0.0	66.7	100.0	20.0	36.4
MATH 4	4	0	1	2	0	0	4	7
		0.0	[illegible]	100.0	0.0	0.0	80.0	31.8
COLUMN TOTAL		1	9	2	3	2	5	22
		4.5	40.9	9.1	13.6	9.1	22.7	100.0

RAW CHI SQUARE = 25.08461 WITH 15 DEGREES OF FREEDOM. SIGNIFICANCE = 0.0488
CRAMER'S V = 0.61650
CONTINGENCY COEFFICIENT = 0.72990
LAMBDA (ASYMMETRIC) = 0.42857 WITH LEVEL2 DEPENDENT. = 0.23077 WITH POLINT DEPENDENT.
LAMBDA (SYMMETRIC) = 0.33333
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.43925 WITH LEVEL2 DEPENDENT. = 0.37219 WITH POLINT DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.40295
KENDALL'S TAU B = 0.54402. SIGNIFICANCE = 0.0014
KENDALL'S TAU C = 0.52893. SIGNIFICANCE = 0.0014
GAMMA = 0.69565
SOMERS'S D (ASYMMETRIC) = 0.53333 WITH LEVEL2 DEPENDENT. = 0.55491 WITH POLINT DEPENDENT.
SOMERS'S D (SYMMETRIC) = 0.54391
ETA = 0.76220 WITH LEVEL2 DEPENDENT. = 0.59683 WITH POLINT DEPENDENT.
PEARSON'S R = 0.59406 SIGNIFICANCE = 0.0016

NUMBER OF MISSING OBSERVATIONS = 38

CROSSTABULATION

FILE HRAP (CREATION DATE = 10/26/80)

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LEVEL2 BY ENVIRON1 PRIMARY ENVIRONMENT * * * * * * * * * * * * * * * PAGE 1 OF 1

LEVEL2	COUNT / COL PCT	TUNDRA 23	N. CONIFEROUS FO 36	TEMPERATE FOREST 46	DESERT GRASS & 52	G S E GRASS 54	TEMPERATE WOODLA 56	SUB-TROPICAL FOR 78	TROPICAL GRASS 84	MONSOON FOREST 87	TROPICAL FOREST 88	ROW TOTAL
MATH 1	1	2	0	0	1	0	0	0	0	0	1	4
		66.7	0.0	0.0	33.3	0.0	0.0	0.0	0.0	0.0	14.3	17.4
MATH 2	2	0	0	1	0	1	0	0	0	0	2	4
		0.0	0.0	50.0	0.0	100.0	0.0	0.0	0.0	0.0	28.6	17.4
MATH 3	3	1	2	1	1	0	0	0	0	1	2	8
		33.3	100.0	50.0	33.3	0.0	0.0	0.0	0.0	100.0	28.6	34.8
MATH 4	4	0	0	0	1	0	1	1	2	0	2	7
		0.0	0.0	0.0	33.3	0.0	100.0	100.0	100.0	0.0	28.6	30.4
	COLUMN TOTAL	3	2	2	3	1	1	1	2	1	7	23
		13.0	8.7	8.7	13.0	4.3	4.3	4.3	8.7	4.3	30.4	100.0

RAW CHI SQUARE = 29.05301 WITH 27 DEGREES OF FREEDOM. SIGNIFICANCE = 0.3583
CRAMER'S V = 0.64889
CONTINGENCY COEFFICIENT = 0.74709
LAMBDA (ASYMMETRIC) = 0.40000 WITH LEVEL2 DEPENDENT. = 0.06250 WITH ENVIRON1 DEPENDENT.
LAMBDA (SYMMETRIC) = 0.22581
UNCERTAINTY COEFFICIENT (ASYMMETRIC) = 0.47824 WITH LEVEL2 DEPENDENT. = 0.30820 WITH ENVIRON1 DEPENDENT.
UNCERTAINTY COEFFICIENT (SYMMETRIC) = 0.37484
KENDALL'S TAU B = 0.19331, SIGNIFICANCE = 0.1300
KENDALL'S TAU C = 0.20164, SIGNIFICANCE = 0.1300
GAMMA = 0.23810
SOMERS'S D (ASYMMETRIC) = 0.17937 WITH LEVEL2 DEPENDENT. = 0.20833 WITH ENVIRON1 DEPENDENT.
SOMERS'S D (SYMMETRIC) = 0.19277
ETA = 0.64112 WITH LEVEL2 DEPENDENT. = 0.44514 WITH ENVIRON1 DEPENDENT.
PEARSON'S R = 0.33411 SIGNIFICANCE = 0.0596

NUMBER OF MISSING OBSERVATIONS = 37

Subsist3==Fishing: There is no significant relationship between fishing and math type because this subsistence practice may be of importance to quite simple cultures as well as very advanced ones.
Subsist4==Animal Husbandry: There is a significant and reasonably strong relationship between animal husbandry and math type. Animal herds are universally viewed as a sign of wealth where the desire to count is therefore quite high. As a result, the math type is quite high even among rather simple cultures such as the Lapps.
Subsist5==Agriculture: There is a rather weak and barely significant relationship between the two variables. As we have seen, simple horticultural societies with redistributive systems will have rather complex math, while others with little concern with wealth status have simple math systems while at the same time being rather dependent upon agriculture.
Comor j==Community Organization: The relationship is barely not significant.
Agri==Intensity of Agriculture: There is a rather strong, significant association, undoubtedly because the cultures with intense agriculture are quite complex and have highly developed organization and a concern for wealth.
Settle==Settlement Pattern: A rather strong and significant relationship exists which is undoubtedly lowered by high math types among pastoral nomads.
Meansize==Mean Community Size: The relationship is quite strong and highly significant. Larger communities, with their need for organization and their occurence among more complex cultures, tend to have higher math types.
Commhier==Local Hierarchy: The relationship between the number of

levels of community hierarchy and the level of math types is also strong and significant for essentially the same reasons that obtain for Meansize.

Games==Types of Games: Considering the value of Games as a predictor shown by the multiple regression, the association between Games and math types is not unusually high. It is, however, highly significant and indicates, as might be expected, that cultures that have significant math skills tend to play more complex games.

Atype==Predominant Domesticated Animal: The relationship between the predominant domesticated animal and the math types is quite high and significant. To reiterate, the reason appears to be that herding cultures universally develop counting systems as part of the pastoral cultural pattern.

Subecon==Subsistence Economy: Subecon shows a moderate, significant relationship to cultural math types which is lowered somewhat by the fact, noted above, that fishing can be important from the simplest to the most complex of cultures.

Weavel==Sex Specialization in Weaving: Weaving was selected for analysis because of the relation between weaving and counting which is necessary to produce patterns. There is a significant but moderate negative relationship between the two variables. Basically, simple cultures with low math types tend to have weaving as a personal activity conducted by females while more complex cultures with full time craft specialists, who tend to be men, also have higher math types.

Classl==Class Stratification: There is a strong and highly significant relationship between the presence of social classes and math types. This is to be expected, since classes are based upon accumulated wealth which quite naturally requires the development of sophistication in mathematics.

Pollnt==Political Integration: For much the same reasons as Classl, there is a strong, significant relationship between Pollnt and math types. This is another of the cultural evolution variables in which complexity of organization can be related to mathematical development.

CONCLUSIONS

There are two separate lines of development of the math types, both related to the ne to count. One of these is cultural evolution, which has been shown to account for the development of complexity in cultures. To put it in modern anthropological perspective, humans are unique among biological organisms in depending on culture--learned behavior--to adapt to the environment. In so doing, they have freed themselves in large part from the need to change genetically in order to adapt to changing environments. Rather, humans change their culture to adapt. As a result, human culture itself has been shown to behave in a way analogous to biological evolution which is called cultural evolution. Many recent cross-cultural studies have statistically validated the reality of cultural evolution for human cultures on a world-wide basis (McNett 1970a for example).

These studies have shown that as cultures adapt to their environmen including other cultures around them as well as the physical ronment, they tend to become more complex. This complexity has been shown to be the direct result of the subsistence practices of the individual culture which in turn lead to a typical, evolutionary series of settlement patterns (McNett 1970a, 1970b). A host of cultural traits, primarily in economics, politics, and religion, are now known to be functionally related to the settlement pattern (McNett 1970a).

From the analysis above, it is now clear that math types are another cultural trait that behaves in an evolutionary fashion. It is postulated here that as cultures become more complexly organized, the need to develop ever more sophisticated mathematical concepts and practices is heightened. The development of social classes based upon wealth, complex economic transactions, the collection of taxes, support of religious heirarchies, and similar cultural traits could not exist without the development of mathematical skills.

At the same time, there is a cross-cutting trend for the development of similar mathematical skills among rather simple cultures whose rather special circumstances dictate a need to count. Two classes of cultures are particularly noticeable in this regard. In the first place, pastoral cultures universally seem to have developed significant mathematical skills relating to the maintenance of their herds. From the point of view of the hunter, more than two buffalo are a lot, but from the point of view of the herder, 66 reindeer is quite different from 65.

The second group of aberrant cultures from an evolutionary point of view are the simple horticulturalists or gatherers in abundant environments who have developed social classes based upon the redistribution of accumulated wealth by the kin group head. Status is achieved by the kin head (and secondarily by the members of the kin group) through the redistribution of this wealth at periodic feasts or other ceremonies. Such cultures develop an almost fanatical concern with counting, since the kin head receiving gifts at a function must return them and more at the next function in order to maintain or increase status.

In both cases, then, a real need to count causes cultures at a lower level of complexity to develop unexpected mathematical skills. The result of these confounding influences is that the influence of cultural evolution on the development of math types is somewhat obscured and the ordinal coefficients are lowered. However, it is abundantly clear that there is a great deal of predictable regularity in human mathematical development as there is in most of human culture.

From the point of view of this project, the fact of regularities in mathematical behavior on a world-wide basis is the most important aspect of this study. Cultures everywhere have developed roughly equivalent skills in response to the same needs. Looking specifically at American Indian groups within the United States, we see that a large number of them may be expected to have been at the level of Math Type 1, while a considerable proportion of the remainder were at Math Type 2. While some had reached Math Type 3, probably none within the political boundaries of the United States were at the highest level. This is, of course, not the result of any cultural inferiority, but simply the consequence of cultures without any significant need to develop more complex mathematical skills. A logical, albeit tentative, conclusion to the drawn is that one may expect a universal problem with American Indian students in learning modern mathematics and the attendant development of math avoidance syndrome.

The cross-cultural analysis, thus, <u>predicts</u> the presence of Indian student math-avoidance (something the project already suspected occurred in the Indian classroom). But the basis given for the prediction suggests several facets to the math avoidance issue which the project had <u>not</u> anticipated. Those details need to be highlighted here.

First, the cross-cultural study shows that American Indian math systems <u>cannot</u> be considered exclusively as Indian-systems. Nor do they contain properties which developed out of unique experiences in native North America. There appear to be universal factors, things not restricted in occurence solely to particular situations, which underlie the visible characteristics of Indian counting systems. Just as the tribes were not immune to the influences of universal culture history, neither were specific details in tribal cultures. If student knowledge of their tribe's traditional counting systems is acting as a barrier to student learning of Western mathematical skills, we <u>must</u> recognize that the basis for the barrier does not rest exclusively within those tribal traditions. Indian culture <u>alone</u> cannot bear the full responsibility for the Indian student's mathematical difficulties.

Second, the close connection between Indian math and (Indian) cultural type also implies certain facts about student knowledge of tribal math and its relation to knowledge of traditional culture as a whole. It seems possible to infer from this relationship that students who evidence knowledge of "traditional mathematics" may also be students who participate directly in the tribe's traditional institutions or otherwise keep themselves in direct contact with traditional culture. The validity of this prediction will be explored in subsequent chapters of this report.

Third, the findings of the cross-cultural study make it very clear that we cannot expect too much from this association between traditional math knowledge and traditional culture, at least where the prediction of student school achievement is concerned. Survey findings as reported here show numerous instances of societies whose math systems are composed of characteristics from several of the ideal "types". Cross-culturally, "membership" in one "type" or at one "level" in no way necessarily excludes a culture from exhibiting "membership" in a second such "type". Situational factors will determine the combination in each instance. And the comparative show that, if demands for type IV mathematical skills become imposed on a culture otherwise operating at a type I "level", the members of the culture will develop strategies and techniques for dealing with those demands. How closely the "type IV skills" will become integrated into the "type I system" is not the issue here (though, as in the garo example cited above, the nature of that integration tells us much about the conditions of the "type IV" demands and about the degree of "type IV" participation open to the tribe as a result of those conditions). What is the issue is the fact that "type I" knowledge does not prevent or preclude acquisition of "type IV" skills. If this is paid to be true at the cultural level, we may likewise expect it to prove to be true at the individual level: a student's knowledge of traditional mathematics need not automatically preclude or prevent him from acquiring control over non-traditional mathematics skills. The validity of this prediction will also be explored in subsequent chapters.

Chapter Four : The Research Sites -- Tribes, Schools, and In-field Activities

The original proposal for this research project introduced its sectio describing project goals and objectives (page 13) with the following statement:

> The research team proposes to conduct an intensive study of math avoidance and barriers to mathematics education among American Indian elementary school students on two Indian reservations. The overriding perspective and methodology of the study will be anthropological in nature. Through the research effort, the team should be able to identify the critical variables and factors which contribute to math avoidance among American Indians. In turn, this should permit the development of some general conclusions with respect to the nature and impact of different styles of cognitive problem-solving on mathematics education.

Clearly, to address these goals and objectives, a considerable amount of primary data about Indian student math skills, math learning, and related classroom experiences first had to be obtained. This meant that much of the work of this project came to center [illegible] field related activities. These included both the data-gathering a[illegible] at each site as well as the process of review and analysis require[illegible] to synthesize the information collected during the classroom observations, the formal interviewing, and the less formal in-field discussions. This chapter presents background information about each of the field sites (the Tribes and the reservation settings), followed by brief descriptions of the work done within each of these contexts. More general contrastive comments will be offered at appropriate points, to help into broader perspective the more specific findings to be detailed in the following chapters.

First, however, it is necessary to explain how the two field sites came to be selected. Originally, it was proposed that field-work be carried out within one of the Pueblo communities of central New Mexico and within one of the Tribes of the Pacific Northwest. Dr. Leap had worked on educational issues with several Pueblo communities on previous occasions. He brought considerable familiarity with Keresan and Tanoan language and traditional culture to the project. His more recent work in applied linguistics under the sponsorship of the Advocates for Indian Education (Spokane, WA) had taken him into the reservation communities of the Pacific northwest. He was assured of that organization's willingness to serve as mediator and source of introduction if site selection among the Pacific Tribes was to be undertaken.

Project staff did not follow through with either part of this plan, however. Between the submission of the proposal and notification of successful funding, Dr. Leap had become involved with a long-term language and education project on the Northern Ute reservation in northeastern Utah. Tribal government (and specifically, the Tribe's education office) had been voicing concerns about the failure of local schooling programs to turn out high school graduates capable of (and interested in) pursuing post-secondary studies in "hard sciences" or in other energy-related fields. This sounded, on face value, like a "math avoidance" situation. Knowing that a Tribal government was already concerned about the problem we proposed to research, it seemed more prudent to follow-up on that opportuntiy, rather than -- as would have to be the case in New Mexico and in the Pacific area, to bypass an existing interest in favor of a more open-ended search for access to some unspecified, and perhaps less acutely concerned, tribal context.

The decision to select Oneida, Wisconsin as our second field site resulted from similar considerations. Though this time, it was the Tribal government itself which contacted us, to ask if -- given our interest in math avoidance, they might open the facilities of the recently established, Tribally-controlled school for project research purposes. Again, it seemed wiser to respond to the invitation, even though none of the senior research staff were familiar with

Oneida (or Iroquoian) linguistics and traditional cultures*. Oneida, like Northern Ute, was offering full backing of Tribal government for this inquiry. And this would mean that a foundation for negotiating, with school authorities with students and with their parents would already have been put into place long before any member of the project staff ventured into the field.

Fieldwork on the Northern Ute reservation was carried out during the month of January, 1980. It was decided to alter the original research plan and delay fieldwork at the second site until late spring, so staff would have ample time to research the Northern Ute field data and identify any necessary modifications in the data-gathering plan before the information was collected within the second Tribal context. As it turned out, this turned out to be a wise decision. Project staff had already summized that there would be several areas of contrast between the educational situations encountered at Northern Ute and at Oneida. Todd Elementary School was a public school, operating in terms of educational policies set by a non-Indian school board based some twenty-five miles away in the county seat (Vernal, Utah); the Oneida Tribal School, in contrast, was just that -- a school administered by Oneida people on behalf of Oneida students. So the difference in administration and in target population should certainly be expected to become reflected in the field data in numerous ways. There were other areas of contrast to be noted, and several of these contrasts will become clearer after baseline information about the Tribes and their reservation contexts are detailed.

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* This issue was resolved by adding to the part-time project staff, a woman who had studied Iroquoian languages as part of her undergraduate training and had continued to remain familiar with the Iroquoian literature while pursuing her graduate studies in anthropology at The American University. She was one of the two staff members to carry out in-field research at Oneida.

The Northern Ute Tribe -- more properly identified as the Uintah and Ouray Tribe of Ute Indians, Inc., is a 1,900 member federally recognized Indian Tribe incorporated under the terms of the Indian Reorganization (Wheeler-Howard) Act of 1934. Members of the on-reservation Indian population closely identify not only as Northern Utes but as members of one of three of the traditional Ute bands, the kin-based, multi-family social aggregates which provided the focus for seasonal economic and social activities in earlier times. Reservation members also recognize close affinity, both in terms of common customs and closely related languages, to the Ute peoples living on the Southern Ute reservation (Colorado) and the Ute Mountain reservation (sharing lands in Colorado, New Mexico and Utah). Marriage between families on these reservations is as common, as is the movement of a single family from one reservation to another at various points in the family's life together. The traditional language of all of these Ute peoples is still spoken by some parties on each of the reservations. At Northern Ute, until the start of a bilingual program at the elementary school in 1980, language fluency had a mosaic distribution - in some families, all members spoke it, in other families no one knew the language at all.

The Ute also recognize a close cultural relationships with Shoshone-Bannock Tribe living on the Fort Hall Indian reservation, with the Chemehuevi Tribe of southeastern California, and with other Tribes whose share membership in the Shoshone language family. More recent cultural innovations -- the Sun Dance religion is a primary consideration here, have also served to link up and further maintain ties between all of these peoples. Visitation and inter-marriage between them is also not infrequent.

So outside the context of their reservation, Northern Ute people can trace a large number of immediately adjacent ties and connections. They in no sense function as a cultural isolate, but have been and continue to be part and parcel of the whole "style" of cultural adaptation which anthropologists now refer to as the Great Basin "experience".

The Northern Ute reservation itself is located in northeastern Utah. Reservation land originally extended from the Strawberry Reservoir (just east of the Wasatch Mountain range in central Utah) well across the eastern border of the state of Utah and into the mountains of western Colorado. Today, however, reservation boundaries include only 1,008,152 square acres, approximately one-tenth of the land originally promised to the Tribe by the federal government. The Tribe itself owns and administers 970,273 acres of reservation land. The federal government claims 24 acres, and individual families (some of whom are non-Indian in background) have been allotted the remaining 37,855. Northern Ute people have been living in these areas since the middle of the 19th century when the federal government forcibly resettled members of <u>ten</u> of the Ute bands into this area. The three bands which exist on the reservation today are, in part, the result of amalgamation and consolidation of the original ten groupings

The center of Tribal government is the town of Fort Duchesne, Utah. The BIA's agency is located there as is the headquarters of the business committee and the offices of its several administrative divisions. Health services are provided through agreement with the county hospital located in Roosevelt, but predominately this has been a non-Indian, Mormon-based settlement; the town rests on what was Indian language but which was passed out of Tribal control under the terms of the Indian Allotment (or Dawes) Act of 1978. Northern Ute people do live in other towns within the reservation's checkerboarded boundaries ... Myton, some twenty miles west of Fort Duchesne; White Rock, 12 miles north of Fort Duchesne; Randlett, ten miles south of Fort Duchesne; and Ouray, approximately twenty miles further south of Randlett. Additionally, there are individual families and family groupings which maintain homes all across the reservation. And, again because of the Dawes Act, there also are numerous non-Indian families occupying privately owned lands across the reservation as well. There is no single population center at Northern Ute. And any attempt to convene a meeting, whether for political, educational or social purposes, always requires advance publicity and often a considerable amount of negotiation to coordinate transportation and other schedules.

Education services suffer directly as a result of the distance problem. The reservation straddles two counties -- Uintah county, whose county seat is based in Vernal , the larger commercial center twenty miles east of Fort Duchesne; and Duchesne county, whose administrative offices are based in Roosevelt. By agreement between the two counties, Ute children from across the reservation begin their grade school education at Todd Elementary School, the facility which served as the focus for much of the research done at Northern Ute. When junior high is completed, students may attend the county high school operated in Roosevelt, again regardless of the specific location of their home residence; or, as has become the prefered choice for many families, students are enrolled in one of the off-reservation boarding schools administered by the Bureau of Indian Affairs.

For most students, especially in the earliest years of their education outside the home, schooling entails lengthy and time-consuming bus rides. Students living in or near Ouray, for example, spend almost two hours a day commuting to and from Todd Elementary school. They leave early in the morning, return late in the afternoon, and face family responsibilities as well as completion of necessary homework assignments before preparing for bed.

The time problem alone may contribute to some of the frustration and dissatisfaction which student and their parents have come to associate with public school education. The absence of any stable opportunities for post-secondary educati.. within a hundred mile radius certainly enters in here. The lack of visible opportunities for on-reservation employment may also be contributing to student questions about the purpose (or ultimate usefulness) of schooling. Until the coming of the "energy industries" (the reservation sits on top of an extensive pockets of oil and natural gas), commercial life on the reservation centered exclusively around a few small grocery and general stores and a larger number of household-based "arts and crafts" activities. Tribal government offices are a source (though a limited one) for employment. The Tribe has operated a f... ure factory at various times in recent years; when open, the factory provides work for semi-skilled family members, but not nearly enough to offset the growing on-reservation unemployment rate documented in the findings of the 1980 Census. (BIA estimates that over 50 percent of those adults actively seeking employment are unable to find it in the immediate area.) Family farming, or more commonly share-cropping or day-laboring on some more fortunate person's farm, has become a strategy some household head rely on to help their families "get by" in difficult times. Overall, the Tribe's economic prospects look less than optimistic . The primary source of job growth in the area is the energy industry. But the job growth is occurring in the skilled and technical areas, not in the semi-skilled domains. To date, there are <u>no</u> Ute Indian geologists, geo-chemists, mathematics specialists, or petroleum engineers. And there are few Ute people trained and skilled in business management, marketing, or other of the whi... jobs which always grow out of a blue-collar "work boom". It was this ... ..fying separation between Tribal work force on-reservation job availability which led the Tribe's Education Division to respond enthusiastically to the prospect of participating, and benefiting from, the work of the Math Avoidance Project.

Oneida Tribal government was equally enthusiastic about participation in

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the project. Though the reasons for their interest were couched in somewhat different terms as the following paragraphs will make clear.

The Oneida Tribe of Wisconsin is a 2,000 member federally recognized Indian Tribe incorporated under the terms of the Indian Reorganization Act of 1934. Members of this Tribe closely identify with Oneida and other Iroquois peoples living on reservation lands in New York State and with the Iroquoian speaking Tribes of southern Canada. The Wisconsin Oneida were, in fact, originally residents of New York state and were part of the group of Indians which chose to move out of that area and resettle further to the west, once American independence had been secured from Britain and efforts were made to "extinguish" all remaining Indian claims to lands within the areas occupied by the thirteen colonies. This group of Onedia peoples settled just west of Green Bay, Wisconsin in 1846. Tribal claims to the land were not fully addressed until the 1930's, when the federal government purchased segments of property from individual landowners and consolidated them into what is now known as the 2,108 acre Oneida Indian reservation.

Ties to the New York and Canadian Iroquois, especially to the Oneida peoples who remained behind in New York state when the group moved to Wisconsin, have long been recognized by all parties. Travel over long distances in the summer months to renew ties with these distant relatives has long been common for Oneida people. But there has, until recently, been a barrier to fuller Wisconsin Oneida participation in political and ceremonial activities hosted by other Iroquoian Tribes. Fluency on the Oneida language began to decline shortly after the Tribe moved to their new home, until by the middle of this century there were almost no speakers of the ancestral language outside of the oldest members of the Tribe. This meant, for example, that Wisconsin Oneida people could observe and listen to, but could not always actively participate in longhouse ceremonies, since full participation in those ceremonies requires fluency in the ancestral language. History, geography, and linguistics have combined to produce a situation for the Wisconsin Oneida wherein, on the one hand, their cultural identity is clear, but on the other, they are not as deeply integrated into the full benefit of that identity as members of the Tribal community might prefer.

Education problems and difficulties experienced by younger members of the Tribe work to exacerbate those conditions. Until 1979, the public school system provided educational services to Oneida students. The problem was, the reservation is located at the junction of four counties. So, depending on residence, Oneida students may attend one of four different schools and become subjected to one of four different sets of teaching styles and instructional strategies. It is common, here as elsewhere, to find families moving from one part of the reservation to another over a given period of time. In this case, family movement often resulted in a crossing of a county line -- in turn requiring that students switch schools <u>and</u> school systems, leaving classmates behind to enter into new environments where friendships might or might not already be established. Tribal attempts to develop some degree of coordination between the school programs, or at least their treatment of Oneida students enrolled in those programs, continually proved unsuccessful. And, with the on-reservation population divided between four county domains, it became almost infeasible to think that a politically motivated Oneida might run for and successfully obtain an elected seat to one of the county school boards.

Education, then, rested almost totally outside of the control of Tribal government until the creation of the Oneida Tribal School in 1979. This program was called for by Tribal members and Tribal government specifically to create some alternative schooling facility for the younger members of the Tribe. Initally, things were deliberately done to make OTS seem as distinct as possible from the public school setting with which the students had become so familiar. (Comments on several of these activities will be made, below.) Alternative schooling still had to provide education, and so along with the development of opportunities for student participation in school governance (and other innovations), much attention was directed toward the development of a school curriculum which would, for all grades K-12, address the full range of needs and interests of Oneida students.

That the students (and their families) <u>were</u> interested in education was clear from the on-site interviewing. The utility of education and the roles it can play in personal development is certainly helped, for example, by the presence of the University of Wisconsin facility at nearby Green Bay. The town of Oneida -- the focal point for on-reservation Tribal government operations and for much of the small-scale commercial business managed by Oneida families -- could well be considered a bedroom community for Green Bay; many families have one or more members who commute into the city and work within its boundaries on a daily basis. The Wisconsin Oneida labor force has not been immune to the influences of the nation-wide recession. But, being closer to an urban environment <u>and</u> to its opportunities for post-secondary education and for technically focused skills-development, the on-reservation unemployment situation is not nearly as severe as is the case reported at Northern Ute. Undoubtedly, the location of the reservation within rich farming country and the tradition of family farming enterpreises which has long been a characteristic of <u>all</u> peoples in the state of Wisconsin, may also be affecting on-reservation employments levels, or, at least <u>per capita</u> income levels within the reservation's households.

The Northern Ute and Wisconsin Oneida Tribal communities are similar in size, and here the resemblances between the two Tribes comes to an end. Oneida occupies a land area one-tenth the size of Northern Ute. Northern Ute's rural isolation contrasts markedly with Oneida's location within a rapidly expanding urban area. The proximity of close cultural relatives for the Ute differs from the isolation experienced by the Wisconsin Oneida, given that surrounding Tribes in Wisconsin are <u>not</u> speakers of Iroquoian languages and the closest language speakers are in New York state or Canada. Contrasts between on-reservation demographics and political structures have been noted. And more of these contrasts of this sort will begin to emerge, once a closer look is given to the two school sites which became involved in the project -- Todd Elementary School (TES) the county-run public school in Fort Duchesne, Utah; and the Oneida Tribal School (OTS), the Tribally controlled school in Oneida, Wisconsin.

Todd Elementary School

Todd Elementary School (TES) is located on U.S. Highway 40 approximately 7 miles east of Roosevelt and 20 miles west of Vernal. The school is located in Ft. Duchesne, Utah. Also in Ft. Duchesne there are several small stores, a bowling alley, and the Tribally owned resort motel with restaurant and lounge. The students who attend TES either live on the western side of Uintah County (if non-Indian) or (if Indian) may live within any part of the reservation land. The non-Indian teachers on TES faculty commute either from Vernal or from Roosevelt. Indian teachers, in the main, live in Fort Duchesne or in Whiterocks.

The school offers educational services to students from kindergarten to grade 6. There are some 40 teachers and teacher-aides working at the school. Only five of the faculty have been at TES longer than two years. Typically, the pattern is that a new teacher, who usually is female and unmarried, will remain on faculty at TES only long enough to secure a position elsewhere in the county school system. Vernal is considered the "prime location" for employment.

TES is the only school in the district to have a sizeable Indian component within its student population. Forty-five percent of the students are Anglo; fifty-five are of Indian (almost always Ute) Indian background. The balance does not carry over into the faculty ranks. There are only four Indian teachers at TES. There are, however, several other Indian teacher aides who are working at TES as part of their training under the Tribally sponsored Teacher Training Program.

The classes. Four classes were observed and recorded during the field research. One, a third grade class, consisted of 29 children, 8 of whom are Indian. This is a "team-taught" class, meaning that students move from one classroom to another, for their instructor in math and other special topics. This teacher we observed also taught the "top" math class. In that class there are 24 children, five of whom are Inidan. The second third grade class observed had an Indian woman as its teacher. Her class was predominantly (15 out of 27) Indian in background. She taught the middle-level "team-taught" math class. The third class observed during field research was a fourth-fifth grade combination class. There are 36 students in this class of which eight are Indian. The teacher divides the class into "ability groups" for math exercises. In the lowest group there are 12 children, five of whom are Indian. The middle group contains 12 children, three of whom are Indian. The upper group contains 8 children,none of whom are Indian.

The final class observed was sponsored by the Title I program. The enrollment in Title I is determined by the level of achievement on the CAT tests. These are timed tests. Reportedly, there is poor attendance on the part of Indian children on the testing day. Children are chosen from the list of low achievers (i.e., low scorers) on the test or by specific request of the teacher. Automatically then, there are several factors weighing against Indian students in the selection process and the political breakdown of the students enrolled in Title I classes in January, 1980, attests to this. Considered grade by grade, we find:

grade 1	About half Indian and half Anglo; specific figures were not provided
grade 2	9 Indian students, 4 Anglo students
grade 3	6 Indian students, 7 Anglo students
grade 4	16 Indian students, 5 Anglo students
grade 5	20 Indian students, 2 Anglo students
grade 6	17 Indian students, 6 Anglo students

Title I program has a director (new as of 1979) and four instructional aides. The aides are not qualified to teach in the classroom without a fully certified teacher being present inthe room. So the aides are paid at somewhat of a lower rate than are the full-time teachers. One of the aides has been working with remedial education, particularly for Indian students, for more than fifteen years; a second has been working for more than ten years in such programs. The other two Title I aides have considerably less experience with these programs.

Fieldwork at TES began on Monday, January 7, 1980 and continued for the next four weeks. The week-by-week breakdown of field activities can be summarized in the following terms:

Week I, January 7 - 11, 1980

* attended math classes, making notes and observing, interacting with students as appropriate; nothing formal.
* identified seven students per class, whose math skills will be focused on during the project; three high achievers, three lower achievers, and one student in "middle range". Introductions to the students may be made.
* met with Ute tribe education committee to review project purposes and arrange for home-based interviews with parents; obtain their views on math issues, etc.
* met with school staff, especially those with interests in math issues, to discuss observed problems and solutions.

Week II, January 14 - 18, 1980

* continued in class observation, increasing informal interactions with students when possible and appropriate.
* collected parental consent forms, clearing the way for interviews with students and their family members.
* began home visiting of parents, to discuss project interests and to arrange times for more detailed discussions.
* began interviews with students at the school regarding math interests and skills.
* began informal discussion with teachers regarding the process of math instruction and problems Ute students appear to have in that process.

Week III, January 21 - 25, 1980

* tape-recorded in-class math instruction in observed classes.
* completed non-verbal interaction analysis of "turn-taking" during the lessons being taped.
* continued parental/home-based visiting and interviewing.
* continued interviews with students and with teachers.
* scheduled and conducted in-depth interviews with classroom teachers participating directly in the project.

Week IV, January 28 - 31, 1980

* completed classroom interviewing and observations.
* interviewed school officials and Tribal authorities regarding problems in Ute student education.
* completed parental/home-based interviewing.

Some of the specific activities identified in this agenda have already been detailed in the opening chapter of this report and will not be repeated here. It should be stressed once again, however, that the decision to extend the data-gathering, observation, and interview-discussion activities to actors outside of the classroom setting proved to be a wise one where the Northern Ute - TES situation was concerned. Staff had been on-site at TES only for a brief time before it became clear that, to understand fully what happens within the classroom context at this school, the in-class instructional process had to be viewed from a variety of perspectives. To do this, data had to be gathered relating to political conditions within the school district, social organization of the classroom, potential conflicts between student and classroom values systems, and to the concerns which parents, as family members and part of the Tribe, might bring to their children's education. Attention also had to be paid to the role(s) which traditional Ute culture itself might be playing within the classroom; and, as a part of those influences, to the impacts which Ute math and computational skills might be exercising within that domain. Some of the relevent data and the insights they brought to our understanding of Ute student education at TES will now be briefly reviewed.

Political conditions. As mentioned before TES is the only school which has an Indian population large enough to be considered a factor in the designing of school activities. Still, the district's policy is to standardize instruction for the whole district. And as a result, some of the student's special needs are not being met. For instance, Title I money is given in a lump sum for each school in the District. A school in Vernal has to divide its 1,000 dollars among 35 children. TES, on the other hand, has to divide its among 100 eligible students. There is a policy in the District requiring all classes to use the same books. These are chosen for their suitability for the majority of (non-Indian) students in the District. Indian needs do not receive high priority under those circumstances.

Instruction offered to Indian students at TES may be shortchanged in other ways. It is commonly held on the reservation that teachers who posed "disciplinary problems" at other schools in the District are sent to TES to work off the remainder of their contracts. It is also commonly argued that "good teachers" are encouraged to press for employment in Vernal's schools, hence teachers who end up at TES must be "second stringers". Whether either of these rumors holds any validity is beside the point; the fact is, parents, reservation officials and (from the content of our interviews) teachers themselves perceive TES and the faculty in that light. Delivery of instructional services cannot help but be affected by such attitudes, as will be seen below.

• The District has tacitly recognized the "hardship" encurred by teachers who have to commute great distances to TES every day. TES faculty receive an extra $500.00 a year, presumably to offset their additional travel expenses. Most teachers claim that the extra funds do not cover nearly all of the extra expenses imposed by their commute, however. The District remains unprepared to provide the $3,000 increment which several teachers at TES feel is a more equitable reimbursement.

Social details. Generally, classes at TES exceed the recommended number of students per room. Since the classes usually exceed 25 and since the class period for math lasts about 30 minutes, it is impossible for teachers to get around to all the children during each class meeting. Some students actually try to avoid being noticed by the teacher and remain outside of instructional activities for days at a time. Other students grow tired of the individual-student-centered classroom activities which are so often necessary with such contexts. This means that a good portion of each class section, regardless of topic, must be devoted to student discipline.

There is, in fact, an endemic problem with student discipline at TES. The situation shows, in part, out of a continual process of teacher turnover, meaning that few teachers have a chance to get to know their students as individuals, and even fewer students have a chance to develop realistic perspectives on their teachers. There is also a fear, on the part of many teachers, that they will be reprimanded if they discipline their Indian students more harshly than they discipline their non-Indian charges (and vice versa). So teacher attitudes enter into this problem.

But other factors enter in as well. It is obvious, particularly at the third grade level, that students spend their day constantly "on the go", changing from one classroom to another; going and returning from Title I classes, recess, lunch period; touching base with their homeroom teacher and other school staff members, and so on. The emphasis on subject-specific, "team-teaching" philosophy is part of the reason for the continual mobility. Teachers complain that they are able to develop only limited rapport with students they see so infrequently. Discipline problems also seem to increase when students from other homerooms rotate into a teacher's classroom for a limited period of topic-specific instruction. All told, the teachers cannot escape a sense of instability and lack of continuity within the classroom day. And students, by their report, observe, and react to, the same impression.

Indian students may, of course, contribute to the discipline issue in their own right. Indian students generally sit together and do not, on the whole, participate in class discussions. The "leveling effect" which becomes imposed on the individual student's classroom behavior cannot be disregarded. One adult woman observed that, while she had had no problem with mathematics when a student in Ogden, she experienced great difficulty with math learning after she returned to Fort Duchesne. One reason for this, she now observes, lies in her being placed within a group of Ute Indian students and her conscious decision to remain a part of that social entity. Pressure was then placed on her by her classmates to curb her intellect and to conform to group-level-defined standards of performance. She agreed to operate at that level, even though she knew from her previous schooling experiences that she was capable of doing far more than that.

Values conflicts. Generally it is the Indian students who are in the "lower" math classes. The Indian students leave the classroom to go to Title I. The

Indian students rarely have the right answer or volunteer to give i Parents say that their children have given up raising their hands t in class because they are never called upon. Teachers and some par to peer pressure which prevents Indian children from succeeding bec teasing that they get from their peers. That, as noted in an examp previous section, also directly affects student "interest in learnir

There may be more at stake here than student-centered patterns communication. Classroom observations suggest that the system of re punishments used by the teachers as responses to student in-class pa may be quite culturally specific, reinforcing issues basic to Anglo Competition for correct answers, continually motivated achievement, academic excellence as a key to economic and social success, and the only a few of those issues. And while they may be integral to the A understanding of social dynamics, they are not necessarily so basic students' understanding of those domains. Often demonstrated perfor tangible evidence of accomplishment become of greater importance to students. In-class exercises and homework assignments could offer I ample opportunities for demonstrating their developing mastery over topics and subject matters. Yet -- again because of class size and i classroom schedules, teachers at TES seem rarely to have the time to each child's seat work. In more than one instance observed by the fi children asked what they should do with their papers after the exerci completed. And the teacher told them to put them in the waste paper The children rarely take papers home. Few parents said that they had child's work. Few ask to see papers. Where does the reward for achi come from?

<u>Parental concerns</u>. Parents who are taking adult education courses st

their children and are able to take an interest in and give support to any homework effort that the child makes. They are aware of the child's level of accomplishment because of direct observations. More commonly, parents are themselves little educated and are not able to help with homework. By and large, these parents feel that the education of their children is the responsibility of the teachers and not of the people at home. Perhaps, this is one reason why so few of the Indian parents go to meetings of the Parent-Teacher organizations at the public schools. There are, of course, other issues here. The school prohibits coffee and smoking . Since most Indian parents like coffee and cigarettes, they feel strange in the school's sterile environment. Some parents voice discomfort in the school for other reasons, citing personality differences with some of the personel or a general feeling of strangeness when returning to a school setting after so many years. Parents also tend not to talk about academic issues at home. Academics are the school's domain, and not the household's. This dichotomy, once pronounced, leads directly to several other of the commonly voiced parental attitudes about schools and schooling processes. parents told the field team that teachers should spend more time on basic skills -- reading, spelling, and mathematics as particulars. Several parents noted that teachers move through the textbook materials entirely too rapidly and do not take sufficient time to work with students who are having difficulty with their studies. The school, then, is a place for academic business. Most parents state emphatically that the school should do a better job of disciplining Indian students, since learning cannot occur when order is not being maintained. Many parents argued that Ute language should not be taught within the schools, since discussion of those topics belongs more properly within the home or Tribal domain.

Viewed in these terms, the school and school-based instruction is certainly a useful addition to reservation life. But in no sense of the term could it be said that the school has become an integral component or even a complement to the activities in the students' home context once the classroom day drawn to a close. Other factors also have a hand in maintaining this separation between home and school. Some of these will be discussed at length in the following chapters.

The role of traditional culture. Although all of the children speak English and for nearly all it is the primary language they speak, student English appears to be somewhat different from the codes used by teachers or in the textbooks. This poses problems for students -- for example, some evidenced great difficulty interpreting the English in the word-problems used as part of the project's math test.

One Ute informant offered an explanation for some of these difficulties, citing not contrasts in English structure but differences in the style of presentation and use of the two languages as prime sources for frustration and communicative breakdown. He explained that there is a cadence "built into" the Ute language. So someone says a few words and then stops speaking. This allows, he explained, the listeners to think "all around" what was said. Then the speaker will "hand another word in the air" and the listeners will think all around that. Conversations carried out in these terms contain all of the turn-taking familiar to western discourse analysis. But the frequency of turn-taking and the time consumed under each rotation departs markedly from the expectations of western backgrounds.

The implications for classroom behavior and Indian student classroom participation are obvious.

The longer a teacher stands at the board and talks without interruption, the more the teacher stands to loose his Indian students. Anglo students, trained to follow linear orientations, evidence less difficulty in responding to these presentations. Indian students (viewed in these terms) may be less familiar with the process of coping with so much verbiage and may tune out of the discussion altogether, merely to maintain some sense of cultural stability within such a discussion.

The influence of cultural variables in Ute student education is often a topic for discussion by school officials. Teachers, too, have their ideas about the role which Tribal culture plays within their classroom. Some teachers argue that Indian students are incapable of memorizing lesson materials because memorization "is not in their culture". Others feel that Indian students have little motivation for success because Indians do not have the goals and ambitions which Anglo families instill in their children. Some teachers said that they get discouraged trying to teach students who don't want to learn, and "who will just end up going back to the reservation anyway". Indian administrators and parents feel it should be no concern to the teachers what the students do or don't do with their education; it is the teachers' job to give Ute students the best education possible.

Speed of presentation (as noted previously) is often cited as one of the real barriers preventing students from benefit is from available instruction. Parents complain that teachers go over lesson materials (particularly, math lessons) entirely too rapidly. Little material is repeated, meaning that students who do not "pick up" on the data the first time around may not internalize the information at all.

Teachers are aware of this situation but are not totally certain what can be done to respond to it. Teachers complain that it is impossible to teacher a class of 25 students at grade level if so many of the (Indian) students are carrying out mathematical tasks at levels below that of the class or age-mates. Teachers point out how there is so little coordinated between grades at TES, forcing some teachers to have to re-trace the steps which should have been covered in the previous year's classes, or go out of their way to correct the misconceptions which students have developed based on their only partial graps of those concepts.

The field team was not surprised, faced with all of these conflicts, to see Indian students drawing on cultural background and on other skills to begin creating "survival strategies" for use within these classrooms. Learning sets of answers to recite for the teacher is the simplist of these strategies. A second involves bending over a blank page, trying to look busy whenever the teacher passes by one's desk. Another requires the student to choose just the right moment to gain permission to go to the toilet. Mathematics classes, where discussion topics so frequently assume a student mastery over certain issues and skills which previous math classes did little to cultivate, are frequently contexts for the use of these strategies. None of them are necessarily traditional Ute activities. But they were evidenced with high enough frequency to suggest that, to the extent these are Ute-specific behavior patterns, some new type of Ute "Tribal culture" may be developing (or becoming evidenced more clearly) within the contexts of this school.

Traditional mathematics. At no time during the four weeks of observations did field staff observe anything which might directly be identified as the use of an "alternative" mathematics skills by Ute students at TES. Students were commonly observed to attempt to "materialize" numbers and number problems, either by counting directly on their fingers or by drawing lines or other marks to tabulate directly on their work sheets; but there is nothing necessarily "Ute" or "non-western" about those practices.

Outside of the classroom, however, the interviews revealed ample information about the continuing presence of Ute styles of computation within the reservation community. Several Tribal activities -- beadwork and ever-popular recreational gambling, require participants to be familiar with styles of computation which are not completely western in their orientation. Beadwork, for example, involves the ability to count up to five, and then enumerate additional groupings in terms of units of five. But that "base-five system" never is allowed to interfere with the creation of a pleasing or properly symmetrical pattern. If after counting out and sewing the beads in groups of five, the overall design needs to be further shaping, beads are added or taken away from the "five-counted units" until the desired result is obtained. Younger beadwork artists now draw out more complicated designs on graph paper before beginning their sewing. But the last-minute flexibility options still are maintained even then.

Beadwork mathematics differs from classroom mathematics in two ways: first, in the enumerational "base" and secondly in the "philosophy" of problem-solving which accompanies enumeration in terms of that base. There may be more at stake in this second point that a simplified form of "work until you get the right answer" ethic which so often is imposed on students during individualized, seat-work activities. Teachers commonly report that, if Indian students seem to be interested in a given project, they will work diligently at it until it is completed. This commitment to identifying the workable solution appears to be a part of Ute Tribal computational skills as well as a part of the Tribe's "work ethic". This, in turn, reminds us that the mathematical system of a Tribal society will not operate <u>independently</u> of the rest of the culture, and cannot operate outside a particular cultural, social or philosophical contexts. What this may mean where instruction in "hypothetical" or "theoretical" computations is concerned can only be guessed at, at this time.

Oneida Tribal School

The data for the second phase of the project were collected at the Oneida Tribal School located at the Sacred Heart Center in Oneida, Wisconsin. The tour of Oneida is approximately 11 miles west of Greenbay. Within one half mile is located the Oneida Community Center and the Oneida Community Public Library. Four miles away (on Rt. E) is the Oneida Tribal Museum where a teacher seminar was held during the first three days of field work.

The location of the Oneida Tribal School has important historical significance for the Oneida. The Sacred Heart Center was built on the site of the former Oneida School that was closed in 1919. One major factor in the creation of a local tribal school is that the Oneida community is a part of four school districts, requiring the scattering of students and long bus rides to the public schools. The tribal school located at Sacred Heart allows all Oneida students that wish to attend one school in a convent location.

The 1979-80 school year is the first year for the Oneida Tribal School. The school is funded by the Bureau of Indian Affairs and the tribe was given a BIA award of $25,000 to assist in the planning and organizing of the school. Jerry M. Hill is employed by the tribe to direct the overall development of the school. Jerry Hill, the Tribal Education Board, and tribal consultants have worked to develop an innovative alternative system of education.

The Oneida Tribal School is a K-8 school employing seven classroom teachers, two Language Arts Specialists, a Reading Specialist and a Parent/Student Instructor. The school's bicultural program includes Oneida culture, language, and history in the general learning process. The school at the same time tries to prepare its students for transitions to and from public schools and to live in diverse cultural settings. The school offers academic classes and curriculum that closely matches the standard curriculum followed by the local Wisconsin public schools at the same grade levels. The school is designed for the use of comparable curriculum categories, record systems and achievement testing.

The school's instructional program is based on individualized instruction. Tribal school officials state that:

> The school environment is based on the concept of mutual respect. It is hoped by providing encouragement for each child to feel accepted and valued and by recognizing individual dignity and worth, each child will have the opportunity to experience the responsibility of caring and accepting others.

One goal of the Oneida Tribal School is the development of a taxonomy of Oneida culture to be used as the basis for integrating the culture, history and language into a truly bicultural school program. Already community resource people and cultural specialists are being identified and scheduled by the school program as guest speakers in classrooms and to the school as a whole.

A future component of the school program will be to work with parents to find specific ways to encourage their children to:

* develop realistic goals valued by the community
* develop planning and decision-making skills
* give their children decision-making roles

The parent program will include techniques for identifying and understanding their children's behavior as well as alternative ways for improving the family atmosphere.

Field work at Oneida began on May 14, 1980 and was completed on June 11, 1980. Field work was undertaken by Robert Baker and Ann Renker both of whom are graduate students at The American University. The 28 days of field work was especially intense since the field workers were roomed in the Sacred Heart Center right above the school classrooms. Thus, the field workers were exposed to the workings of the school and local community activities 24 hours a day.

Several major tasks were accomplished during the fieldwork. A week-by-week division of how the researchers spent their time follows below.

Week I, May 14 - 18, 1980

* arrived at Oneida, Wisconsin, Wednesday, May 14.
* became oriented to Oneida and its people.
* participated in a 3-day bicultural curriculum workshop held at the tribal museum.
* gave presentation to school staff on the math project.

Week II, May 19 - 23, 1980

* attended math classes, making notes and observing.
* selected seven students in the four/five grade classroom and four students in the three/four grade classroom to become the focus for research inquiry.
* met with Oneida tribal school authorities to review project
* obtained permission of students and parents for formal in-depth interviewing.
* met with school staff, discussing observed problems and solutions.
* attended staff meeting, discussed math project and future activities.

Week III, May 26 - 30, 1980

* administered work and number problem math test to student in grades 3 through 8.
* continued in-class observations.
* interviewed students in-depth.
* began home-based parental visits and interviews.
* attended pre-school graduation.
* attended end-of-the-year trip to Bay Beach.
* attended Oneida Tribal School graduation.
* held informal discussions with teachers on math issues, and specific students.
* taped recorded in-class math lessons.
* attended weekly staff meeting.
* attended International Day at the tribal school.
* attended student art show.

Week IV, June 2 - 6, 1980

* taped recorded in-class math lessons.
* attended weekly staff meeting.
* continued in-class observations.
* began formal interviews with teachers.
* began home-based parental visits and interviews.
* attended pre-school graduation.
* attended end-of-the-year trip to Bay Beach.

Week V, June 9 - 11, 1980

* finished home-based parental visits and interviews.
* finished in-depth teacher interviews.
* interviewed school officials for overview on the math project.

Orientation to Oneida. Throughout the field period, research was conducted to attempt to learn from the Oneida about math, problem-solving, schools and learning, as well as more general facts about the Oneida way of life. The researchers attended several community events, visited several Oneida-owned shops, farms, the community library, and the community civic center.

During these trips a dozen Oneidas, who are not connected to the school in any way were interviewed about a variety of topics including:

* traditional math
* higher education
* employment
* nature and the Oneida view of life
* children in the community
* other Indian tribes

The interviews were conversational in nature and followed the interests the Oneida being interviewed. The informal, friendly nature made tape recording or note-taking impossible, however, the researchers did gain an orientation to the Oneida community and an awareness of issues of interest to the community.

A major theme seemed to be a hope that today's Oneida could accomplish the goals of other generations -- to use the good things from the white world and yet remain being Oneida. Discipline and the need to get along with all kinds people were seen as important. Those interviewed had heard about the Tribal School but admitted that they knew little about what was going on there. There seemed to be a general tend on the tribe's part to leave school to the "experts", a feeling that the Oneida and other tribes should have schools of their own but that well trained people should run them. Knowledge and a respect for nature are important to adult Oneidas and they feel that children need to learn to behave and think in those same terms. All those asked about traditional math felt that it was used but they themselves could not recall any examples.

Attending math lessons. The researchers attended math lessons in several classrooms including one session in which older students taught math concepts to students 5 grades behind themselves. Each researcher spent the majority of time in two classrooms one a combined third and fourth grade class, the other a fourth and fifth grade setting. Nineteen tapes were made of in-class math lessons and of teacher-student interaction during periods of math problem-solving. Both researchers aided in-student learning by assisting studying with individual instruction in each classroom. Math lessons by the teachers usually consisted of introducing new concepts or reviewing the work papers and tests of one or two students while the rest of the students worked at their desks. Most of the math instruction which the researchers observed was confined to specific teacher-student dialogues. Not surprisingly, classroom sessions were extremely active and changeable due to shifting methods of teaching and to the many special events occurring at the end of the year. Truly representative profile of classroom activities may not have been obtained.

In both classrooms the researchers observed all of the students and using both verbal and nonverbal interaction analysis noted their individual styles of learning. Profiles for each student were noted including verbal and non-verbal interaction between teacher and student and between student and student. Student-student interaction was a critical component of the instructional process. In the four/five grade classroom, for example, students were especial-ly encouraged to aid each other -- e.g., students would often give spelling tests to each other or would help in the understanding of instructions.

Classroom activities and procedures not directly connected to math lessons were also observed by the researchers. It was noted, for example, despite the amount of work, students seemed bored most of the time and that any sort of activity was preferred to sitting at one's desk. Performing a [illegible] for the teacher or serving at lunch were very popular with all the students while talk-ing in front of the class on any subject was very unpopular. (One student who did not talk much in class would make strong vocal demands that proper represent-ation of girls and 4th graders were included for the weekly task assignments.) Students enjoyed having their papers read to the class but did not want any-one to know that it was theirs.

Breaks and trips to the language teachers or others allowed discussions on a wide range of subjects and gave the researchers special insists into the school and teaching styles. Observing teachers and their students in different school settings showed several consistent and inconsistent patterns of learn-ing behavior.

<u>Special school activities</u>. The researchers were invited to several Oneida Tribal School activities during their stay at the school.

International Day had visitors from the local high school exchange students come to see the school for the day. Events included an art show, visits to classrooms, talks by Bill Gollnick and others about the Oneida and the school and a school social. The students were very pleased to have the visitors at the school and were happy to help and explain about themselves and the school. The visitors had a good time and felt that they had learned a great deal -- more than they would have if they had gone to see some Indians "perform" some traditional dances and crafts.

The Oneida students bring their "ribbon shirts" for most special activities, particularly for the Friday socials. The shirts are worn by both sexes and are usually a print pattern with thin red, yellow and pink ribbons across the chest, back and shoulders. It appears that every student owns one and that they play an important role for the students and the tribal school. During pre-school graduation all the students used their ribbon shirts while last year each had to use white shirts turned around. One can see the impact that a long line of these shirts can have on an audience. The graduation, in general, was impressive in terms of discipline, pride of self and tribe and of the reality of the tribal school.

There were two school functions that a lot of parents attended: were the pre-school graduation and the Oneida Tribal School graduation a week later. At both functions students gave presentations and received objects (feathers, diplomas, Oneida Tee shirts) from school officials expressing their pride in the accomplishments made by the students during the year.

An end-of-the-year trip to Bay Beach was made by the entire Tribal School. Several parents came to help as did the researchers. It was interesting to note some startling changes in some students. One girl who never talked at school, stood by herself at breaks, and tried to hide at her desk acted very outgoing and friendly at the park. Patrick, the discipline problem of the three/

four grade and of the school, behaved very well and even helped out several times in finding some kindergarteners. A general view one could draw from this is that it can be misleading to attempt to understand an Indian child by observing him in just one setting, especially if that one setting is a school.

One activity generated by the research team was trips by the six and seven/eight classes to see the tribal computer. One member of the field team arranged the trips and gave some instruction as to the functions and potential uses of the computer. School and tribal officials seem to have a commitment to make the computer available to teachers and the students of the tribal school for classroom learning and special school projects.

Overall, the field work at OTS introduced fieldworkers to a much richer variety of Tribal and on-reservation activities than appears to have been the case at TES. Undoubtedly, the fact that OTS is a Tribally controlled school, and that work within the school *de facto* is work within the Tribal context, contributed greatly to this difference. Still it must be stressed that opportunities for more formalized data-gathering, of the sort used extensively at TES, were not overlooked during this phase of the field research. Some specifications regarding the use of more formal data-gathering at OTS now need to be made.

During the field work contact was made with everyone directly connected to the tribal school. Most were either interviewed or held long discussions with the researchers. Six of the formal interviews were taped recorded; two were recorded by note-taking.

The first three days at Oneida the researchers attended a teacher's conference sponsored by tribal consultants. The researchers presented the MAP project and discussed some of the findings from the Ute fieldwork. In addition, the researchers contributed to the discussions of bilingual education.

The school held staff meetings each Thursday afternoon after classes were over for the day. The researchers attended each of these meetings held while they were in Oneida and gained an understanding of the internal workings of the school. These weekly meetings were the principle means of communication between the entire staff and between the administrators and the teachers. Problems, coming events, procedures, work assignments and announcements were discussed at these meetings. Frequently decisions were made in these meetings. The trip to Bay Beach, the creation of an art show for International Day, and the issuing of final student reports were all finally decided at these meetings. Participation in these discussions provided invaluable background information on particular Oneida students and on the school's perceptions of their strengths, weaknesses, and potentials.

Five students in the third and fourth grade classroom and seven in the fourth and fifth grade classroom were interviewed in great depth about math, problem-solving, their likes and dislikes, work habits and other subjects. The remaining students in each class talked with the researchers in the classroom during breaks, and at special school activities.

A test of 46 number and word problems were given to the 46 students in the grades 3 through 8. The test was given to Ute and Anglo students in the first in-field phase of the project. The test was given by the researchers and were monitored by both the researchers and the classroom teacher. To eliminate the effects of speed, all students were allowed all the time they required to complete the test. Students were encouraged to attempt as many of the questions as possible and to work out the problems on the test paper.

Ten of the parents of the selected students were interviewed. Three at the Tribal School, three at school functions, three at their homes and one by telephone. In addition, twenty parents whose children were not in the study were interviewed to a lesser extent. The researchers made special efforts to speak with parents that attended school functions in an effort to seek their input on the math issue.

The parent interview questions used at Northern Ute were followed in these discussions. Many of the questions seemed to deal more with a public school situation rather than that of the Tribal School, however, and the best responses seemed to come with the tape recorder off and with those questions dealing with specific people or events.

The parents first concern was over parent-school communication. The parents stated they did not know what was going on in the school and complained that was not enough opportunities to find out first-hand. Their children were the principle channel of communication reporting on daily events and messengers of notes from the school to the parent. And (as the researchers discovered in the three/four grade class) students do not take home notes unless they themselves are very interested in the activity. Those parents wanted to know more about the teaching of their children and they wanted to attend school meetings. Parents seemed ready to get involved yet opportunities did not appear to be available or open to them.

Parents did not feel "good" about math and were not certain as to the "right" way to help their children.

The parents all seemed to have strong positive views concerning the tribal school. Most felt the school was doing a good job and that the problems could be worked out in the next few years.

An important aspect of the field work was to interview knowledgeable people about the math issue and concepts of traditional Oneida math. In-depth interviews were held with five native speakers and with a non-Indian linguist who has worked for several years with the Oneida Language project. Speakers interviewed include Maria Hinton, who is studying to be a linguist and her brother Amos Chrisjohn, who gives the Oneida prayers at tribal functions. Both have worked for some time on the creation of a bilingual Oneida educational program. The three other women speakers interviewed are part of the Oneida Language project that provides native speakers during Oneida language classes.

Responses from these interviews seem to indicate somewhat differing conceptions of traditional math and ways in which the Oneida language can be used in expressing mathematical concepts.

One perspective holds that there is a traditional Oneida math and that it was used to function within the Iroquois confederacy. Examples mentioned include beadwork, agriculture, time, and matters in which records had to be kept of each tribe's participation in confederacy matters. This group feels that the Oneida language can be used to express any mathematical concept and that it is just a matter of time and effort to discover the proper terms. It was noted that it is difficult for Oneidas to think of a traditional math, since both Oneida math and English use a decimal system.

It has been one of the tasks of those working on the Oneida bilingual curriculum to attempt the development of math concepts. At the present, work is being done on how the Oneida language might deal with fractions. Thus far, the only term that anyone has been able to remember is a term for one half. This group still feels that there are ways to relate fractional concepts in Oneida. When asked about the concept of zero, it was felt that the Oneida word for "nothing" could be used, even in mathematical equations.

The other perspective is that traditional Oneida math consists only of enumeration. They felt that the Oneida term for "nothing" could not be substituted for "zero" in mathematical equations. So higher level computation simply would not have been possible. It was stated that fractions and fractional concepts are not "Oneida" and that searching for fractional terms in Oneida is a waste of time. Those holding this perspective show great concern about these limitations and are aware of the need to present fractions in the bilingual curriculum.

Chapter Five: The Teacher Interviews

Issues in American Indian elementary school education and the problems which arise in the schooling of American Indian elementary-aged students have both been the subject for any numbers of studies and research inquiries in recent years. Methodologies employed in those studies have identified any number of variables, each having a hand in determining how effective schooling opportunities for each Indian student will be in particular contexts. Some of the relevent variables are student-centered — e.g. student self-esteem, pride in cultural heritage and tradition, interest in education, level of English language proficiency. Other — including the relevence of the curriculum to the students' Tribal context, sensitivity of school staff as to unique needs of Indian students, extent of Tribal involvement and control over the educational process, and the like — touch on issues with more inclusive domain. We knew before the field research began that student math-learning at Todd Elementary School and at the Oneida Tribal School would be affected by the influences of such variables. But we also knew that these influences would not be operating totally within a contextual vacuum. The classroom was the place where math-learning and math skills development was occuring, in the formal sense of those terms, at least. So, we reasoned, it seemed appropriate to assume that those variables were of relevence to Indian students' math education specifically to the extent that those variables (and others like them) were impacting on student behavior within the classroom. And we structured the in-field activities to ensure that the information about classroom math-learning, which would be collected by project staff, would help us understand and appreciate the dynamics of in-classroom mathematics instruction at both field sites.

To do this, a two-fold data-gathering strategy had to be implemented.

Classroom data themselves had to be gathered, of course, but those observations alone would not be sufficient for research purposes. We needed background data on the classroom participants — the students and the teachers. And, because of the important roles they play in overseeing and motivating student involvement in education, we also needed background data on family membership and family attitudes regarding education. Participant-observation within the school setting was not going to be the project's in-field research strategy. Some in-depth interviewing and a considerable amount of less-formalized discussion with students, teachers, family members and other members of each Tribe was also going to be necessary. All of that material would have to be thoroughly analyzed and the patterns in the responses thoroughly described, before the interaction between classroom behavior and student math-learning could properly be understood.

This chapter reports on the findings from one portion of this actor-focused field inquiry: background information relating to the teachers' perspectives about Indian education, the problems in schooling Indian students, and the roles they feel teachers play, and should play, in coming to grips with these issues in the Todd Elementary School (TES) and Oneida Tribal School (OTS) contexts. The information summarized in this chapter was gleaned from two sets of data: the results of a series of oral interviews with the teachers whose classrooms were serving as foci for the in-field research, and statements in the written comments from other teachers at each site, given in response to a brief questionnaire. The interview schedule was designed by project staff. The questionnaire was taken from the package of instruments used by the Advocates for Indian Education, Inc. of Spokane, Washington during their multi-site survey of Indian educational needs in the Pacific Northwest (1974-75). The questionnaire is reproduced in Appendix II. . No modification was made in the instrument in hopes of strengthening the validity of comparisons we hoped to draw between the findings of the AIR study and the results of our own inquiry.

The questionnaire itself is divided into two parts. The first asks the respondent to select the <u>one</u> statement out of four choices which <u>best</u> reflects his/her own feelings about the purpose of Indian education. The respondent then selects, again from the four options, the one statement which he/she feels best identifies how the school as a whole feels on this same question. As will be seen below, responses to these two requests fell within a limited set of combinations. This made it quite easy to draw conclusions between responses to Part I and the responses made to the questions in the second section of the instrument. These more focused and more probing short-answer questions asked the respondent to supply information about his/her own interests and background in Indian education (question II.1); about the precise meaning of his/her definition of Indian education (II.2); about the school's treatment of that same theme (II.3); about problems in education of Indian and non-Indian students within the same classroom (II.4-7); about the management of education at the school (II.8-9); about the involvement of other actors in school policy-making (II.10-12); and, about reactions to several specific innovations which could be made in school curriculum (II.13-14). The final question (II.15) asks for comment on the effectiveness of the educational "product" being supplied to students at the school; the responses to this question gave additional ways to interpret the meanings of the responses to the questions in Part I and the various themes found to be running through the additional responses in Part II.

Note that the questionnaire calls for anonymous responses. Handwriting offers the only clue to the identity of the respondent, and that clue is meaningless to persons as otherwise unfamiliar with school personnel as were we. The candidness of most of the comments provided on each questionnaire suggest that the respondents were not worried that problems of self-disclosure would be forthcoming. This greatly strengthened the usefulness to this project of the instrument and the data it elicited.

The teacher questionnaires were distributed to all faculty members at each school site during the first week of research. Thirteen of the teachers at Todd Elementary School returned the questionnaire during the four-week in-field period there. Six more questionnaires were submitted during a follow-up visit to the site later that spring. The response rate at Oneida Tribal School was less satisfactory. A total of questionnaires were distributed during field work at that site, but only six of the questionnaires were completed and returned to project staff. The sample does include responses from five of the school's six full-time teachers as well as responses from one of the school's more prominent resource persons. Staff with interests and expertise in other of the school's educational efforts — e.g. the Oneida language project, are not represented in the sample. When asked about the low level of responsiveness from what had otherwise been a highly cooperative and receptive school staff, most school personnel suggested that the public school orientation of the inventory was simply not relevent to the interests of a "tribally controlled" schooling program. There are other questions which attempt to contrast Indian and non-Indian student interests on certain issues and these may be the questions which these comments are in reference to. On the other hand, there may be some more subtle reason for the perception of irrelevence; points of contrast (and parallel) between the OTS and TES responses need to be considered carefully in those terms.

Because five of the six classroom teachers at OTS did return the inventories, the sample, while admittedly small, is ample representation of conditions and attitudes within classrooms at that site. Fortunately, the inventories are not the only set of data. We have teacher attitudes toward education at OTS.

In-depth discussions following the general format used for this purpose at TES were held between members of the research team and other faculty and staff persons at OTS. The discussions were tape-recorded, the content discussions analyzed, and information from these interviews will be presented below to amplify the impressions suggested by the inventory responses.

The Part I Responses

Part I of the inventory asks the respondent to indicate which out of four choices best reflects his/her own attitude regarding the purpose of Indian education. Then, the respondent to indicate which of those choices best reflects the school's attitude on this question.

All but one TES respondent answered the first question. All but one (and not the same one) answered the second.

The validity of any generalization drawn from a sample of thirteen responses could be questioned. To counter this, all of the responses are weighted equally, including those instances where more than one response was given to a question by a respondent. Treating the data in this fashion yields the following pattern of TES response to these questions:

	OWN	SCHOOL'S
1. Orient the Indian student to slowly lose identification with his tribal heritage and assume adaptation to the dominant society.	0	2
2. Orient the Indian students to respect their Indian culture yet to change predominately toward the dominant society.	2	7
3. Orient the Indian student to combine Indian culture and d.s.	7	3
4. Orient Indian student to accept some aspects of dominant society but remain predominately identified with their Indian culture.	4	3

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The TES data suggest several points worth mentioning here:

1. Position 1 -- for the student to lose identification with tribal culture and assume adaptation to dominant society -- was selected only as a school-related attitude. No TES teacher -- Indian or non-Indian -- was selecting this as his/her own position on the purpose of Indian education. Moreover, position 1 was selected as a TES school-related attitude only in conjunction with the selection of some additional attitude -- either position 2, or positions 2 and 3. While this seems paradoxical, on the face of it, it still suggests that the TES teachers do not perceive the school as being totally assimilative. At least, not so far as its formal purpose is concerned.

2. The most recurring combination of TES responses was OWN (3) and SCHOOL'S (2). Four of the thirteen respondents selected this pairing. The remaining nine respondents selected any number of other combinations. The most frequently selected attitude in the OWN column was item 3, however; The most frequently selected item in the SCHOOL'S column was item 2 -- each receiving seven votes respectively. This shows that approximately 50 percent of the TES respondents see the school as something oriented toward respect for Indian culture while attempting to change gradually toward the dominant society; while 50 percent see their own attitude as one oriented more toward a co-equal treatment of tribal and dominant culture within the classroom.

3. Three of the thirteen TES respondents assigned the school the same philosophy as he/she does to him/herself. (One respondent identified both as 3, one as 4, and one as item 3 and 4 jointly). The remaining respondents -- ten out of thirteen and therefore a distinct majority, did not see consensus between SCHOOL'S and OWN attitudes on this question.

4. The interesting thing is -- there is little evidence in the remaining

responses (those of Part II) which carries this theme or this distinction to any greater length. The TES respondents show little evidence that the school is trying to orient the students toward a respect for their own culture. Reference to specific "Americanization" processes is also not provided. Why this was the case is explored below.

The OTS responses show a higher degree of internal consistency in Part I. This is true both between respondents and within a single respondent's comments: All OTS respondents described their own attitude and the school's attitude on the question of educational goals in identical terms. Three respondents selected position 3 — that the school should orient the Indian student to be able to combine Indian culture and that of the dominant society; two selected position 4 — the school should orient the student to accept some aspects of the dominant society but remain predominately identified with their Indian culture. The positions have in common their insistence that the school should not try to undo a student's control over Indian heritage while trying to strengthen his control over western-oriented edcational topics. One respondent highlighted this commentary by marking postion 3 and position 4 on the questionnaire. Unlike the case for TES, no OTS respondent identified with position 1 or 2. Both of these see the school as having an assimilative function in Indian education and it would appear from the content of the inventories and the interviews that it is the assimilative function which the OTS respondents are rejecting.

In all, then, position 3 was the most frequently selected of the OTS options: a total of four persons selected it. But in several cases, selecting position was only <u>part</u> of the total response in Part I. Unlike the TES case, OTS respondents felt free to add their own comments to the wording on the inventory. One OTS respondent noted that the real issue in Indian education is for the Oneida students to learn how to "make it in both worlds". A second

OTS respondent stressed the over-riding need for Indian students to be "members of their tribes" as well as "citizens of the world"; this was proposed as an additional alternative for the inventory, a number 5 to go with the existing options 1 through 4.

In more general terms, when compared to the attitudes found at TES, the OTS respondents to Part I seem much more committed to a philosophy of education which emphasizes the retention of student identity and orientation which does not assume that their Indian-ness must be lost before education can succeed. The TES responses are much more diffuse in this regard. They neither show agreement on this position (only three of the thirteen selected either position 3 or 4) nor on any single position in regards to their definition of Indian education. The fact that the TES teachers and school-related staff do not agree among themselves as to the basic philosophy of education in the schooling context is worth noting, if only as a comparison to the more uniform position which is taken by the OTS staff in their inventory responses.

Even more seriously, perhaps, is the fact that only three of the thirteen TES respondents feel that their attitude toward Indian education and the school's attitude toward Indian education are one and the same. More generally, there seems to be some variance between the individual and institutional philosophies on the point, and this variance continues to be reflected within the TES responses to other questions in the inventory. The continuity between individual and institutional positions at OTS is likewise represented throughout the OTS inventories and the consequence of that uniformity on Oneida education will become equally apparent below.

<u>The Part II Responses</u>

Part II then asks a series of questions, probing facets of OWN and SCHOOL'S orientation to Indian education in somewhat greater depth.

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Question 1 asks when and why the respondent became interested in Indian education. There is no predominant theme in the TES responses. The reasons seem quite specific. But out of thirteen answers, only 1 TES respondent gave a reason which had anything to do directly with Indian educational needs — boarding school taught this teacher that Indian teachers were needed to motivate Indian youth. Beyond this, however, the motivations leading these persons to go into Indian education are motivations which could have led the teachers into education in any context. This implies that the TES respondents, as a group, do not see anything unique or particular about Indian education, and this hypothesis is more than supported in the responses to the following questions:

Three of the six OTS respondents relate their interest in Indian education to their interests in children — e.g. they are interested in children, they like children, they enjoy working with children. <u>Indian</u> children as such are not mentioned by these respondents; hence, what is given as a reason for involvement in Indian education could just as easily explain any person's involvement in education in any context.

The OTS respondents do not show any particular time-period when a decision to work with children was made, nor is any single time-period characteristic of the respondent's professional decision generally. One respondent did refer to problems he/she had experienced while in school as a child, and related those problems to the problems facing today's Indian students; <u>this</u> perceived continuity was the basis then cited for involvement in Indian education (and this was the only respondent who mentioned an Indian-specific reason for this career choice).

Overall, the OTS responses parallel the TES responses: at both sites, with the exception of one respondent per site, Indian-specific reasons for involvement in Indian education were not identified.

Question 2 asks the respondent to state his/her own definition of Indian education. Recall that in Part I, the respondents were given the chance to express their perspective on this very question and then to match that perspective with what they saw as the school's philosophy. All OTS respondents expressed agreement — the school should maintain tribal culture with instruction in Anglo-culture as well.

Three of the six OTS respondents continue this theme in their responses to question 2. All three selected option 3 as their philosophy as requested in Part I. The balance between Indian and western orientations noted in that option is likewise expressed in their responses to this question. One respondent refers to the need for schooling to "...change stereotypes and add understanding about what it means to be an Indian"; a second emphasized the need for the school to help the child, "...hold on to his culture, while becoming aware of other cultures"; and a third, somewhat similarly, stressed the need for the Indian child "...to deepen his self-respect while learning how to deal more effectively with the dominant society".

Two of the remaining responses stressed the significant ways in which school-based Indian educational experiences can overlap with the more traditionally oriented educational experiences already ongoing within the students' tribal communities. One respondent sees Indian education as a holistic activity through which the school comes to relate more effectively with the language and culture background of the student. The second respondent sees Indian education as another facet of the Indian "way of life". Neither of these respondents require that the school provide training in Indian culture for the students; instead, the point seems to be that the school has its contributions to make within the larger whole of education experiences in which the student is already involved.

Only one respondent sees Indian education's "Indian-ness" in other than cultural terms. This respondent relates Indian education to the political issue tribal self-determination, specifically equating Indian education and tribal control over the schooling program.

The responses from TES take somewhat of a different tactic on this question. All but one respondent defined Indian education in content-specific terms, as if to say that what is taught defines the whole nature of the education process. There was, however, no agreement among these respondents how best to identify this "Indian" content: some argued, whatever it contains should be sufficient to allow Indian students to receive education which equals that received by their non-Indian peers. Others required that Indian-specific cultural topics be contained in the curriculum before an "Indian education" could be said to have been obtained.

Even so, the TES tendency to define Indian education in terms of its congruence with other educating influences within the Indian child's home and tribal environments. It is true that the OTS respondents do not necessarily agree as to the ways in which this congruence can best be obtained. But all respondents do see that, for Indian education to occur, the work of the school must relate in visible and conscious ways to the orientation and the content provided to the Indian student outside of the classroom. The TES respondents, on the other hand, appear less concerned with how the school relates to the student's tribal context and more concerned with determining what sorts of Indian-related things the school can do within the classroom context. Reflexes of this distinction will be seen in the responses to subsequent questions below.

Question 3 asks the respondents to identify the goals of Indian education at their school. Again, all six of the OTS respondents see the school's goal in comparable terms, continuing the theme first elected in response to Part I. Question 3 offers a chance to clarify one's perception of this goal in the respondents' own words: here we are told that the school should deepen the Oneida students' understanding of their Oneida tribal heritage, then from that basis help students to use that knowledge (perhaps in combination with other sets of information) as a basis for building pride in self and pride in culture. Greater levels of personal responsiveness, more personal responsibility, and higher levels of personal success can all be expected to be outcomes of these efforts.

In part, there are similarities between the OTS responses and those reported for TES: three of the TES respondents define the goals of Indian education in culturally-centered terms. Six others define the goals in terms of student-level psychological adjustment. None of the respondents draw a connection between the two positions, however, in the sense evident within the OTS responses. That is, OTS sees culturally-related instruction can have a larger-level benefit on the student as a person, while TES respondents see cultural understanding as an end in itself, and something not necessarily related to (or relevent to) psychological stability. This distinction parallels the commentary made by question 2 -- OTS sees Indian education as something directly related to the larger Indian context, while TES sees Indian education as something standing separately from local conditions.

Still, both of these positions are working in terms of a common assumption about the responsibility (and legitimate right) of the school to bring about changes on its students' behalf. Both OTS and TES respondents appear to be attributing a "human engineering"-like function to the school, since they apparently see it the school's responsibility to help the individual student become better able to interact within the whole of his social environment. If this is true, then persons who see the school as having an assimilationist function (as do many of the TES respondents), and those who feel the school should operate in integrative terms are not disagreeing over the school's right to manipulate the mind-set of its charges; instead, they appear to be disagreeing over the ends toward which the institution's manipulations should ultimately be moving.

The extent to which the school must make specific adjustments or commitments in its activities, so that these student-centered changes can be brought about is certainly a point of contrast. As will be clear below, the OTS teachers -- unlike many of their TES counterparts, acknowledge that the Oneida students have unique educational needs, and that these needs are Oneida-specific in detail, not "Indian" in some general sense of the term. This means that if the OTS is to achieve its goals in Indian education, Oneida-specific content must be included within the classroom day, and this will certainly involve some level of departure from standard curricula and standard instructional practices. The TES respondents, on the other hand, classify student need in general, pan-tribal terms -- if they acknowledge there is something specifically Indian in those needs at all. Definitions of Ute-specific concerns are not cited within the responses here or at any other place in the inventory. Instead, the TES respondents emphasize the importance of student psychological adjustment and well-being, topics the school could certainly address without an extensive overhaul of curriculum or of existing instructional practices, or (at least in the sense in which the concept is discussed within the TES inventories), without any reference to tribal traditions and cultural details, or involvement of tribal personnel.

Once again, the tie-in between OTS and the surrounding tribal context and the self-styled autonomy which separates TES from its surrounding context are underscored and illustrated in the respective responses.

Are these goals being achieved at OTS and at TES? Do the respondents feel that the OTS is using Oneida language, culture and traditions as a basis for building stronger student levels of pride in self and self-awareness? Question

3b is designed to elicit perspectives on this point.

Here, for the first time, some of the OTS respondents chose not to respond to the questionnaire; in fact, only four of the six respondents commented on this question, and all of them answered in similar ways: progress toward these goals is just beginning to be made, the overall pace is slow, yet still they felt that OTS would be able to fulfill its mandate if present conditions continued and/or present conditions improved.

It is important to recognize that this uniform response may, in large part, be conditioned by respondent defensiveness: as discussions during the in-depth teacher interviews revealed, OTS being a new school program, all persons associated with it recognized that there are numerous problems for which solutions have yet to be developed. Viewed in that sense, the first year's experience was less than desirable to some; there are teachers, openly dissatisfied with the way things had gone in year one, who made it clear in the interviews that they were not intending to return to OTS in the coming year. This put the teachers who plan to remain at OTS in the awkward position of defending their continuing involvement in the work of a schooling program which they admit has been less than desirable in its operation. To stress the relative newness of the institution and the fact that progress under these conditions has nevertheless been made both weakens the severity of the admission that self-identified basic goals in education have yet to be fully obtained.

TES respondents likewise argued that their school was making progress toward the goals of Indian education as they have defined it. TES respondents were able to identify several signs of accomplishment to illustrate those claims. The TES definition of Indian education goals, it will be remembered, focused on content component of the educational experience. Evaluation in content-related terms is always an easy thing to do — one can merely tabulate the increase in number of enrolled Indian students, of Indian-oriented bulletin boards and displays, the extent to which Indian art is used in art classes, and the like. And these are the indices of progress cited by TES respondents when discussing the progress their school has made in Indian education.

Note, however, that progress can be affirmed in terms of these measures without any need to evaluate the outcomes of the educational experience; and none of the respondents attempted to draw any correlation between the in-class use of such Indian-oriented educational "elements" and any other of the terms in which Indian educational goals are defined for this site. Again, it would appear that to TES respondents, the presence of an Indian cultural component in the school represents an end to itself, and not something which should be viewed or evaluated in terms of any level of concern larger than itself. Our impression is that TES respondents see that school as operating in terms independent from the local context, terms which do not see the local context as relevent to school-related purposes. The validity of this impression — and the contrast in attitude which OTS reflects, will continue to be seen in subsequent questions.

Question 4 asks the respondents to identify, in the light of the preceding statement, the major problems faced by the school in educating Indian children. A total of ten different problems were identified by OTS staff, and these problems can be grouped into five more inclusive problem-areas. The most frequently noted problems were, as in the TES case, student-related problems. These include: student discipline problems (noted by three respondents), the impact of behavior patterns learned by students in previous schooling environments (one respondent), and student basic skills problems (one respondent). Two school-specific problems were cited both of which relate to the school's approach to the discipline question. Only one parental-related problem — school difficulties obtaining parental cooperation in the child's education — was noted, although one respondent did add that if current problems in educating the tribe's adults could be remedied, the school would have less of a difficulty meeting its responsibilities toward the younger people.

The OTS responses to this question are consistent with the statements given in questions 3a and 3b. There, respondents noted that certain school-related issues have yet to be solved to every person's satisfaction. In question 4, respondents identify the problems the school faces in educating its students as problems for which solutions have yet to be developed. Yet, it is the nature of the problems which is really of interest to the present discussion, particularly if contrasts to the TES situation are to be constructed.

Recall that the TPS respondents centered their problems on issues specific to the students, their parents and their homes — implying that the difficulties in Indian education at TES lay outside of the classroom and, therefore, outside of the classroom's control. The OTS teachers are not making the same assertion. True, student-related issues are cited most frequently as being at the focal point of OTS' educational difficulties. But the basic issues being referred to there is the discipline issue, and discipline is something that the school _is_ inherently capable of addressing: all of the OTS respondents agree on that point.

Notice, again in contrast to the TES data, that reference to the home as a pathological environment which works to the detriment of the children's schooling experiences, is _not_ found within the OTS responses. The TES respondents emphasized this point apparantly as another instance of the general belief that the problems in Indian education lie outside the school's control. No such school-external factors are referred to or emphasized by the OTS respondents: the problem facing Indian education at OTS are problems which the school can resolve, issues which — in the sense of question 3b, the school is already in the process of resolving.

That the TES respondents may have been trying to absolve the school from blame but not (necessarily) to present negative stereotypes of their Indian students is shown in the TES responses given to question 5 — are these problems in Indian education any different from the educational problems facing non-Indians at your school? Eight of the TES respondents saw no difference between Indian and non-Indian educational problems. Four saw differences in degree, not in kind. And only one TES respondent felt that Indian educational problems were in some unspecified way distinct from the problems faced by other students at the school.

The OTS responses are automatically skewed by the fact that OTS is a school designed for Indian students. A non-Indian component to the school was never intended within the design of OTS. Most of the experienced teachers report that they find little areas of congruence between OTS and the style of operation characteristic of any of the public schools where they may have taught in previous years. In theory, then, teachers at OTS would not have a common ground baseline against which Indian and non-Indian educational difficulties could jointly be measured. To be sure, there is no basis in OTS, as there is in TES, for contrasting the same problems within the same institutions.

The OTS responses do not, however, uniformly reflect the homogeneity of the student population: while three respondents noted that the question was meaningless (there being no non-Indians at OTS), there were non-responses from three persons. One of these stated that the problems would be the same, Indian or non-Indian student background. The other two argued that the problems would be different. No further comment to elaborate on this theme was made. If we assume that the problem being referred to in the response is the same as the problem referred to in question 4 — the discipline issue, then we may have a basis for understanding why there is such disagreement within the positions taken by the respondents. As noted, however, this may merely reflect differences in the individual teacher's own experience with Indian and non-Indian education. We do not have sufficient data to be able to determine the matter or clarify it in any greater detail.

Question 6 asks the respondents to explain how the problems identified in question 4 could be solved. It was argued in the discussion of that question that the school's discipline problems are in large part a by-product of the school's failure to address the discipline issue in its school policies and procedures. Thus, whatever may be the specific cause, the discipline issue is something which lies within the school's potential to resolve.

The answers given to question 6 do show that, from the OTS respondents' point of view, the existing problems in Oneida Indians' education can be solved through school-related action. Seven of the ten solutions advanced by the respondents identify changes in school policy and activities appropriate to this end: four of these solutions suggest clearer ground rules be developed and greater consistency be given to their implementation. A fifth response -- calling for an overall evaluation of the whole of the school's administrative process, echoes a similar theme. The remaining two policy-related responses focus on content changes. One calls for greater emphasis on Oneida culture in school curriculum, the second for greater emphasis on academic development and skills achievement. Both of these suggestions call for changes in educational policy, changes which are within the school's immediate domain.

The remaining responses to this question are more individualistic in focus. One of these responses suggests that the teachers need to be more sensitive and more honest when dealing with their students — a complaint which is not reflected in any of the interviews or discussions with other school personnel. A second such response calls for greater levels of parental involvement in school activities — something which the school can certainly help facilitate.

The final response suggests that the children should take on a larger share of responsibility within the adult education process in the tribe. Yet none of these suggestions necessarily directs attention or responsibility away from the work the school could do to correct existing education problems. And more importantly, none of these responses suggest that some party other than the school should likewise play a critical role in addressing these needs: the central role ascribed to the school in Oneida tribal education is again affirmed by the responses to this question.

It should be noted, however, that none of the suggested strategies mention the discipline problem directly. If we assume that discipline is a policy-related issue (and interview data allow us to do so), then we can infer that four of the ten respondents may be alluding to the discipline issue when the call for the development of ground rules and more consistent implementation of them. In general, however, respondents did not use question 6 as an occasion for identifying specific solutions relevent to the discipline issue. This apparent ommission may suggest one of several things: that the teachers do not feel it is their place to suggest specific solutions for school-related needs (and the responses to question 12 show that the teachers see a limit to the range of issues over which they have domain), that the discipline problem is symptomatic of some larger issue (e.g. the "newness" of the whole institution, perhaps) and thus is something to be addressed in larger and more inclusive policy terms; or that the discipline question will remain with the school regardless of any other alterations in school policy or school agenda. This latter point was expressed in private discussion by several members of the school staff, noting that habits developed and reinforced at previous schooling locales are almost impossible to eliminate.

The TES respondents identified out-of-school issues at the basis of the educational problems faced by the Indian students in their classrooms. While the respondents did not have a central or even a common theme in the answers (as was the case for the Oneida responses) a significant number did suggest that the school needs to undertake a new effort — parental training, apparently in hopes that changing the parents will in turn change the home environment, making that environment less in conflict with the school's pre-established agenda.

The next largest grouping identified a series of general, child-centered changes, designed to offset general (but unspecified) child-centered problems. Whether those problems are having a negative impact on the children's education or whether the school setting has intensified the seriousness of those problems is not determined. Whether the schools need to be involved in the programs which address these needs is clear from the respondents' comments: specific school-based programs (e.g. Title IV, parts A and B) are mentioned as possible avenues of attack. But whether these school-based efforts will address the causes of the students' problems, or merely offset the severity of the symptoms, remains to be determined.

Herein lies another contrast between OTS and TES positions as revealed by the inventory. The TES respondents appear to be more willing to propose solutions for their Indian students' educational problems, even though the problems as identified by their responses lie outside of the school's domain altogether. The OTS respondents, after identifying school-internal difficulties, appear less ready to propose solutions for those problem's remediation. Issues of power, problems diagnosis, and other factors may be at stake here. But the contrast between the site-specific problems remains, paralleled by the differences in site-based perceptions of the most effective way to address those problems.

That there may also be school-external conditions which are impacting on the education of Oneida students is noted by the OTS respondents in question 7. The question asks if there are local economic, social, or other such factors working to such ends. Two of the OTS respondents did not know if there were such problems. One said there were no such conditions. The remaining three respondents did identify some local conditions but there is not topical uniformity to the list, and the topics themselves were stated in quite nonspecific terms. Thus, two respondents mentioned the political conditions surrounding the OTS program, while one respondent (each) mentioned local philosophy (unexplained), economic conditions (unexplained), and alcoholism (unexplained).

Given the tendency seen in previous questions for the OTS respondents to trace educational problems directly to the school itself, the lack of specificity in response to this question is not surprising. We might expect there to be a point of contrast here, given the tendency seen in the previous questions for the TES respondents to trace all educational problems to external conditions. A larger proportion of the TES respondents (nine of the thirteen) do in fact cite the negative influence of such external factors. Yet, as in the OTS instance, there is little uniformity within the overall listing. Initially, it seemed probable that this luck of specificity might be viewed as an indication of the TES' teacher's lack of familiarity with local conditions on the Northern Ute reservation -- hence, the tendency to look at the students' home context in stereotypic, and therefore, quite prejudicial terms. Such an explanation seems less plausible where OTS is concerned, given that members of the school staff are largely drawn from the local Indian community and that the school is reported to enjoy high levels of interaction with parents and other community members. Perhaps the diffusiveness of the responses is not as critical a datum as had been originally thought.

One might suppose that if these factors were having such a critical impact on the Indian students' educational experience, teachers and other members of the school staff would take the opportunity to comment on them if given a chance to do so. Yet, in spite of the general attitude that factors outside of the school provide the basis for the Ute children's educational difficulties, only one of the factors cited by the TES respondents — home-environment related problems — shows up in any detail within the corpus of TES teacher interviews. Such is not the case where the OTS responses are concerned: issues noted in response to the inventory are likewise predominant themes in the in-depth discussions as well.

One way to account for this divergence is to wonder whether two different styles of interaction between school and home community are not being attested within these data. That is, the TES answers to this question are individualized and appear to differ one respondent to the next, which may imply that the teachers have constructed their impressions about local problems on an individual basis and not as a byproduct of collective discussion or group-level activity. The OTS responses on the other hand are not so totally idiosyncratic; themes mentioned by some respondents are mentioned again by other respondents in subsequent contexts. Apparently there have been some corporate attempts at OTS to come to some understanding of local, external educational problems.

Apparently, individual teachers serve as the focal point for school/community interaction at TES, while teachers as a collective unit or perhaps the school staff as a whole provide the focus for school/community interaction at OTS. To put that another way, these data show that the school — as an institutional aggregate, is less actively involved in school/community interaction at TES than at OTS; or conversely, that the individual teacher assumes (or is expected to assume) a greater share of responsibility for this interaction within the TES context. And there certainly is support for these claims within comments made in other parts of the inventory.

The next five questions on the inventory deal with issues relating to the administration of the school. The responses, when taken in the aggregate, provide some indication of the teachers' perceptions of their own level of involvement in decision-making and of the degree of impact that involvement actually has on the outcomes of those decisions.

Question 8 asks the respondents to identify those decision-makers who set educational policies for the school. The TES respondents provided a long list of specific power foci, many of which revolve around the work of the country school board and/or other of the officials who work on the level of the school district. The school itself is not seen as playing a critical role in educational policy-making — implying that the school is seen by the respondents as being just as distant from an involvement with the controlling authorities as it is distant from involvement with the students' home backgrounds.

The OTS responses to question 8, in contrast, do not point to removed or non-localized decision makers. OTS being a tribally-based school, local/tribal involvement in all levels of policy-making and policy implementation is to be anticipated. The OTS responses certainly reflect this idea. The following decision-makers, listed in terms of the frequency of their reference, are cited: school board of education — four respondents; the school staff — three respondents; the school administration — three respondents; and Jerry Hill, parents, outside resource persons, and the Oneida tribal council mentioned by one respondent each. By this count, paralleling the case found at TES, teachers at OTS likewise see parties other then themselves as having primary responsibility for school-related decision-making. Yet, the parties so identified at OTS are local, not distant from school operation in the sense seen in the TES reference. Moreover, the OTS respondents see that teachers play a part in the decision-making process even if the part is more secondary in its intensity to the part played by these localized authorities in this process. Here is a contrast with the perceptions expressed by OTS staff about teacher roles in policy-making; teacher involvement was not mentioned by any respondent in reaction to this question. Both sites agree that parents are not actively involved in any stage of this process, and this raises the question whether, if given the opportunity to do so, respondents would recommend an increased role for teachers or for parents in local policy-making.

Question 9 probes this very point, by asking whether there are other parties who could be included in the school's decision-making activities. Some TES respondents identify persons on the local level, persons more familiar with the daily operation of the school who should be so involved. The list includes: teachers (three respondents), tribal personnel (two respondents), and community leaders (one respondent). Other TES respondents stated that they did not know what other parties could be so involved (four respondents) or simply did not answer the question (two respondents). This may mean that they do not see any parties being absent from policy-making as currently carried out, or that they are not aware of potential personnel who could be, but have yet to become involved in this operation. Note, of course, that the idea of a continuing school-district base for decision-making is not being superceded by any of these suggestions; though the need to enlarge the base of decision-making to include local input is being implied (as is the absence of such input from current policy-making activities).

The OTS responses to question 9 likewise identify additional personnel — in specific, teachers and parents, both of which tended to be left out or de-emphasized in the response to question 8. Only one respondent chose not to answer this question and no OTS respondent selected the "do not know" option. But responses were evenly divided between teachers and parents, suggesting perhaps that — even if teachers are already involved, teachers still need to have more significant involvement in this process.

Thus far, comments linking tribal governments to educational decision-making have yet to be made for either site. Since TES is a public school, the absence of any comment about tribal input may not be surprising; but we would still have expected some acknowledgement here of the work being done by the tribe's education office in affecting more favorable educational experiences for Indian students there. OTS being a tribal school, where the administration falls under tribal government, some mention of the relationship between school-based decision-making and tribal government activity might likewise have been anticipated.

Question 10 provides an opportunity to determine whether the omission was deliberate on either parties' case. The question asks whether there are other organizations working to improve Indian education at the school. Question 11 continues the emphasis and cross-checks the meaning of the responses in question 10, by asking the respondent to describe what these organizations are actually doing to improve local educational quality for Indian students.

The TES respondents provided a long listing of "other organizations", including a wide range of agencies and individuals. All of these agencies are located outside of the school and its institutional structure. And no one agency or office appears to receive any more acknowledgement than any other. The respondents in their answers are specific enough to show that, in each instance, the identified agencies are carrying out some effort to improve local educational quality. In many cases, respondents highlight the special opportunities for continuing instruction, e.g. after-school tutorials that these agencies sponsor. The involvement of these agencies in materials development efforts, in procuring equipment needed for instruction, in mediating between Indian and non-Indian parties with mutual concerns in education, and in encouraging larger parental involvement in the educational process are also noted.

Missing, however, is any evidence that the teachers see an active role being played by the tribal education office, or by any other component within the tribal government where educational interests are concerned. Some respondents mention tribally sponsored education programs; but these are noted as specific activities not as illustrations of more general, tribal-wide commitments.

The convergence between this omission and the position taken previously in question 9 is obvious: TES respondents claim that educational decisions are being made at a higher and (geographically as well as structurally) more distant level of authority. Tribal government not being a part of the school-district's educational administration, it is inappropriate to expect that tribal government would be referred to within such a context. Similarly, the school itself being under the administration of the school district, it is equally inappropriate to find that school-related programs included in such a reference as well.

But an additional point is also being made by these responses. While the fact that several school-related agencies are engaged in educational activities is noted, none of these activities is described as a change-related agent, nor is the work they seek to do perceived in change-related terms. After-school tutorials, for example, certainly assist individual student's "catch up" to the level of performance that the classroom expects from them. But after school tutorials do not work to correct the problems in the delivery of instruction which created the need for tutorial programs to begin with. That the TES respondents do not identify change-related activities within the listing of on-going activities they carry out within the school is worth noting. The point of view they cite here parallels the attitude reflected in earlier responses: school-related programs cannot do anything to change or to minimize the problems facing Indian students in their educational experience since the problems lie outside of the domain of the school's educational concerns. Under such circumstances, we expect that teachers would not emphasize — or perhaps even acknowledge, that educational activities might have a change-related function. Such is precisely the position indicated by the responses of TES school personnel to this question.*

OTS respondents likewise provide a list of "other" organizations and parties involved in improving local educational opportunities. The list includes: the Boys Club, the Oneida language program, the Parents' Advisory Committee (Title IV-A) as well as the school district (comment unspecified). As in the TES case, there was no single organization or party which figured predominately in the responses; similarly, tribal government in specific was not included in the listing as well. Yet even so, all of the identified agencies and activities are in some direct way school-related phenomena. That is, the references are either to specific programs operating within the school or specific associations with some school-based activity. And by doing so, the OTS responses to question 10 are really suggesting that the school staff itself is assuming a multi-faceted role in providing quality education for Oneida students. Recall that most of the organizations mentioned by the TES responses to this question emphasized programs working "in addition" to the educational services already being provided by the school. For OTS, no such separation of efforts appears to be acknowledged: the school is again being affirmed as the one focal point around which all aspects of educational service delivery to Oneida students should be implemented.

But are these various programs actually bringing about improvements in educational quality at these schools? Question 11 is designed to probe the point, and the OTS responses to that question are particularly of interest in this regard. Two kinds of OTS-related activities are cited — some which strengthen

*This position also suggests that — since the problems facing Indian students are outside the school's domain, the problems must lie within the domain of tribal concern — at least from the teachers' point of view. If this is true, we might predict that the teachers will not acknowledge a vital role being played by tribal government in Indian education until the tribal government begins to address those very issues. Until then, any work undertaken by tribal government will merely duplicate, if not conflict with, the legitimate responsibilities of the school and school district. There is evidence in the responses to justify this prediction.

the work of ongoing school activities (e.g. development of materials and broadening of staff expertise for Oneida language instruction); then some which expand school-related services into domains outside of the classroom (e.g. providing incentives for more creative uses of the students' leisure time). Suggestions of the latter sort are especially important here; such a use of school-related efforts as focal points for school-external educational activities contrasts quite sharply with the limitations and restrictions placed on perceived school function by the TES respondents. As the TES respondents see it, such efforts would move the school far beyond the domain of its appropriate involvement in student affairs; other agencies should more properly be involved in efforts to this end.

A difference between the levels of involvement of teachers in decision-making as perceived by the TES and OTS respondents was noted in the discussion of questions 8 and 9. Question 12 offers additional clarification of the point, by giving respondents the chance to identify some of the specific activities in which they are -- or are not involved.

Both the TES and OTS respondents agree unanimously that staff selection is one activity in which teachers have no say. Given that staff selection is usually handled as a higher-level administrative decision, such uniformity is hardly surprising. But where activities with more of a classroom-specific focus are identified, some interesting divergences between site-specific responses begin to appear.

The TES respondents do not agree uniformly as to the overall extent of teacher involvement in any of the identified areas. Nine TES respondents see teachers involved in the selection of curriculum content and four do not. Nine respondents (but not the same nine) see teachers involved in the setting of classroom policies (e.g. attendance rules), while four do not. Nine see teachers encouraged to attend meetings between school and parents and four do not. No other areas of teacher involvement in school affairs were cited by respondents, save for the mention by one teacher of the option to participate in summer school programs.

The absence of consensus can be read in several ways. The responses may reflect the idea, seen before, that TES teachers see no role for them in school decision-making. It may be, however, that the respondents were describing their own individual patterns of involvement in these activities — suggesting that some teachers are more involved in these areas than are others. Whether this is a byproduct of individual teacher decisions to set individual levels of school-based involvement, or whether this suggests a "class structure" within the school, where some faculty see themselves closer to the sources of power than are others, remains to be determined. It is, then, overall lack of uniformity in responses which is of greater interest to present purposes; apparently at TES, teachers are not in agreement as to how powerful they are, or over what areas they may actually have influence.

The OTS respondents reflect a different opinion where their participation is concerned. While respondents are divided equally as to participation in curriculum planning, four of the six respondents see teacher involvement in the setting of school policies, and five of the six see an opportunity for active teacher participation in school-community meetings. Overall, then, outside of the staff hiring area, OTS respondents see teachers playing more significant roles in these activities than do the TES respondents. Given the school-based centralization of decision-making which characterizes OTS, the evidence of larger levels of teacher involvement in the identified activities is not surprising, since greater opportunity for teacher involvement in decision-making would therefore be expected. The fact that teachers do not agree as to the extent of teacher involvement in the curriculum content area needs to be explained. It may be possible to account for this divergence in teacher-specific terms, noting that some teachers take greater advantage of the opportunities to participate in curriculum-planning processes than do others; or that some teachers' curriculum suggestions are found to be more useful than are others. Still, the fact that staff from both the TES and OTS contexts do not identify consistently high levels of involvement in either the staff selection or the curriculum-content planning areas is worth noting, especially given the differences in organization and orientation which is said to characterize the administration of each school.

The next two questions in the inventory touch on two specific areas of change which could seem appropriate lines of activity for any school designed to serve an Indian student population. Question 13 asks whether the students' ancestral language should be taught within the school, and if so at what grade levels this should be taught. Question 4 asks if more Indian teachers should be hired for the school, and asks the respondent to explain why more teachers would be an asset to the program.

The OTS respondents were overwhelmingly in favor of Oneida language instruction within the school program, and were equally in support of Oneida instruction for all grade levels. One reason for this enthusiasm, of course, rests in the fact that the language is already being taught in the school — however, the present program is hampered somewhat both by staff limitations, by budgetary constraints, and by the amount of time available during the classroom day for such purposes. The near unanimous endorsement (one person did not respond to this or to any of the other questions on the final page of the inventory) of the language issue may be a response to those yet-to-be met needs, or may merely be an indication of the integral place within the school curriculum which Oneida language instruction has <u>already</u> come to occupy. The fact that no respondent found it necessary to offer justification for Oneida language instruction at the school is especially telling in this latter regard.

The TES responses do not show the same sort of uniformity. Half of the respondents are in favor of language instruction, although only two specific reasons for this instruction are cited — Ute language classes will strengthen the existence of the language in the community, and in ways unspecified, help the children better understand the school curriculum. The remaining five persons do not indicate a connection between Ute language instruction and either classroom-specific or tribally-based educational goals. The three persons stating objections to the instruction do not explain the basis for their position, though if they had cited the familiar argument that Indian language instruction belongs in the home and not the school context, those three persons would likewise be saying that there is no necessary connection between classroom curriculum and Ute language instruction. But even then, given the distancing the staff has placed between the school and the local tribal context in responses to other questions, it seems surprising that so many of the respondents would endorse so potentially dramatic a departure from traditional school practice. The fact that in previous years Ute language classes were held on a voluntary basis, as a student enrichment program, may be held indirectly influencing the responses here.

The OTS responses to question 14 are not as uniform as one might anticipate. Two respondents simply do not answer the question. One says that Indian teachers are not necessarily needed, since educational philosophy is more important than is race (sic). And the remaining three respondents endorse the hiring of more Indian teachers. The reasons cited for this move are: having more Indian teachers will prevent racism — something that the students encountered in countless forms within the schools of the public system in previous years; more Indian teachers must be the ultimate goal of a tribal school.

Two of the TES respondents object to the idea of hiring more Indian teachers at Todd for the same reason cited above: teachers should be hired because of their qualifications, not because of their ethnicity. Three of the ten respondents who call for more Indian teachers add the stipulation that they be qualified teachers as well as Indian in background. Particular emphasis is given to the understanding of student needs which more Indians on staff can produce; three respondents hold that position and fourth echoes it by noting the important role model an Indian teacher can provide to Indian students.

So there is a common theme uniting the responses from both sites. Persons in favor of more Indian teachers cite student-specific benefits as the reason they endorse the move. Teachers objecting to the idea do so on an institutionally-focused grounds — teachers should not be hired for ethnic reasons. Differences in school philosophy and in perceived site-specific needs appear not to affect the perceptions of this issue in either case.

The final question in the inventory asks if the school is equipping the children for overall success. One OTS respondent says yes, while four say no. There is, however, no consistent reason cited to explain the school's current shortcomings. Each respondent has his own explanation for the failure — a stronger curriculum needs to be designed, the teaching environment needs to be up-graded, more materials need to be developed, and discipline needs to be improved. But as before, the problems are issues which the school is empowered to correct — neither the students nor the tribal context from which they come are associated with the existing limitations on school performance.

As might be expected from previous responses, the TES staff are not in agreement as to the effectiveness of the school's existing program. Four respondents feel the present effort is effective, five respondents feel it is not. Two areas of change are cited so that existing problems can be corrected: student motivation needs to be increased, and parental support needs to be strengthened. Both of these problems, while partially school-related, are nevertheless problems which are based in school-external conditions and which will require school-external adjustments before they — and their impact on the students' schooling experiences can be fully corrected.

Summary: The Todd Elementary School Responses

1. While the school is not identified directly as having an assimilative function, the school's commitment to changing the Indian student gradually in the direction of Anglo society and values is recognized. Part of this commitment includes efforts by the school to develop student respect for their Indian culture. But it is the teachers who see Indian education as a bicultural activity, not the school. The school's priority is toward Anglo-related values. (Part I)

2. Hence, there is evidence of conflict between teacher perspectives and school perspectives on the goals of Indian education. Equally important, there is no consensus within the teachers themselves as to these goals. (Only three of the thirteen respondents assign the school the same philosophy as they do themselves). (Part I)

3. Indian-specific reasons for the teachers' involvements in Indian education are not cited at TES. (Part II, question 1)

4. Indian education is to be defined in terms of the specifics of its content; that is, Indian education occurs when the school undertakes to teach about Indian culture to Indian students. Hence, Indian education is a school-centered, if not school-internal activity, whose focus is on activities lying inside the school's immediate domain. Indian education need not include a commitment to go beyond the classroom. Teaching about Indian culture to Indian students in the school may, therefore, be viewed as an end in itself, not necessarily something which must be linked to higher-level goals. (Question 2 and 3a)

5. Progress and effectiveness of Indian education can be measured, given this definition, in strict quantitative terms — the presence of Indian students, of Indian-related items on bulletin boards, of Indian-focused units in the lesson plans, and so forth. Visibility of an Indian "presence" within the school is the key to such an assessment. (Question 3b)

6. The problem in educating Indian students at TES are child, parent, and/or

home-centered. Many of these difficulties involve behavior patterns, attitudes, or other orientations which should be corrected by persons and parties outside of the school. School-internal problems in Indian education are quite secondary to the obstacles and barriers presented to the students by their home environment. (Question 4; see also questions 6 and 15)

7. There is no consensus at TES as to whether the problems facing Ute students in their education are similar or distinct from the problems faced by non-Indian students. The majority opinion seems to see no necessary difference — which gives all the more reason for the school, even with its commitments to "Indian education" as here defined, to attempt to meet its commitments strictly in school-internal terms. (Question 5)

8. There may be any number of specific things the school can do to strengthen the quality of the educational experiences of the Ute Indian children. The most favored strategy calls for the school to undertake a more intensified program of parental training. Presumably this will give parents more adequate basis for undertaking necessary changes within the home context so that existing barriers will be removed. At no time, however, is it recommended that the school itself should intervene into the home context and deal with those external problems directly. Other parties and agencies, based outside the school, have the responsibility to do that. (Question 6; also see questions 2 and 3a for background)

9. There are limitations placed on the kinds of activities in which teachers should be involved; school-external activities, in particular, are not expected or necessarily required on the teachers' part. (Question 6; see also question 12)

10. Out-of-school influences and their impact on Indian students' educational experiences lie at the <u>core</u> of the problems these students have in school. (Question 7)

11. TES staff appears to operate on individual terms within the out-of-school

contexts; teacher impressions of the nature of these out-of-school problems differ, one respondent to the next. Some are more familiar with local conditions than are others. (Question 7)

12. The school-board, and other school-district level officials, provide the focal point for all educationally-related decision-making. Todd, itself, has little say in the direction of those decisions. Tribal government has just as little say, if not less of a voice in such decisions. (Question 8)

13. A wider role for teachers and for school-related committees in educational decision-making is recommended, although just as many parties do not recommend that input from any other party be sought. Whether parents, per se, should have a larger role in decision-making is not clear. (Question 9)

14. A wider role for tribal government in educational decision-making is recommended, although the precise role currently being taken by tribal government in Indian education-related activities is consistently identified. Discussions of current activities show convergence only when school-district related activities are mentioned. The school-district, not the specific site, is perceived as the focal point for decision-making and implementation of decisions. (Question 10)

15. Ongoing support activities have a unique responsibility — to complement the work already being carried out within the school context. Current efforts are not change-oriented, but work within given confines to make the children more receptive to the instruction the school is already offering. Advocacy is not a significant part of the work being done by agencies and parties at any level. And all school-external activities are the responsibility of school-external parties, which may or may not, be working under the auspices of or with the support of school-district authority. (Question 11)

16. TES teachers are not involved in the staff selection process. Some teachers are involved in curriculum, policy, and school-community meetings, others are not — though whether this reflects more individualism on the teachers' part

or reflects some sort of class-structure within the school cannot be determined. (Question 12)

17. There is some agreement that the Ute language should be taught in the school, though no statement of purpose linking the Ute language instruction to any larger-level educational goal is identified. (Question 13)

18. TES staff largely agree that the hiring of more Indian teachers would be a useful move on the school's part. Objections stress only the idea that teachers should be hired on the basis of their skills, not their ethnic background. (Question 14)

19. If the school is truly to be successful, student motivation must be intensified and parental support for education must be increased. (Question 15; see also question 6)

<u>Summary: Oneida Tribal School Staff Responses</u>

1. The purpose of Indian education is not to assimilate the Indian child into the American mainstream. Educational success need not come at the expense of knowledge about tribal culture, language, and traditions. The school faces a unique challenge — to assist the child in learning how to "make sense" out of Indian and Anglo lifestyles. (Part I)

2. There is no conflict between teachers and the position of the school on this question. (Part I)

3. Indian-specific reasons for the teachers' involvement in Indian education are not cited at OTS. (Part II, question 1)

4. For the school to be effective, the school must grapple with issues and problems affecting the students and their educational experiences which lie outside as well as inside the school's domain. Reference to Indian culture within the classroom is meaningless unless it has their larger syncretic purpose behind it. Indian education is more than a content-specific phenomenon. (Questions 2 and 3a)

5. The fact that OTS is a new school — less than one academic year old, weakens any attempt to evaluate how effectively the program is operating. (Question 3b)

6. There are problems relating to the education of Oneida students which remain to be resolved. These problems are, however, school-based; they largely revolve around discipline and other policy issues; and therefore are questions which the school can and should be expected to take care of. (Question 3b and question 4; see questions 8, 10, and 11)

7. There is no consensus at OTS as to whether the problems facing Oneida students in their education are similar to, or different from the problems faced by non-Indian students in their educational experiences. (Question 5)

8. The school (e.g. OTS) has a primary and central role to play in the education of Oneida Indian students. Other local parties and/or agencies should work in conjunction with the school, not apart from the school, if educational issues are to be addressed through their efforts. (Question 6; see also questions 3b and 4 for background, and question 10 and 11)

9. OTS staff see certain restrictions and limitations placed on the kinds of activities for which they are responsible and within which they should become involved. (Question 6; see also question 12)

10. Great emphasis is <u>not</u> placed on the impact of out-of-school conditions on the educational experiences of Oneida children. OTS staff see such conditions as secondary to the problems presented by school-internal conditions. (Question 7)

11. OTS staff do not operate as independent agents when dealing with the Oneida students, their parents, and the surrounding community. (Question 7)

12. Decision-making in regards to the operation of OTS is a local-level phenomenon, involving agencies and parties who are immediate to the local educational scene. Teachers are involved, though to a secondary degree, within the

listing of local-level decision-makers. Parents — and more importantly, tribal government *per se*, are not perceived to be involved. (Question 8)

13. A wider role for teachers and larger role for parents in educational decision-making is recommended. (Question 9)

14. A wider role for tribal government in decision-making is not emphasized, since the *school* is perceived to be the conduit through which all local-level decision-making relating to education should pass. (Question 10)

15. The school has a responsibility to carry its educational function outside of the classroom walls. Local agencies and programs associated with the school may be particularly useful in that regard. (Question 11)

16. OTS teachers are not involved in the staff selection or the curriculum planning process to any extensive degree. Level of teacher involvement in other areas of school-related activities appears to vary, one staff person to the next. (Question 12)

17. It is quite appropriate for the Oneida Tribal School to be providing instruction in the Oneida language. No justification of this idea needs to be provided — language instruction is that basic to Oneida education. (Question 13)

18. OTS staff do not hold a uniform opinion as to the need for hiring more Indian teachers, though no party objects to the idea *per se*. (Question 14)

19. If the school is not preparing its students for the future, the problems rest within the school's power to correct. (Question 15)

The Teacher In-Depth Interviews: The TES Responses

Originally, it was assumed that the questionnaire responses would be used to amplify and broaden the information obtained from the in-depth interviewing of the classroom teachers participating in the project directly. The amount of information about schooling processes and educational assumptions at TES and OTS which the analysis of the questionnaire data revealed soon suggested that a reversed strategy was more appropriate. For, as will be evident below, comments made in the teacher interviews were usually found to elaborate on issues, observations, and attitudes which in the questionnaire responses had already identified. To highlight the possibility of drawing these comparisons, the main theme of each item from the questionnaire was used as the focus for analyzing the interview transcripts. Comments in each interview relating to a given theme were marked and set aside, to be grouped with comments on the same theme made by other respondents in other interviews. The frequency of occurrence of a given comment within a particular interview was of interest and was noted. However, because the interviews were deliberately allowed to be "open-ended", comparisons of frequency of comment occurrence between interviews seemed less meaningful. Tabulations of response frequencies within the sample, of the sort provided in the discussions of questionnaire responses, were not attempted for the interview data. Instead, theme-related comments from each interview have been synthesized, in order to determine whether the teachers more closely associated with the project hold attitudes on Indian education and Indian schooling which are consistent with the attitudes held by other teachers at each school.

What follows is a summary of those findings as gleaned from the interviews conducted with of the teachers and teacher aides at Todd Elementary School.

1. On the goals of Indian education. Most of the TES interviews did not touch on so general an issue. Three interviews did, and the consistency of response is striking. One respondent notes that Indians have to live in two worlds, but that both of those worlds are here — i.e. in rural Utah, and the school must prepare the students for such a life context. Two other teachers echoed the same sentiment, when noting that the students can get their Indian orientation at home, but must rely on the school to provide the Anglo balance and complement.

Such a position is not inconsistent with the attitude reflected in Part I of the inventory responses, where seven out of thirteen TES respondents selected position 3 — to orient the Indian student to combine Indian culture and the ways of the dominant society. But it also suggests how one could hold position 3 (and thereby reject Anglo-oriented acculturation) but still argue in favor of an Anglo-emphasis within the school. Such an educational approach would work, if the school and the home were co-equal partners in the educational process, each doing its part to maintain the whole. But responses from the inventory show that the teachers do not feel that the home context does its fair or appropriate share in this arrangement, and the responses made in the interviews more than reiterate this same theme.

> Comment: There is a self-serving philosophy underlying this attitude: accepting the overall need for bicultural living, and noting that the school must assume responsibility for its unique charter — Anglo-oriented education, allows the children to become anglocized de-facto if (1)the home is not doing its part, and (2)the school does not assist the home to better do its part. Requiring that the home context participate in an educational contract for which it is not prepared or in which it is not able to participate is tantamont to working within an acculturization framework even if the school gives lip-service otherwise.

2. On Indian education problems. (Compare to responses to question 4 on the inventory). A total of nineteen different problem-foci are volunteered in the TES interviews. They break down into four main problem-areas:

Area 1 : Student-based or student-specific problems:
- 1.1 Students cannot follow complete directions (2 respondents)
- 1.2 Students cannot accept challenges (1)
- 1.3 Students are not goal oriented (1)
- 1.4 Students have no internal motivation (1)
- 1.5 Students will not ask for help from teachers, because they are afraid of being shamed (1)
- 1.6 Students are starved for affection and make security a higher value than learning (1)

1.7 Students who have high incidences of absences
1.8 Students who have reading-related problems

.Area 2 : Home/tribe-related problems
2.1 The home environment itself is pathological (1)
2.2 No out-of-school followthrough on homework
2.3 No parental involvement in the children's education (see comment on this point below)
2.4 Frequency of student absences

.Area 3.: School administrative problems
3.1 Insufficient finances
3.2 Teacher/student ratio is imbalanced
3.3 Teacher turn-over leads to noncontinuity in education
3.4 Not enough time for instruction in any subject area
3.5 The remedial and support programs are not coordinated with each other or with the work in the regular classroom

.Plus 4.: Interference of Ute language and culture
.Plus 5.: Inter-ethnic conflicts

Note that of the nineteen problems, fourteen are related specifically to student-specific or home/tribally-related factors. The school-related problems, on the otherhand are over and above the classroom level, and relate in the main to issues and concerns over which the individual classroom teacher has little control. This is consistent with TES responses to the questionnaire, both on the question of specific problems in Indian education — where the student and home, not the school were blamed — and questions relating to teacher perceptions of power and influence in policy-making — where teachers acknowledge that persons and factors above their control actually made and implemented policy. The teachers in the project-related classrooms are being consistent with other persons in the school, when they fail to identify the role of classroom-internal issues in creating Indian student educational difficulty.

The TES interviews provide some amplification on issues within two of the problem areas here noted. Several teachers had things to say about conflicts between Indian and non-Indian students, as they might relate to Indian student educational achievement. Two teachers specifically cited Indian student resentment of white students, and one linked this to an Indian desire to see white teachers fail in their job. Two other teachers, however, denied that there are such conflicts, or that they exist in any meaningful way; a third teacher argues that, in his experience, level of ability takes precedence over ethnic background in defining friendships and social cleavages in his classroom.

The teachers all had things to say about the issue of parental involvement in the children's education. All agreed that some Indian parents are actively involved on a day-to-day basis in their children's education -- and these are the parents who participate in the PTA and other such activities as well. These are the parents the teachers are most likely to see each year. Other parents appear to stay informed, even if they do not come to the school for visits and discussions with faculty and staff. The teachers also agree that most parents want their children to get all of the help and assistance the children need for solid school achievement. No evidence was cited of any stigma attached to a student being enrolled in Title I or any of the other self-help programs offered at the school.

Several TES teachers noted that until recently, parents were not able to participate actively in the homework process since (1) the parents may not have been as skilled in the technical skills these exercises required; (2) the parental first language fluency in the Ute language may interfere with providing such assistance; and (3) the home environment itself may not be conducive to learning or supportive of education. These factors have begun to change, these teachers argued although some parents are not equipped to provide assistance even now.

Teachers noted two problems which often make contacting parents for conferences a difficult task. First, many families do not have telephones. Second, parents work and so contacting them during the day, or scheduling day-time appointments for discussion, are both made more difficult.

Note: The picture of parental involvement is somewhat less negative than the responses to the inventory would have one believe. The teachers interviewed seem to indicate the parents are more cooperative and interested than those responding to the inventory implied. None of which negated the fact that the teachers see parental and home-based input as being necessary to strengthening the children's education.

TES teachers also identified several issues which are not problems in the education of Indian students at this school. Four of the teachers were quick to argue that the oft-cited stereotype of the "silent, nonverbal" Indian child was not relevent to local conditions in their school. Each teacher had his/her own interpretation to this theme, including:

- The silence is surface level and requires interpretation on the part of the teacher; it is not an end in itself.
- This is an overworked stereotype which has not been seen in this teacher's experiences.
- Silent Indian kids are just scared.
- Silent kids will respond if called on, otherwise, they will remain passive.

(These comments are worth noting, when we recall that only some of the students in these classrooms are "silent", while others are as aggressive as any non-Indian child could ever hope to be).

Teachers also rejected any attempt to argue that English language verbal skills are problems in the Indian students' education. Ideas that the students speak "Indian English" were rejected as were other attempts to cite specific English language arts difficulties.

The teachers rejected any attempt to cite discipline problems as barriers to the students' educational progress. They likewise rejected the idea that the students might feel different or inferior because they are in the minority, culturally, within the school district.

These comments suggest that the TES teachers are not accepting stereotypes in a blind fashion, when discussing educational problems. They clearly have a sense of what _is_ and _is not_ going on in their classrooms, and the other comments in the interviews must be reviewed carefully to determine the scope of the perpective which is governing these distinctions.

3. _On the uniqueness of the Indian students' problems_. (Compare to response to inventory question 5). TES teachers seemed unable to provide any specific evidence that the Indian students have unique educational problems. The two bits of example provided — Indian students cannot estimate and Indian students count on their fingers during problem-solving, are hardly exclusively _Indian_ behavior patterns as the teachers noted.

Proof was offered to suggest that there must be something unique about the Indian students' educational experiences. The argument is as follows: there are more Indians than Anglos in Title I, so Indians must have more basic skill's problems than Anglos. And, relatedly, Indian CAT scores are always lower than the Anglos' scores — which in turn explains why more Indians are in Title I, since CAT scores govern student entrance into that program.

The questionnaire respondents rejected the idea that there were unique Indian problems. Perhaps the teachers in the interview are trying to find problems since they were asked specifically to discuss them. In any event, specific problems are not cited beyond the CAT differential — and the teacher who cited this noted that because the test is timed, Indian students are automatically placed at a disadvantage. (Title I, in fact, is now teaching their students how to take timed tests so this unique problem will soon pass away).

4. _Solutions necessary to solve Indian education problems_. (Compare to question 6). The TES interviews gave greatest emphasis to the need to use specific teaching strategies to address and solve the students' educational problems. These strategies include:

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- Careful explanation using lots of repetition
- Individualizing instruction
- Use of "hands on" principles in instruction
- Stress student learning before doing
- Use of "foreign language" approaches to instruction in all content areas, since what is being taught is "second culture"

Other solutions were noted, including:

- Career development programs
- Hiring of Indian teachers
- Adult education
- Steps to deal with problems in the home environment

Only one skills'-related improvement was mentioned — the teaching of speed in taking timed-tests. No other student-specific change is proposed. And this is very surprising given the long list of student-specific problems identified by these teachers in the interview responses on that issue. Why, then, instructional changes, if the problems are student-based?

Are these instructional changes? No comment is made to revise or reorient the curriculum content. These suggestions take the curriculum as a given and try to identify ways to make the data more accessible to the students. Accessibility of information, however, was not identified as a problem before — and these suggestions, taken at face value, leave without comment the ways in which they will build student motivation to accept challenges, teach them how to follow directions, and the like.

The parallels to earlier statements cited here regarding the overall purpose of education is worth noting. The school's job is to provide Anglo-oriented instruction. The school must do that effectively. If the students do not profit from this, and the school is doing all it can, then the fault lies externally, in situations over which the school has no control.

These solutions, then, leave many of the identified problems — 14 out of 19 without attention. Those are the student and home-based problems. Apparently, there is some question whether it is within the school's purview to undertake changes in those school-external domains, or whether if deemed desirable, such changes <u>could</u> be carried out.

We might wonder, in this regard, how much awareness the teachers actually have as to the out-of-school context of their students? A review of the TES interview transcripts for comments about Indian culture, reservation life, and related issues helps answer this question. Several specific facts were cited, including:

- .The importance of band membership for each student
- .Silence as a means of communication in tribal culture
- .The existence of the Indian language within the home
- .The existence of home-based Indian culture, including canning, quilt making, and the like
- .That Indian families may not be equivalent to Anglo families (i.e. the child may live with an aunt not the mother)
- .The students are more familiar with learning before doing

But negative comments about the tribal culture were also made and these include:

- .Indian culture is not precise or accurate in its orientation
- .Indian culture is not complex or detailed and neither is the lifestyle
- .Indian culture is not future oriented nor does it have long-range goals
- .Indian culture, being traditional, is a barrier to modern and progress
- .Indian orientation leads to school-related indifference

Comment: First, those who held attitudes in the second grouping also had knowledge in the first area. The only way to interpret this on a group-general level, then, is to note that the teachers may have some specific facts about Indian culture on the reservation, but also hold generalizations <u>not</u> based on facts but derived in other sources. Hence, we can have TES teachers rejecting specific stereotypes about Indian student classroom behavior (e.g.the silent nonverbal child), but still holding to assumptions like "Indian culture is not complex or precise". Such positions only reinforce the idea that the school is perceived as needing to go "only so far" in its educational endeavor — and that some of the educational problems call for solutions and orientations which lie outside of the school's domain of responsibility.

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5. On Indian language instruction. (Compare to question 13). The responses to questions about the need for in-school language and culture instruction are insightful in this regard. One teacher said that information about Ute traditions would help the children gain more respect for their background, and this would help improve their sense of self. But the other respondents — Indian and non-Indian — were quite negative on the idea. Two noted that such instructions belong in the home and not in the school; the home, one noted, can provide a closeness that the school cannot provide in this instruction. One teacher noted that the school has more important things to teach, even though maybe a unit on Ute history and culture would be useful. Another teacher — echoing a sentiment seen throughout these responses, said that the students need to learn Anglo culture and the school is the place to do that.

One student did note that, if such instruction were offered, all students (Ute and Anglo) should be provided the instruction. That comment hardly sounds like one to be made in a school with high degrees of inter-ethnic conflict.

These responses are at variance with the responses on the inventory, but the variance can be explained, in part, given that these comments were made in the context of larger issues, while the inventory called for responses not connected to preceding or following questions. That the inventory respondents did not cite rationales or benefits to include the Ute language and culture in the school is worth noting; it may be that teachers know they "should" support the Ute language and culture in schools unless they have specific reasons against the idea.

Another thing the school can do, as noted in earlier responses, to help strengthen its educational services, is to hire more Indian teachers. The teachers noted that if they were qualified this would be a useful thing, since Indian teachers can be sensitive to student needs and can act as role models. But the pedagogical qualifications are nonetheless more important than the ethnic sensitivity. And even then, one teacher noted, some non-Indian parents may resent having an Indian teacher in his child's classroom. One respondent told a lengthy anecdote about that problem.

6. On progress. (Compare to question 15). Are there signs of progress -- is education at this school working out for the students' best? Some indications were cited:

- More Indian students are now entering high school (how long they stay there was not noted, however)
- Attendance rates are higher at the elementary level
- Parental participation has increased

The lack of congruence between these measures as the solutions the teachers offered to address existing problems still remains.

7. Other points. Two other points emerged from the TES interviews and need to be noted in closing. First, teachers see Todd Elementary School as a unique educational environment; first, because of its location on the west side of the district, far from authority, and second, because it receives much federal aid to assist in Indian education. This is an interesting way of defining a school site's uniqueness, especially given some of the other characteristics one could associate with the school. Second, TES teachers cited evidence of learning about students before they have the students in their classes. Ample evidence exists to show how damaging this can be to teacher perceptions of student behavior. But it also says something about "information flow" within the TES setting.

The Teacher In-Depth Interviews: OTS and TES Responses, Compared

In-depth interviews were carried out by project field staff with a total of nine staff members at OTS. In addition to discussions with the teachers within whose classes the observations and student interviews were made, project staff interviewed four teachers of students of younger grade levels, two of the school's resource personnel, and the school principal.

Two of these persons did not wish their interview to be tape-recorded. The content of these discussions was summarized from notes and recollections after-the-fact by the participating interviewer, and the analysis given here was based on the written statement of that summation. The remaining seven interviews were tape recorded and an effort was then made to transcribe an exact wording of the discussion for analysis purposes. The quality of the recordings, background noise, interference and other "technical" problems made it difficult to obtain an exact transcription of the taped discussion in several cases.

Still, a review of the summary notes and the transcripts provide ample amount of information for purposes of the present analysis — to determine whether the general themes revealed through the comments on the teacher questionnaires are consistent with the attitudes about teaching, about Indian education, and about the instruction process at Oneida Tribal School, which members of the school staff would identify during a more concentrated discussion of these themes.

1. <u>The goals of Indian education</u>. Interviewed OTS faculty, like their TES counterparts, did not touch on as general a theme as "goals of Indian education" within their discussions. In part, this was an artifact of the interview itself. And so, sensing that the public school-orientation of the instrument was offensive to some OTS faculty members, project staff decided to restrict the interview almost exclusively to Indian math and Indian student mathematics performance within the OTS classroom. But there may be other reasons why in the OTS case we do not have extensive comments on the goals question. One influencing factor, here as elsewhere, may relate to the nature of the OTS itself. The school was set up in the summer of 1979 to offer Oneida students an alternative to the public school instruction — and instructional philosophy to which they were being exposed. The existence of the school and the fact of a person's participation within it serve as reflections of Indian educational "goals" in their own right. Further, OTS being a <u>tribal</u> school, the philosophy of education is something which (in theory at least) has been developed by faculty, parental as well as tribal authority; it is not a

philosophy known only to small group or shared only among a professional elite. Thus any discussion about OTS specific activities has already made a tacit recognition that OTS has some specific philosophical orientation associated with its work. The interview could therefore proceed from this assumption and did not have to spend time trying to decipher it.

Evidence of this same theme is seen in OTS staff responses to other questions in the interview inventory. The internal consistency in individual responses throughout the interviews stands in marked contrast to the diversity of attitudes reflected in the TES interview comments and responses. Comment will be made on these differences below.

Of course, uniformity and consistency in implicit attitude is not to be taken to mean that all persons within the Oneida tribal community accept the school's philosophy without question, or even that all persons would claim to be able to understand it. The point is, unlike the highly implicit attitudinal conditions characteristic of TES, the philosophical orientation of OTS is an explicitly stated fact. And in this one difference lies much of the real contrasts which distinquishes TES and OTS as educational environments.

2. Indian education problems. A total of sixteen different problems were volunteered in the OTS interviews, each of which was -- from the respondents' point of view, contributing to the difficulties in educating Indian students which were being encountered within the OTS context. These problems fall, in part, under the problem-areas identified in the TES analysis and are listed here according to that framework:

.Area 1 : Student-based or student-specific problems:

1.1 Students are not able to perform orally in the classroom; their seatwork shows they understand certain concepts, but they may not be able to explain verbally what they have mastered when called upon to do so

1.2 Students do not have the self-discipline requred for classrooms or home-based study

1.3 Students are not well disciplined where behavior is concerned; they are unruly and often lack courtesies assumed by adults to be present within children their age

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.Area 2 : Home/tribe related problems:

- 2.1 Sometimes parents give children too much help with homework so that the students do not have a chance to develop skills on their own
- 2.2 There is not enough parental involvement in the student's education

.Area 3 : School administrative problems:

- 3.1 Provisions have yet to be made to enforce school regulations consistently or to provide teachers with the support they need when they seek to enforce them
- 3.2 School organizations encourage student discipline problems
- 3.3 Time tests do not provide an accurate picture of student skills
- 3.4 The absence of textbooks provides problems in instruction

.Area 4 : Interference of Oneida language and culture:

- 4.1 Oneida culture orients students away from the value system which schools utilize in their instruction

.Area 5 : Inter-ethnic conflicts:

Comments on this point were restricted solely to conditions at schools Oneida students attended prior to enrolling at OTS

To this list of OTS-TES parallels must be added a sixth, uniquely OTS identified problem-area:

.Area 6 : The negative impact of previous school experiences:

- 6.1 Teaching through "rote learning" prevented many OTS students from mastering critical concepts — even if they have mastered some of the data related to those concepts
- 6.2 Public schools condition the Oneida students into viewing education in terms of polar opposites — e.g. good vs. bad, right vs. wrong, succeed vs. fail, even though the tribal value system may not give emphasis to the same distinctions with equal intensity
- 6.3 (And continuing that theme even further). Public school practices simply do not make sense to Oneida students, leaving them with disoriented feelings about school, classroom activities, and education in general

The TES and OTS responses contrast, then, in the importance each group gives to the previous (and, in specific public) schooling experiences in shaping their students' orientation toward education. The emphasis given to the negative impact of public schools on Oneida students is not surprising. OTS being in the first year of its operation, almost all students have had previous school experiences in at least one other locale with some students reporting having been enrolled in several different schools before 1979. Much of the OTS faculty's struggle during the first year centered on measuring the levels of mastery which OTS students had individually attained in various subject areas; the impact of their previous school experiences could not have been clearer in those terms.

The lack of attention given to this point by the TES respondents is understandable. In almost every case, Todd was the first grade school that Ute children attended. Antecedent or alternative schooling programs simply do not exist at that grade level within this area. So previous school experience cannot be blamed for any less desirable skills the Ute students reflect within the TES classroom.

There is, however, an interesting contrast being made here all the same. The TES respondents chose to focus blame for the Ute children's educational difficulties on influences lying outside of the school and the classroom — the home context, tribal influence being two of the primary foci of influence. In contrast, while OTS staff trace many of their problems to the make-up of the school itself, OTS staff also lay blame in part on school-external influences. Here, however, the problems are not being traced to the home or tribal contexts. Oneida, being a tribal school, is supposed to be working in concert with those domains. And that leaves only one other external source of influence which can be blamed — the public schools. In the TES case, laying blame to the home and tribe was a useful attitude in that it provided a ready-made excuse to absolve TES from any responsibility if the Ute children did not evidence progress in their education. Ironically, tracing part of the basic Oneida students' educational problems to the students' previous exposure to public school education does precisely the same, self-serving thing. In both cases, negative influences based outside of the school have been found. In both cases, those influences provide ready-made and convenient explanations for continuing student problems in their education. In both cases, the effects of these external influences may not be easily eradicated. So, if student school achievement does not improve in the coming months, reference to these ex- ternal influences will <u>continue</u> to serve as an explanation for problems — further absolving the school from admitting to any short-coming or wrong- doing which it might otherwise be forced to acknowledge. In spite of the seeming parallel, a contrast can still be found: TES respondents seemed ex- plicitly aware of their tendency to "shift blame" from the school to the out- side source of failure. Problems at the school were not linked directly to pro- blems in the education. OTS respondents, in contrast, were less willing to divorce the school and its activities from the list of problems they associate with Oneida student education. Whether OTS staff will ultimately find it necessary to separate the influence of the school from the influence of the tribal context which surrounds it cannot be determined at this time.

Some other areas of difference between the TES and OTS explanations for student education problems need to be highlighted here.

The majority (fourteen of the nineteen problems) of the TES responses identified student or home/tribal based sources for these problems. Only four of the sixteen problem areas identified by OTS staff are student-oriented. And even these, when examined in closer detail, do not allude to claims about student inadequacy which so often underlay the TES comments. In fact, three of the OTS student-related "problems" are clearly found to be the result of con- ditions brought about by the influence of other identified problem-areas: the impact of previous schooling experience (as just detailed), and the discipline issue, which played so significant a role in the teacher questionnaire re- sponses are two of these.

The third such student "problem" traces part of the OTS student classroom difficulties to the difficulties they experience in giving in-class presenta- tions. Note that the respondents did not say that Oneida children are "non- verbal". (No OTS respondent made reference to this stereotype). The respondent

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argued only that Oneida students are not as expressive as they need to be, where classroom-based rhetorical and reportive skills are concerned. But again, this — like almost every other student-related problems identified by OTS staff, is a problem which the school is empowered to remedy.

It appears accurate to argue that, in general terms, the OTS staff attitude toward their (Indian) students is somewhat more optimistic and positive than is the corresponding attitude among the TES faculty and staff. The responses show that the OTS staff does not view the Oneida students as problem-or deficit-ridden and that the teachers do not (within interview contexts at least) identify student-specific problems in the same detail as was found to be the case for TES. Similarly, OTS staff appear to be somewhat more critical of the school and the ongoing efforts of the classroom than are their TES counterparts. OTS respondents identify several issues which the school is capable of correcting, and specifically chastize the school for its failure to take necessary steps to correct them. No such indictment of school-internal educational services is contained within the content of the TES interview responses.

One additional contrast remains to be noted, but the nature of the contrast can be appreciated only in the light of the preceding observations. Ironically, respondents from both contexts argue that the school, as an educating institution, operates in terms distinct from principles basic to the students' tribal backgrounds. Yet the respondents' respective treatment of this theme and its implications for school and educational policy reflects the very essence of the differences which characterize, and therefore distinguish, one site from the other.

According to the attitudes reflected in the responses, TES educators recognize the negative consequences which may erupt out of these school-tribal conflicts. Hence, they want to see the introduction of various types of intervention strategies (in [illegible], parental training) so that the home and tribal context can be brought into closer harmony with the operating philosophy of the school. OTS educators also recognize the negative consequences of these conflicts. They, however, choose to address these conflicts by calling for an expansion and intensification of the work of the Tribal School itself, since it was in response to home-school conflicts that OTS was created in the first place.

3. The uniqueness of Indian educational problems. Most OTS respondents reported it difficult to draw conclusions at such a level of generalization. Thus, they were unwilling to state whether Indian students encountered "the same" or "different" problems from non-Indian counterparts. Respondents were, however, willing to identify specific parallels between Indian and non-Indian difficulties with school activities. For example, the fact that Oneida students use their fingers for tabulation purposes when attempting to solve more complex additional and subtraction problems is one of these parallels.

The more assertive comments on the question came from those OTS staff members who have had experiences in public as well as tribal school classrooms and/or have taught both Indian and non-Indian elementary students. The TES respondents have exposure to such contrasts on a daily basis yet they were unwilling to identify problem-areas in education which might be restricted solely to Indian students. However, since there are more Indian students in the Title I program each year than non-Indian students, TES respondents were still willing to assume that differences in Indian vs. non-Indian educational experiences must exist at some level. No OTS respondent was willing to make such assumptions, perhaps because, as one of the more articulate OTS respondents put it, OTS is concerned with the whole of the child, not with fragments, and OTS needs to know "who the child is", not "what others think the child should be". In this sense, attempts to identify contrasts between "classes" of students would be inconsistent with the OTS orientation toward education. And the fact that such contrasts are drawn by the TES respondents shows, once again, how the differences in each school's perceptions of their students' capabilities are merely a small part of larger-level differences between each school's perception of its educational mandate.

4. Necessary solutions to Indian education problems. Given the overall differences of the sort just noted, it is expected that TES and OTS respondents would take differing positions on the steps necessary for dealing with the problems in Indian education evidenced at each site. Consistent with positions taken in answers to previous questions, TES respondents suggested a series of classroom-based activities each of which is designed to make information more accessible to the school's Indian students. The list is interesting, in that at no point in its recommendations is a call made for changes in the content or organization of the curriculum. Few of the recommended strategies touch on the specific problems identified by the respondents at earlier stages of the interviews. Since most of those specific problems dealt with issues lying outside of the school's domain, it is not surprising that respondents do no propose extensive strategies to address those difficulties. In fact, the position emerging from the recommendations seems to suggest that only the delivery of instruction to Indian students at TES needs to be changed; the organization and relevence of the curriculum, the appropriateness of its design to student needs, and the like appear not to require further modification.

Three suggestions are made on this point by the OTS respondents. The first calls for the school to individualize its approaches to instruction both by presenting information in student-specific terms (e.g. greater use of the lexis, more one-to-one discussion between teacher and student) and by taking steps to treat each student as an individual and in terms of his individual needs. The interview responses provide ample indication that OTS staff endorse individualized, rather than group-general classroom strategies. Classroom descriptions show that such strategies are already well grounded in the work of OTS and its teachers. Thus, neither of these suggestions calls for a radical change in current OTS practice; in fact, the suggestions more properly call for an intensification of current practice, rather than a departure from it. Apparently from OTS point of view, there is nothing immutable about instructional strategies or instructional orientation at OTS. This is quite a contrast from the perspective revealed by the TES interviews.

But other suggestions are also made by OTS personnel. Several respondents evidenced the need to have qualified and informed persons from the local community come into the classroom to serve as guest speakers and "resource persons", when particular topics of interest were to be explored. (The suggestion was made in particular reference to the math question). The use of traditional Oneida-like activities as a means of reinforcing and strengthening student academic skills (e.g. gambling games as an aid in math instruction) was also noted. (Once again staff call for a stronger evidence of integration of Oneida tribal culture into the school's curriculum). No such suggestions were made by the TES respondents. More significantly, little recognition was given to the need for increasing the tribal components of the school curriculum or even for adding specific Ute-based features into the daily lesson plans. True, OTS being a tribally-based school, stands in a more favorable position to see such an integration of traditions within its curriculum. Still, there is little in the TES responses to suggest that, administrative circumstances being different, TES staff find it necessary (or appropriate) to make such adjustments in the existing school curriculum if solutions to Indian education problems are to be the outcome of the efforts.

OTS respondents, as noted, took exactly the opposite position on the question. For, in addition to calls for individualizing instruction and for integrating specific Oneida cultural traits into the curriculum, OTS respondents also hope to see an eventual remaking of the curriculum itself into something which operated in terms of an Oneida "sense of completeness".

Particular ways to move the school and its activities away from the Anglo philosophy and closer to the traditional Oneida value system were suggested. But even more comprehensive changes in the school's intellectual organization were detailed. Respondents note that public schools and the schooling programs modeled after them tend to fragment attention into discipline or subject-matter-specific domains, while traditional Oneida culture treats every theme as part of all other themes and every area of inquiry as something integral to all other of inquiry. What OTS would be like if such an Oneida-based orientation were to be adopted is not discussed by the respondents — yet, the need to adopt such an Oneida tribal orientation is clear if only as a means of correcting the attitudinal damage done by "alien" institutions during earlier stages in their education careers.

5. Knowledge of Oneida culture. It was suggested in the analysis of the TES interview responses that the TES respondents may not make reference to Ute tribal culture in any positive way because they may not actually be aware of details within the traditional cultural inventory. A review was made of interview data to see what evidence could be found to show how familiar TES staff were with such local cultural conditions.

A comparison with the OTS responses along these lines is somewhat fallacious, since most members of the OTS school staff are Indian (and many are of Oneida background). There should be more evidence of respondent familiarity with Indian culture in the OTS instance. The interview more than fulfill this prediction.

Of greater significance to present purposes, is the understanding that OTS staff reflected where the uses of tribal culture to classroom purposes is concerned. Not only were the respondents aware of facets of Oneida traditional life, the respondents saw relationships between traditions and remediation of educational problems, relationships which they could act upon within their own classroom even if the school itself was not favorably disposed to such integration. There is, then, little evidence of the negative or stereotypic orientation to Indian culture(s) being presented in the responses made by the TES personnel. Instead, a continual and dynamic interaction between the Oneida student, his Oneida tribal background, and the Anglo-related content of the school being affirmed by the OTS respondents. Taken literally, the position seems to argue that there can be effective education for Oneida students at OTS (even education in Anglo-oriented skills areas) only if the Indian "nature" of the Oneida student is being addressed by the educational process. No TES respondent ventured such a claim.

6. <u>Indian language instruction</u>. Hence, the divergence in attitude between TES and OTS perspectives on the need to include Indian language instruction within the school curriculum. One TES respondent saw this as a means of strengthening the Ute child's appreciation for the Indian component of his being. Remaining TES staff persons saw Indian language instruction as something alien to the purpose of the school, something not appropriate for inclusion within the classroom, something more properly to be provided within the home context. This is exactly the perspective which might be expected, given the predominant TES argument that the school must fulfill Anglo-specific educational agendas, not Indian ones.

OTS, it must be remembered, already had an Oneida Indian language component within the school. And, consistent with responses to other questions, the OTS respondents called for a stronger Oneida language program as well as broader efforts to integrate language instruction and language use within the whole of the OTS curriculum (Oneida "completeness", once again). Overall educational and cognitive benefit is expected to emerge from such an integration: positive impact on the student's sense of self and well-being is likewise to be expected. Several respondents pointed to the sense of personal loss which

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is always associated with one's inability to speak the language ancestral to the tribe. And one respondent linked Oneida language learning and mental acumen, by referring to one student who "must be bright because she was able to pick up Oneida language in less than one year at the school". Clearly, there is no question here as to the propriety of school-based instruction in the Indian language.

7. Evidence of progress. TES respondents were able to identify several features in the education of Ute Indian students which suggests that educational quality and service delivery are both improving. Particular emphasis was placed on the decline in school-leaving rates, especially at the higher grade levels. Since school-leaving had not been identified as a major problem in Ute education — either in the questionnaire responses or in the interviews, some question about the overall significance of this decline as a measure of educational progress in the TES context might be raised. That the progress is being measured in terms assumed to be exclusively school-and classroom-based (in truth, any number of things might be contributing to the decline in school-leaving, not all of which is necessarily school-related); and that progress should be measured strictly in terms of student performance (and not, for example, in terms of changes in tribal attitudes toward educational quality) all reiterate the autonomy which TES respondents have ascribed to the school throughout this discussion.

The OTS respondents were not nearly so optimistic, at first reading, where effectiveness of educational efforts are concerned. Respondents cited several problems — discipline being a primary concern, at earlier stages in their interviews. It is clear from respondent commentary that until the discipline issue is resolved, true progress in educating Oneida students cannot be expected. Still, the problem is one which the school administration is able to resolve. The fact that efforts are already being made to deal with the student behavior issue — e.g. the creation of a special education program to begin in the fall of 1980 — coupled with the fact that more serious and complex barriers to educational progress at OTS have not been cited by the respondents, both say something about the chances for success which the respondents themselves ascribe to the work of the tribal school. Whether TES respondents can approach this issue with comparable levels of commitment cannot be determined from the data. That it cannot be determined may say something on the point, in its own right.

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Chapter Six: The Parents' Interviews

Information presented in Chapter 4 has shown that the two school sites — Todd Elementary School and Oneida Tribal School, offer their students quite different educational environments. TES being a public school and OTS a tribally-controlled school, project staff expected to see some of the contrasts the in-field research identified. Data in Chapter 5 have already shown how far-reaching such general differences in "educational philosophy" can actually become. Comments in the staff interviews revealed differing perspectives about the nature of Indian education, the needs of Indian students, and the strategies which the schools could use most effectively to address them. All this suggested that there will be contrasts in the types of expectations teachers from each school bring into the classroom, and <u>also</u> in the types of demands which teachers make [illegible] students as a result of those expectations.

Teachers are not the only adult-level a[illegible]rs involved in these students' schooling. Parents — including within that category legal guardians, close relatives and others who may bear legal and cultural responsibilities for a child's upbringing within these two tribes — can also be expected to contribute significantly to the impact which schooling and school-based instruction has on the Indian student's educational development. So time was set aside at each site to interview parents as well as teachers, hoping to elicit through these discussions parental perceptions about the strengths and weaknesses of local schooling programs along with comments and assessments about the roles they play in the child's education.

Again, to set the foundation for the data-gathering, project staff turned to the set of instruments used during the Advocates for Indian Education's regional needs assessment. The general inventory, probing the extent to which the parent agrees with certain observations about parent-school relationships, was adopted without modifications; the inventory became the first task the research staff asked parents to complete. The remainder of each interview built directly on those responses, asking for anecdotes or more detailed commentary on specific issues or concerns which answers to the inventory had highlighted.

Six Ute parents were interviewed in this fashion. Informal discussions held with other parents served as a "quality control", to help staff determine how representative the six sets of responses might actually be if reservation-wide parental surveying was undertaken. All six of the parents had children enrolled in the classes in which project in-school activities were being based. So while the sample seems limited in a strict statistical sense, information which these respondents supplied remained quite consistent with the descriptive and comparative interests of the project's research design.

The Ute Parents' Responses

An overall sense of parental attitudes about education and about the educational opportunities made available to Indian students through TES can be gleaned from a quick review of Table 6-1. Here are presented tabulated responses to the questions asked of parents during the most structured portion of the parental interview. For eight of these questions (numbers 2,8,10,12,14, 16, and 18) aggregate responses were more positive than negative. For ten questions, aggregate responses tended to fall in the other direction. In only one instance, (item 9), did an impressionistic "favorable" vs. "unfavorable" categorization become meaningless. This question calls for a direct comment from the respondent regarding parental willingness to work more closely with the school; but the answer is to be stated in terms which link up willingness to become involved with understanding of the tasks which need to be done. It is clear from other discussions that school authorities see many things parents should be doing to assist in their children's education. It is also clear, from

TABLE 5-1 — Compilation of 5 parents

PARENT INVENTORY

INSTRUCTIONS:

1. Do not sign your name.

Please indicate the extent to which you agree with the following sentences by checking (X) one of the following choices:

(Y) yes, (MY) Maybe yes, (MN) Maybe no, (N) no.

PLEASE CHECK ONE

Example:	Y	MY	MN	N
You really agree that: I want my child to get a good education.	X			
1. I feel comfortable when I go to the school.	2			3
2. I think I know what type of education my child needs.	2	1	2	
3. I enjoy talking to school teachers.	2		1	2
4. Teachers are interested in what I think.	2		2	1
5. I really don't like to go to the school building.	2			3
6. I can make the school better for my child.			3	2
7. When my child gets into trouble at school he is generally wrong.		1	1	3
8. I think school teachers are doing a good job.	1	2	2	
9. I'd get more involved in school if I knew how to help.		3	2	
Parents working together can help our children get a good education.	3	2		
11. The school is not doing what it should for my child.		1	2	2
12. I can help my child stay in school.	3	1	1	
13. My child tells me what he learns in school.	1	1		3
14. My child listens to me.	2	2		1
15. My child has to go to school, even if he doesn't want to.	2		2	1
16. Whenever my child has problems in school, I'm the last to know.	3	1		1
17. I don't know what to tell my child about why he should go to school.		1	2	1
18. I would like to learn how I can help my child do well in school.	1	2	2	

19. I've been to Total 8 (2 par) school meetings last year.

20. Last year I visited the school principal or my child's teacher(s) Total 4 times. (One parent works at school, sees teach. & princ. frequently)

If I had to blame someone for my child not doing well in school, I would blame: my child; the principal; the school; myself; other 2-myself; 2-school; 3-teachers.

information to be discussed in this chapter, that parents do not feel welcome when they attempt to visit the school or talk with the teachers. There is quite a separation of attitudes revolving around the issue of "appropriate parental involvement". The "centered" responses to question 9 reflect part of this controversy. And other (sometimes contradictory-sounding) remarks contained in the parental responses will provide other reflections of it.

A comparison of the other aggregate responses suggest several facts about attitudes toward education among Ute parents. Taken as a unit, the responses to questions 2,8,10,12,14,16, and 18 indicate that parents know what kind of education their children need to receive, and seem to feel that the services being provided through TES are in fact addressing those needs. Parents agree that, by working together and becoming more involved in the school setting, parents could make more substantive contributions to the children's education. They admit, however, that ties between school and home are not as developed as they should be. And this is one of the reasons why parents say they are the _last_ to find out when their children are experiencing difficulties with their classwork.

The responses to questions 1,3,4,5,6,7,11,13,15, and 17 help explain why Ute parents have not developed closer ties with the local schooling programs. One theme was frequently expressed — parents simply do not feel comfortable within the classroom environment. Unpleasant associations from their own childhood, coupled with school restrictions on cigarette smoking and coffee drinking, and a sense that schoolteachers, being educated persons, are not going to be interested in what "dumb" Indians have to say — these are some of the explanations for this feeling which parents offered during the interviews.

Instances of contrast, if not conflict, between school and home are being alluded to in these responses. Parents noted that their children are not really "in the wrong" when they get into trouble at school; this is one reason why parents do not always respond to requests for teacher-parent conferences, when the requests are sent home from school authorities. Parents noted that their children do not talk about their school experiences in any detail. The prevailing attitude that children do not have to attend school except if they wish to attend parallels the same theme: participation in schooling is a voluntary thing. The school and its educational opportunities are there and are available to those who wish to become involved with them. The school has its mandate, the faculty have their responsibilities, and the program should be left to its own initiatives to operate in those terms.

Hence, the responses to question 8: parents did not say that the school is ineffective. There was consensus (here, as elsewhere in the Ute parents' interviews) that the education offered through TES is doing its job. Parents did not identify areas of curriculum, instruction, or related educational services where quality is poor and which should be upgraded or improved. We know from other, more comprehensive studies of parental attitude in Indian education — issues discussed in Havighurst's National Study of American Indian Education (Fuchs and Havighurst, 1973, especially page 171 and following) for example, that favorable assessments of this sort are generally offered by Indian parents. At Northern Ute, we have some basis for understanding <u>why</u> the attitude prevails. As responses to questions 2 and 5 suggest, there is great distancing between parents and school authorities, and great separation between the roles parents play and the role the school plays in Ute Indian education. From the point of view of this project, parental "votes of confidence" for the work of the school are to be viewed as a byproduct of this distancing and separation, and of the factors which created them. These parental endorsements should not be taken as indications that Ute parents are necessarily satisfied with the schooling services provided to their children. Nor (as is popular with some educators) should the uncritical assessment be treated as proof that Indian parents remain blind to the things that "really go on" within the school.

Discussions during the more open-ended interviews with Ute parents did bring up any number of specific problem-areas with Ute parents associate with their children's education; mechanical and procedural problems were some of most frequently cited concerns. It was mentioned that teachers tend to call on the Anglo students more frequently than they call on Indian students; and that little attempt is made to encourage Indian students to participate directly in class discussions. Indian students end up sitting in the back of the classroom, either by choice or because of seating assignment. This places a wall of Anglo students, and of high frequency Ango student responses, between the teacher and the Indian component of each class.

Certainly, the school's reliance on "pull out" programs and other specially-focused education activities does not work to break down this Indian/non-Indian student dichotomy. Some parents expressed concern that Indian (or, in the case of Title I, predominately Indian) participation in these programs may lead to stereotyping on the part of the teachers, the non-Indians and even the Indian participants themselves. It was noted that Title I and other programs are of benefit to students who need the services they provide. No question was raised about the quality, or lack of quality, in those programs. Rather, the concerns are procedural in nature. Pull-out programs and other augments to the established curriculum at the teachers' lesson plans disrupt continuity of learning. And unless the curriculum of the special program is coordinated closely with the work going on in the students' home classroom, the participants may end up being exposed to several sets of concepts, topics and issues, and becoming master of none of them. Differences in social contexts for learning were also cited. The special programs are for more uniformly Indian in composition than are the students' home classrooms. Perhaps more importantly, the teaching staff of these programs also includes a higher percentage of Indians. The socially-focused learning skills which are developed and reinforced by these programs may not transfer readily into the student's home classroom; nor may they necessarily be relevent to the classroom, given some of the social and psychological factors which parents feel are at work there.

Parents noted without using the technical terms, however, that student "self-image" and "self-esteem" also prove to be problems throughout their children's school experiences. All of the parents interviewed referred to some form of student "fear" (their term) operating as a deterrent to learning. Some parents said that their children do not attempt to give answers in class because they do not wish to wish giving incorrect information, thereby embarassing themeselves and their classmates. This fear of failure parallels rather precisely one of the mathematical "values" referred to in a previous chapter — as in beadwork construction, the student should pursue a project until the project is completed; the young student should not consider the project completed until the project is satisfying to him. A one-time response to a teacher's question in class allows little opportunity for students to work toward self-satisfaction. Evidenced student "fear of failure" and parental awareness of that fear may grow directly out of reluctance to operate in terms of those limitations.

Parents report that peer pressure from other Indian students may also contribute to student reticence to speak [illegible] class discussions. Ute students are subjected to a considerable [illegible] teasing and ridicule themselves from their silent comrades. In some cases, this has resulted in potentially gifted Ute students being transferred, at their parents' request, into one of the off-reservation boarding schools operated by the Bureau of Indian Affairs. Having the child spend the school months with relatives in Salt Lake City or other, more cosmopolitan areas, has also been a strategy parents use to address this problem.

Whether the parents think that the TES classroom expects too much out of Ute students cannot be determined from the responses. Only two parents felt that TES expects Ute students to perform at levels above their capacity. Yet, all respondents cited specific factors which may be preventing students from working fully at their capacity level. Some parents noted that teachers place much emphasis on memorization of data, adding that Ute students appear to have some problem with rote learning, at least when required by the school. Two parents cited specific language factors as probable causes of student classroom difficulty. Ute students speak English but, by parental judgement, their English may not be as "effectitive" as that of their non-Indian counterparts. Ute language competency was not mentioned as a part of the students' language problem. But some English-specific performance-related issues were detailed. Chief among them was the fact that teachers speak too rapidly when they present information, and particularly when they give instructions or detail homework assignments, to the students. Parents complained that teachers will give assignments once and will react negatively to (Ute) students asking her to repeat or elaborate on her directions. These comments elicited some of the few comparisons between TES and schooling programs in which people of parents' and grandparents' generations were enrolled. Parents who had attended the BIA-administered White Rock Boarding School on the reservation (the school closed in the early 1950's) remarked that at that school, teachers always exercised great patience with their students, frequently allowing the whole class to work on a single exercise until all of the students understood the information. Such is not the case within classrooms at TES, for many reasons.

Textbook language was not cited as a problem contributing to Ute student educational difficulties. However, some problems with the textbooks themselves were noted. Four of the parents reported a sense of frustration when they look at their children's textbooks or at their homework sheets. They simply cannot understand what their children are being taught or what tasks the children are expected to complete before school opens the next morning. The issue is not of relevence in subject matter. Adding more references to traditional Indian lifestyles and customs will not alter the fact that the content of the elementary school curriculum has changed drastically in recent years; and parents, for whatever reasons have not stayed current with the latest directions and newest trends. Such observations from the parents' side help place into broader context the complaint raised so frequently by TES staff, that so little educational reinforcement comes out of the students' family background.

This was one of the issues of keen interest in the project: what formal roles does the home and family context play in the schooling of Ute students. That parents are not actively involved in the day-to-day operations of the school is clear. TES is a public school, operated and administered through the Uintah county school system. Indian parents are eligible to serve on several of the federally-program related Parents Committees. Beyond that, and other than through the forum provided by the (non-Indian dominated) Parent-Teacher Organization, Indian parents have little opportunity directly to express concerns and even less of a chance to hold people accountable for their failure to respond to them.

This is not to say that opportunities are never extended to increase parental awareness about the work of the school. Notes are sent home asking for parent-teacher conferences. Open-houses are sponsored by the staff and by specific programs within the school. And parents are invited to attend and participate in any school activity they wish. Parents admitted that they are aware of those options. But they listed specific reasons which often prevent them from taking full advantage of those opportunities. Scheduling and time constraints was a factor, especially if both parents work full-time, and particularly if the work-schedule conflicts with the hours of school operation. Others reported little incentive, adding that tribal government should be assuming a greater role in moniterlng the educational services provided through the county system. Parents agreed that families whose members have had more schooling, and especially families where parents completed college-level degree programs, will probably respond more readily to school invitations. Parents who themselves have accumulated less amounts of formal education said, in contrast, that the school seems a foreign and uninviting place and that they feel uncomfortable and out-of-place whenever they have to attend some function on school grounds.

Parents did stress that within their limitations and subject to availability of time and other factors, they do what they can to help their children with homework and to make certain that assignments are completed and submitted on time. Parents pointed out, however, that in other households, supervision and assistance may not be nearly so thorough. And several parents noted that there is more to a parent's responsibility than playing "homework warden". Children have many needs and interests and parents must see to it that these other needs and interests are addressed as well. This was the way one respondent explained the frequently reported observation, one made by teachers and families alike: some parents take their children shopping, go with them to the movies, travel with them to visit relatives, go camping with them in the mountains, and do other things — but never help their students with their studies. The point is, the school has responsibility to deal with the children's formal education; the parents, on the other hand, are supposed to see to it that the rest of the child's self-hood receives equal amounts of attention.

The information from the parents' interviews identified other areas where school and home differ, if not have outright disagreements, in their respective perceptions of issues and problems in Ute education. Some of these contrasts are highlighted in the following table. The first column lists concerns about Ute student education raised by the teachers during their discussions with project staff; these comments have been reviewed in greater detail in the preceding chapter. The second column summarizes comments made during the parents' interviews or otherwise relects the teachers' concerns in the light of the parents' information.

TEACHER'S CONCERNS	PARENTAL RESPONSES
Child-centered problems:	
1. Students do not see the importance of education.	Only one parent agreed with this point. Most parents said they tell the child that education is important and all feel their children believe it.
2. Children need to listen carefully.	No parents raised this as a problem. They did, however, charge that teachers need to adjust their rate of presentation and their speed when giving directions, since this is a true cause of the students' difficulty.
3. Children are not properly motivated at home.	Parental lack of familiarity with text book content may be at fault here. Parents see themselves as being actively supportive of the schooling process, even if they do not make themselves visible at PTO and other meetings.
4. Children are not competitive.	Self-esteem and fear enter in here, as does the fact that competition for the sake of winning alone is not a traditional value in Ute culture. Doing the best job you can, and taking the time you need to do that, is a prime value. And that attitude often conflicts directly with competition.
Parent-centered problems:	
1. Parents are not involved in their children's education.	Parents see themselves as involved, though they recognize that their avoidance of the school itself may create a false impression in the eyes of an outsider.

2. Parents do not help with student's homework.

See comments in item 3 above.

3. The home creates undue stress on student learning.

Parents agree with the teachers' comments. Drunkenness, divorce, and parent absenteeism are cited as common problems. They are not said to occur as commonly or as stereotypically as teachers appear to assume, however.

School-centered problems:

1. The school expects Indian students to perform beyond their capacity.

Parents did not accept this observation, and charged that the school does not requre full performance <u>at</u> capacity.

2. The school does not do more to integrate parents into classroom activities.

Parents agreed and could identify a lengthy list of things the school (and the teachers) must do, if they wish to see this integration occur. The point is, the <u>school</u> has to make the overtures.

The contrasts suggest several general observations which need to be made before bringing in the responses from Oneida parents for purpose of larger comparison.

It seems clear that, even if they do not visit the school or discuss issues with the teachers on any regular basis, Ute parents remain quite informed about activities which go on within the classroom. In fact, Ute parents seem more familiar with the school and its "culture" than school authorities are knowledgeable regarding Ute households and Ute tribal traditions.

That the school traces the problems in Ute student schooling to home and tribal — e.g. school-external factors was demonstrated in the preceding chapter. That the parents do <u>not</u> respond in kind is now clear. Parents do not, for example, dismiss the negative impact which home-centered problems can have on education, motivation, and interest in education. Parents appear to recognize their own limitations where education is concerned; this, some said, urges parents to support their students' interests in schooling even more forcefully.

Parents also recognize that there are several aspects of tribal tradition which can inhibit student achievement, especially within a culturally and ethnically heterogeneous classroom.

But parents are also quick to point out that conditions within the school do little to address or minimize these problems and, because of ill-advised or short-sighted policies and practices, create conditions which further exacerbate their negative effects. Almost everyone of the complaints parents raise about school conditions could be resolved through shifts in classroom practices or other direct means. Parents' assessments and recommendations for change are considerably more realistic than are the recommendations which the teachers' comments identified. It is quite difficult, for example, to bring about value reorientations within a population which has lived for many generations with attitudes quite comfortably non-Western in their orientation. It is much easier to undertake activities which will help the school integrate (or accomodate) those differences in value orientation within the curriculum, teaching strategies, and teacher/staff perceptions of student needs. That this has not yet happened at TES remains one of the primary barriers to effective education for the Ute Indian students, from the parents' point of view. The same barriers also have a hand in discouraging parents from developing closer ties of cooperation with school authorities and the school program. The situation results in even more of a serious impact on the educational conditions within the reservation for this reason.

The Oneida Parents' Responses

Interview data from five of the parental interviews carried out during the Oneida, Wisconsin phase of the field research will now be considered.*

*Additional interviews with Oneida parents were conducted, but technical problems with the tape recorder and other difficulties made it impossible to draw on the interview data for purpose of this analysis.

The analysis will highlight parental perceptions of educational prospects at OTS and help identify additional points of similarity and contrast with the situation reported from Northern Ute.

Only three of the parents chose to fill out the parental inventory. Because of the small number of respondents and the amount of the convergence in their replies, it seems best to present a summary of their responses in paragraph form. Comments given later in the parent interviews revealed that the wording of inventory questions 5,11, and 17 was quite misleading and, because of the negative construction in the question, parents ended up taking exactly the opposite position from the one they intended to take. Consequently, it was decided to disregard the answers given to inventory items 5, 11, and 17; and we have deleted comment on those responses from the following discussion.

All three Oneida parents agreed with the statement that "I feel comfortable when I go to the school" (question 1). One parent felt that "I know what type of education my child needs", and two were somewhat less certain (question 2). One said yes and two parents said maybe yes. Question 3 revealed that all three parents "enjoy talking to the school teachers", and felt that the "teachers are interested in what I think" (question 4).

Two parents answered "yes" to question 6 and one answered "maybe yes" indicating that the parents generally feel that "I can make the school better for my children". These parents did not feel that "when my child gets into trouble at school, he is generally wrong" (question 7, one "no" and one"maybe no"). Two out of three thought "yes" and one "maybe yes" that "the school teachers are doing a good job".

All three parents agreed (question 9) that "I would get more involved in school if I knew how to help", and they agreed that "parents working together can help our children get a good education" (question 10). All parents agreed that "I can help my child stay in school" (question 12) and "my child tells me what he learns in school" (question 13). Two out of the three agreed that "my child listens to me". The third gave a "maybe yes" response to this question (number 14). All three parents said "yes" to " my child has to go to school, even if he doesn't want to (question 16). Two parents answered question 16, one "no" and one "maybe no" to "whenever my child has problems in school, I'm the last one to know". All three parents answered yes to question 18 " I would like to learn how I can help my child do well in school". These parents said they attended "three", "alot", and "just about all" school meetings last year (question 19). These parents said that"last year I visited the school principal or my child's teacher(s) "three", "many", and "four" times" (question 20). There were two responses to question 21. One parent said he would blame "my child" and "myself" as response to "If I had to blame someone for my child not doing well in school, I would blame: my child; the principal; the school; myself; other______." The other responding parent said "all of the above".

Generally, this group of Oneida parents seem generally pleased with the school, the type of education, and the teachers. They also feel competent to improve the educational opportunities for their children by themselves becoming more involved in the educational process. Judging by the responses to questions 19-21, these parents do participate in the school operation to the extent possible under certain conditions. All are eager to participate even even more extensively.

Parental participation was one of the issues which came up repeatedly during the open-ended portions of the interviews. Four of the parents noted that they were not involved deeply in school activites. Two questioned whether the teachers wanted to see the parents playing a visible role in school governance or elsewhere in school operations. There is no PTO at this school, and parents agreed that one should be created as soon as possible. It was noted that OTS was only in its initial months of operation; parental involvement had to be constructed carefully, parents said, and it would be unrealistic to expect that a high level of school-community relationship would emerge "automatically" so early in this school's program.

What seems critical, especially where comparative interests are concerned, is the absence of parental comment about school-based barriers to parental participation. This is due, in part, to OTS being a tribally-controlled school; working within that philosophy, the charter for all school activities is derived out of local priorities, not out of county or state-wide curriculum planning.

There is evidence of a sense of shared (or share-able, at least) responsibility for the education of Oneida students throughout the Oneida parent interviews. Four of the parents noted that the education is a responsibility to be undertaken by teachers of OTS, but three of the four immediately added that parents have their roles to play in this process, too. Homework activities were one of the avenues which the school can use to make certain that both parties jointly participate in student education. Here, however, a familiar concern was raised: three of the parents felt they were capable of providing necessary assistance on their children's homework exercise; three parents admitted they did not feel comfortable doing that, and expressed concerns that other opportunities for out-of-school instruction were not always available when students needed them.

Parents noted that communication between school and them could be more effectively accomplished. In the words of one parent, "I think we should be more informed as to what is going on up there". "They should send more papers home, how they are disciplining their kids. I don't think they have sent any home this year". Another parent would have preferred it if the teachers had kept me more informed about the "whole learning system". She said "all of a sudden that (system) was in effect and that was it....Who runs the show? Who's making these decisions?". Notice that these concerns about communications are quite different from the ones expressed by parents at Northern Ute. Where TES was concerned, parents said they felt separated from activities going on within the school. At OTS, however, parents already consider themselves to be an integral part of the operation of the school. Hence, their frustration when they are not treated with the respect co-participants in such a venture are entitled to receive.

In spite of the communication difficulties, interview comments suggested that parents hold a high-level of confidence in the competence of the teachers and administrative staff at OTS. Only one parent mentioned concerns that the rate of presentation in the classroom was too rapid for his child to understand. None of the school subjects were viewed as being more difficult, or less difficult necessarily. Objections to the content of instruction, or in the teachers' capabilities in presenting that content to the students were not raised. And only one of the parents reacted negatively to OTS' increasing emphasis on individualized instruction and self-paced in-class learning activities.

Parents were agreed that OTS represents a major advance over the public school programs their children attended in previous years. Several of the problems parents identified from the public school experiences paralleled concerns voiced by parents at Northern Ute. Difficulties faced by Indian students as distinct minority in an Anglo-dominated classroom were given particular emphasis. Some parents did question whether, over the long run, operation of schools specifically to serve the needs of Indian students would not end up prolonging and intensifying the levels of misunderstanding and distrust which already have been built up between these two populations. Concerns on this issue are not strong enough, apparently, to urge parents to want to send their children back to the public school environment.

Overall, as was originally expected, Oneida parents seemed to be describing an educational context which differs from that at Northern Ute in several ways.

One very critical difference needs to be noted at this point. Comparison shows that teachers and parents hold conflicting attitudes regarding education and the quality of educational services made available to Ute Indian students. Such conflicts do not appear to be nearly so severe when data on teacher and parental attitudes at Oneida are compared. Parents and teachers both agreed that problems in the home can have negative effects on student education. Parents and teachers agreed that parents need to receive better training from the school as well as the tribe, so they can become more effective participants in their children's education. (The teachers' commitment to such a school-based outreach function was not nearly so evidenced at TES). Parents, then, are not part of the "problem" of Indian education at Oneida. Parents need to be more involved in school affairs, all parties agree. So present frustration hinges more on the fact that parents are not more involved, and not on the assumption that, for social and cultural reasons, they cannot or are not willing to be.

In all fairness, it must be recognized that the relative difference in the operational histories of the two schools may play a part in structuring parental attitudes about the school and about its potential for educational effectiveness within these two Indian contexts. OTS, for example, was a very new school at the time of the field research. The problems reported by parents appear to be organizational in nature, issues which could be corrected once staff becomes more familiar in the daily and annual routines. The parents at TES, on the other hand, identified problems which are described as relatively unchanged in focus, things which have been of concern to parents for a number of years. TES teachers report that the situation at TES has improved over the years, so while more changes may be necessary, teachers insist changes are coming and all the same, the parents of TES students are less positive about the prospects for improvement. They see changes as immediately necessary and point out persistent failures to make adjustments in policy and classroom activities as barriers to Ute children's educational advancement.

But even when difference in time-depth is acknowledged, perspectives on change still contrast from one context to another. If changes are to be made at OTS, parents feel the changes must be made as joint propositions through efforts in which parents, teachers and tribal government jointly participate. Northern Ute parents might like to see a greater role for tribal government in the planning of such changes; and appear not to be unwilling to consider expanded roles for parents to play in that process as well. But Northern Ute parents also recognize that decision-making in a public school system grows out of discussions in which Indian parents currently have little voice. As long as those conditions persist, Northern Ute parents — like the teachers at TES, ironically enough, will continue to see themselves as power-less figures where the administrative aspects of Ute children's education are ultimately concerned.

Chapter Seven: The Student Interviews

Teachers and members of the school staff, as well as parents and members of the Tribal community, play significant roles in the education of American Indian students. So it was critical that the project gain some insight into their attitudes and orientations regarding schooling, the importance of schooling, and the issues and problems associated with schooling at Todd Elementary and Oneida Tribal Schools. Clearly however, the prime actors in the Indian math-learning at these schools are the Indian students themselves.

Early on in the project, it was decided that field research should attempt to gather as much information as time would allow about student interests and attitudes regarding schooling and mathematics learning in school contexts. Base-line data on elementary school Indian student mathematics interests were not otherwise available for project purposes. More seriously, it seemed important to try and avoid the problems of stereotype and over-generalization which previous assessments of Indian student educational "needs" had unfortunately generated. Construction of a relatively rich data base seemed the most effective plan for addressing both of those needs.

A series of instruments were ultimately selected for use in the field. This chapter begins with a review of those instruments and of the information they elicited. Copies of the instruments themselves are included in Appendix II.

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Problem-Solving Test

A test of skills in mathematical problem-solving was given to all the students in the grades 3-8 in order to get an estimate of the amount of math knowledge of the general population of the school. The test serves as a base line for centering the detailed analysis of individual students' attitudes and interests about schooling in general and math classes in specific. The test contains substantive topics and problems which are commonly a part of 3rd and 4th grade math lessons at TES and OTS. Witherspoon (1961) had used the same test productively during his earlier studies on educational problems at Northern Ute.

The test has two sections. The first section gives word problems involving several levels of linguistic and mathematical complexity. The sixteen questions deal with ability to decode significant math functions asked for in the question plus the ability to solve the mathematics. For example, item 16 has three different math functions to be decoded and correctly performed in order to get the answer. For each word problem the student must decide what math functions are to be performed, in what order, and how the math is to be performed.

Section two contains 30 number problems ranging from simple addition to three place long division. This section probes the students' ability to perform math functions and calculations.

To eliminate the effects of speed, students were allowed all the time they wanted to complete the test. Students were encouraged to attempt as many of the questions as possible and to work out the problems on the test paper.

Scoring for the test is comprehensive. The coding system allows for the evaluation of each item on the test as well as the performance of individual students. Each question was coded as to "correct", "no attempt", and "attempted but incorrect". Reliability of scoring was insured by comparisons with ratings of the students' math abilities as given by teachers and with the students' comments about their own math abilities as given during the interviews.

More will be said about the students scores on the test during the discussion of the factor analysis, below. For the present, it should be noted that according to the test findings, amount of calculation is a critical element in math performance for these students. That is, it is not the level of the math concept but rather the size and complexity of the problem that governs the students' ability to answer it. This agrees well with the researchers observations of the mechanics of student math problem solving at both sites. Almost without exception when working on math problems students would attempt to do all their work in their heads. To help them remember certain calculations, students would write on their desks or on small slips of paper that were kept hidden, despite encouragement by the researchers to write on the test itself. Calculations were a means to an end, but not part of the solution, per se, and if the problem required several stages for solution, students were forced to remember (or notate) the results of the interim steps. The more interim steps, the more that must be remembered, hence the greater the chance of forgetting and the greater the risk of error. Observations showed that math work in the classrooms followed this same pattern. The teachers were usually presented with long sets of answers with no supporting work. Even in long division problems there appeared no set of steps needed to arrive at the answer. The teachers interviewed were aware of the students problem-solving behavior and felt that it was causing the students to make mistakes. Tests results point to the same conclusion.

Data from the problem-solving test are referenced under the variable score in subsequent sections.

Ways of Living Scales

It was necessary for the project staff to devise a quantitative approach to measuring traditionalism in order to assess its possible influence on avoidance of "western" or non-traditional math. Precedent for this approach can be found in Spindler's recommendation for establishing "sociocultural" variables, by obtaining

> ... detailed information on a variety of attributes and behaviors that seem logically related to the degree of orientation toward the native culture or western culture is known for every individual so placed, and is systematically ordered on schedule (1955:6).

In a review of research on acculturation, Kavanagh (1980) found an even earlier precedent in a paper by Gillin and Raimy (1940) in their study of the Flambeau in which one of the measures of acculturation was in terms of "concept of self", a summation of scores on three five-part scales: Indian/White; Christian/Midewiwin; Wage earner/Hunter-fisherman.

The staff approached the problem of devising "indices" by surveying ethnographical material on the Ute and Oneida for their characteristic values and belief-systems. Witherspoon (1961) was the principal source used for the Ute and Wallace (1951) for the Oneida (as a group within the Iroquois nation). Bravery and getting along with people and nature, for example, are among the values/beliefs said to be favored by the Ute whereas a need for material achievement, competition and a wish to conquer nature are

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repudiated as "non-Indian" or Anglo. Examples of values/beliefs said to be favored by the Oneida are sharing, not taking advantage of others and a "live and let live" attitude.

The sets of items finally assembled consist of 20 statements which Ute students can judge for importance (12 on Ute value/beliefs and 8 on ones perceived as Anglo) and 15 for Oneida students (10 on Oneida and 5 on Anglo). A statement on Ute values/beliefs: "It is important not to run away from difficult things your are asked to do". For the Oneida: "It is important to share what you have with others". With the possibility that certain values/beliefs would be "culture-wide" and certain might be shared, the staff used a shorter scale for the Oneida students because both scales were to be administered.

Coding

An interval-level scale was used to rank the data. A basic dichotomy is used with (0) to indicate that the student disagreed with the statement and (1) indicates that the student agreed.

> A dichotomy is a variable with only two possible categories or values. While some dichotomies are based on a natural ordering, many have no inherent basis on which either category could be judged superior, preferable, larger, etc. Yet, any dichotomy can be treated as though it were an interval-level measure and in some cases even a ratio-level variable (Nie et al. 1975:5).

Three scores were given to each student based on:

* the total number of Ute statements
* the total number of Anglo statements
* the difference between the Ute and Anglo statements.

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The responses of both the Oneida and Ute students and the mean scores for both the Oneida and Ute students for the Ute/Anglo Ways of Living are given on pages 319 - 320.

Oneida and Ute students agree fairly well on the ways of living questions. In general, there are no grouping of students strictly in terms of uniquely Tribal or consistently Anglo value orientations. Several interesting patterns showing recurring combinations between Tribal and Anglo value-statements emerged in the student responses.

As a group the Oneida students feel that it _is_ important to: get along well with people, to make money so you buy lots of things, to give other people what they need, to be efficient and practical in everything you do, to work hard and to achieve so that everyone can live better, to know and understand the ways of nature, to make up your own mind about things, to be quiet while others are talking, to be respected for what you know, to know when to take advice, and to never let your family or friends down.

The Oneida students feel that it is _not_ important: not to run away from difficult things you're asked to do, to show you are no better than other people, to be free so that no one can tell you what to do, to take from nature whatever you want, to be able to tell other people what to do, to act smarter than other people, and to judge other people for what they are worth.

On several of the Ways of Living questions different Oneida students gave mixed responses. There are not consistent patternings and it is difficult to do more than list the two statements which elicited the less uniform reactions. They are: "to work hard and be industrious so people will respect you", and, "to be respected for what you have".

A comparison of the mean scores of Ute responses with Oneida responses shows similar overall responses to the statements of Ute/Anglo Ways of Living.

The chart below represents the differences in mean scores. For the first two columns, a score of 10 would indicate all or nearly all of the students in each Tribe agree with the statement while a score of 0 would indicate they disagree.

Statement	Ute	Oneida	Difference
1	8	3	5
2	8	7	1
3	3	1	2
4	4	3	-1
5	6	8	-2
6	8	9	-1
7	8	7	1
8	0	0	0
9	10	4	6
10	0	1	-1
11	0	0	0
12	9	10	-1
13	9	9	0
14	8	9	-1
15	1	0	1
16	10	10	0
17	8	7	1
18	6	4	2
19	8	7	1
20	9	9	0

A low number in the third column indicates convergence in attitude between the two groups of students, while a high number reflects inter-tribal disagreement.

The comparison indicates that the Oneida and the Ute student share a large set of "ways of living" values as measured by this instrument. The Ute and Oneida students seem to disagree strongly only on Ways 1 and Ways 9.

Ways 1: It is important not to run away from difficult things you're asked to do.

Ways 9: It is important to work hard and be industrious so people will respect you.

In both instances, the Oneida students treated the issues with much less importance than did the Ute students.

As a further check on Oneida-specific student values, a second Ways of Living instrument was prepared for the Oneida phase of the in-field research. That listing of fifteen statements (ten Iroquois-specific in focus, five deliberately Anglo in reference) was also administered to Oneida students. The procedures used when administering the original, Ute-based "Ways of Living" scale were used to elicit responses to the Oneida-specific questions.

The responses and the mean scores for the Oneida/Anglo Ways of Living are given on page 321.

The mean scores show that, as a group Oneida students do not necessarily favor or reject Anglo values, as measured by the instrument, is quite clear. As a group, their responses indicate that it was important: to share what you have with others, to never tell anyone else how to live their life, to never waste a thing, to save for today because you never know what might happen tomorrow, to always remember to return favors people do for you, to look out for yourself above everything else. to help others when they need it, and to let the future take care of itself.

As in the Ute/Anglo Ways of Living there are several statements having mixed responses, and as before, no generalizations predicting the occurrence of mixed responses can be made.

Data from the Ways of Living scales are referenced under the variables labeled <u>Way</u>, <u>etc</u>. in subsequent chapters.

Attitude Inventory

One aim of the project was to study the relationship between various attitudes of students and classroom response and aspects of "math avoidance". To assist in doing this, project staff drew on one of the instruments used in the Advocates for Indian Education's educational needs assessment. AIE had constructed, for that survey, a "Student Inventory" designed to determine "basic dipositions" of individual students in regards to themselves and their relationship with members, peers and school personnel. The Inventory had also been designed to obtain information on the self-concepts of the students, defined as " awareness of personal effectiveness and acceptability as an individual with functional responsibilities within given social units".

The Student Inventory is in two parts with open-ended questions (on Influential Persons, Parents, Language and Culture, Curriculum) e.g. "Do you have a choice in the classes you take?", and 20 statements describing the students themselves, e.g. "I find it hard to talk in front of class". Both sections of the Inventory were administered to students at both sites during the interviews.

Pages 322 - 324 show the students responses and mean scores for the responses when both sets of data are compared. The Oneida students as a group, stated that the following statements were "like them":

I usually do the wrong things.

Things often bother me.

I find it hard to talk in front of the class.

I do all right in school.

I often feel left out of things that are going on around here.

There are many times that I'd like to leave school.

I am usually able to get the things I need by myself.

I can make up my mind without too much trouble.

I think most people understand the way I feel about things.

I usually do what my parents want me to do.

I usually do the right thing.

The Oneida students felt that the following statements did not seem to be like them:

I think I am as good as everyone else.

I find it hard to talk in front of the class.

No one pays much attention to me at home.

Kids usually pick on me.

There are many times I'd like to leave home.

Others have to help me in the things I need.

I have trouble making up my mind.

My parents expect too much of me.

According to the responses on this Inventory, the Oneida students feel that things often bother them, that they do all right in school, that they feel left out of things around the school, that they are able to get things they need by themselves, that they can make up their minds without trouble, that they do what their parents want them to do, and that they usually do the right thing.

As with the other instruments mean scores for the Oneida are similar to those for the Ute. Again, a few interesting differences emerge. For example, the differences in responses of Oneida and Ute sentences 7 and 8 seem to point to differing relationships between home attitudes and school attitudes for each site. Oneida students do not feel that sentence 7, "No one pays much attention to me at home" was"like them" while more than half the Ute respondents do. Sentence 8, "I often feel left out of things that are going on around here" works the other way around. Oneida respondents agree that this is "like them" while the the Ute students do not. This difference is made even more interesting by the fact that Oneida school officials have a special program to include students in the decision-making process and that the officials feel that the number one problem of the students is trouble at home.

Data from the Attitude Inventory are referenced under the variables labeled Like in subsequent sections.

Math Class Questionnaire

This questionnaire measures "total classroom climate" and consists of ten items. Kleinfeld (1972:46) developed the instrument during a study of Alaskan Indian school children to determine whether " a warm and accepted classroom climate" increases classroom participation. The questionnaire consists of ten statements with the respondents given four possible answers. A four point scale was used to measure the students' views towards math lessons. The answers and codes are as followed:

always	(3)
most of the time	(2)
sometimes	(1)
never	(0)

Individual responses range from positive to negative, however, there were much fewer responses at the ends of the scale. Page 325 gives the responses and mean scores for both Oneida and Ute students for the math class questionnaire.

The Math Class Questionnaire mean scores indicate the Oneida students' attitude towards the math class falls very close to the middle of the scale. The scores range from 1.1 to 2.4 with the majority close to 1.5. The responses report, in specific: most of the time Oneida students feel like staying away from math classes yet most of the time they do their best in class. Most of the time other students are friendly to them and their friends like the teacher. Most of the time the teacher helps them with enough in math class. Some of the time they talk in class discussions in math class. They sometimes like to be in math class and sometimes have fun in math class.

The chart below compares the mean scores of the Ute students with the mean scores of the Oneida.

Question	Ute	Oneida	Difference
1	2.4	1.3	1.1
2	2.0	1.1	.9
3	1.4	1.5	-.1
4	2.4	1.8	.6
5	2.8	2.4	.4
6	.4	1.6	-1.2
7	2.5	1.6	.9
8	2.8	2.1	.7
9	1.8	1.4	.4
10	2.0	1.8	.2

The differences between the two mean scores indicate among other things Oneida are more critical of their math lessons.

Data from the Math Class Questionnaire are referenced under the label Math in subsequent sections.

Semantic Differential

A form of the Semantic Differential was also used during the Advocates for Indian Education needs assessment in 1974-75. We decided to use the Semantic Differential approach to help us elicit evaluative judgements or opinions from the students regarding their family, teachers, and other influences in their lives. In the Advocates instrument, nine concepts were rated on seven bipolar scales, e.g. "good --- bad". For in-field purposes of this project, students were asked to rate seven of the nine concepts: Myself, My Tribe's Way of Life, My Family, My Teachers, My School Classes, My Friends, and My Future against a bipolar, seven-step scale. The students were shown the coneept on the instrument and asked to place a marker in the appropriate position on each successive scale.

There are several ways of analyzing these data. For the purposes of this project several concept scales were correlated and one overall score was given across the two concepts. The five correlated concepts are as follows:

<u>Sem1</u>: Myself and My Tribe's Way of Life

<u>Sem2</u>: Myself and My Family

<u>Sem3</u>: Myself and My School Classes

<u>Sem4</u>: My School Classes and My Tribe's Way of Life

<u>Sem5</u>: My Family and My Teachers

Page 326 gives the values and the mean scores for the Oneida and Ute students for the five correlated concepts.

The mean score shows a strong difference between the responses of the Oneida students contrasted with the Ute students. The Oneida have much lower scores on the correlated concepts (<u>Sem1</u>) Myself and My Tribe's Way of Life and (<u>Sem2</u>) Myself and My Family, indicating that the Oneida students expressed less semantic space between themselves and tribe and family than did the Utes. This corresponds with the feelings expressed in the interviews of Oneida students and adults. During the interviews, the researchers were told of the "family" nature of the Oneida Tribe. The Oneida feel related and that even the most distant (in kinship terms) is a "cousin". All of the students interviewed had close relatives in the tribal school as students or working in the building.

The Oneida and Ute students have the same mean score for the correlated concept (Sem3) Myself and My School Classes. However, this score is higher than the Oneida scores for Myself and Tribe and Myself and Family, and lower for the Ute Myself and Tribe and Myself and Family. This would seem to suggest that both the Oneida and the Utes separate school from tribe and family, with the Oneida feeling closer to tribe and family and the Utes feeling closer to school.

The final two correlated concepts (Sem4) My School Classes and My Tribe's Way of Life and (Sem5) My Family and My Teachers reinforces this position. In both concepts the Oneida students have a higher mean score indicating that the Oneida students feel a separation between school and tribe and family and teachers.

Data from the Semantic Differential are referenced under the variable Sem in subsequent sections.

Integrative Analysis of Student Data

The analysis of student data to each of the in-field instruments yielded a data-base containing some 59 variables indentifying attitudes and other bits of information about 26 Indian students. Through a gross comparison of the responses, instrument by instrument, it was possible to construct an overall sense of the attitudes toward self, schooling, and mathematics characteristic of the individual students from each tribe. It was also possible again, by gross comparison, to identify some of the points of similarity and difference within the total student population. For purposes of this project, more finely tuned, substantial, and reliable comparisons were going to be required.

In specific, it seemed imperative to carry out a thorough analysis of the quantitative relationships underlying the various responses and response patterns, and then to identify the precise connections between those quantitative relationships and the overall assessments of student mathematics skills and interests. Only in this way would the final analysis allow us adequately to identify the dimensions of mathematics avoidance and to assess the relative significance of each of the identified "dimensions" within this student population.

We decided to take advantage of the computer-facilities at The American University and to perform cross-comparisons of the data using the Statistical Package for the Social Sciences (SPSS) and the Numeric Taxonomy System (NTSYS) programs. The following procedures were employed to make the raw data more suitable for purposes of computer-assisted analysis:

1. Standardization of the data. The z-score variable transformation is the most commonly and universally utilized method for standardizing the scale of a variable of interval level measurement. The z-score transformation generates a new variable with a mean of 0 and a standard deviation of 1. The result is that each case in the file contains a value equivalent to the number of standard deviation units that is above or below the mean. Z-scores are computed by subtracting from the value of each case the original mean of the variable and then dividing that remainder by the standard deviation. Z-scores were computed for all of the scored responses.

2. Factor Analysis. The single most distinctive characteristic of factor analysis is its data - reduction capability. Given an array of correlation coefficients for a set of variables, factor analysis techniques enable us to

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to see whether the data contain underlying patterns of relationships. Discovering those patterns allows the data to be rearranged or reduced to a smaller set of <u>factors</u> or components which may then be taken as <u>source variables</u> accounting for the observed inter-relations in the data.

2a. <u>Types of factor analysis</u>. There are three steps customarily used to identify and isolate simple and interpretable factors. The first level requires the preparation of the correlation matrix. This is a simple factoring procedure and SPSS handles it readily. This leads us to the second step - extraction of the initial factors. The general measure of significance is the <u>eigenvalue</u> figure. If the eigenvalue is greater than 1 the factor is considered statistically significant. In this factor run there were eighteen factors with an eigenvalue greater than 1. It seemed excessive to assume that all eighteen factors were significant enough to rotate (the next step in the factor analysis). Therefore we looked at each factor to determine if there was also a significant loading of the variable "score", the variable measuring performance on the math test. Four (4) was selected as the level of significance for this project. We found a loading of -.41492 on Factor 2 and .51102 on Factor 3. There was no significant loading on any of the other factors. This suggested that we needed to rotate only three factors.

It should be understood that the remaining factors, while significant in terms of the whole body of data did not carry a <u>level of significance</u> in terms of the math score sufficient to justify including them in the finer detailed analysis which was to follow. The majority of the other variables had their most significant loadings on one of the first three factors. Therefore we were confident valuable information was not being lost through the factor selection process. We did refer back to the findings of this initial factor run in order to correlate some of the rotated variables with other variables. The importance of these references will become apparent below.

2b. The rotation of factors into Terminal Factors. The first factor run identified the three factors on which there was significant loading of the majority of the variables. These were the factors subjected to an orthogonal rotation. Orthogonal rotation is the technique used for factor analysis of uncorrelated variables. In the orthogonal rotation, the loading or numerical values in a given row represent regression coefficients of factors; these coefficients are then used to describe a given variable. If a variable loads significantly higher on one factor than on the others, it is said that its factorial complexity is 1. If a variable loads significantly on more than one factor, it is said that its factorial complexity is 2 (or 3). If a variable loads on more than one factor, or its complexity is greater than one, the meaning of that variable is said to measure more than one theoretical dimension.

Orthogonal rotation showed that the following variables have a complexity of greater than 1: Sex, Math4, Sem5, Math3. It will be noted that the variable sex loads as a negative on factors 1 and 2, that Math4 loads as a positive on factor 1 and a negative on factor 2; Sem5 loads as a positive on factors 2 and 3; and Math3 loads as a positive on factor 2 and negative on factor 3. It was assumed that if a variable loads either positive or negative on each of the two or more variables, that its complexity should be considered as greater than 1. If however, the variable loads positive on one factor and negative on another, the variable should be considered simple in the meaning it attaches to the factor. Following this line of reasoning then, we have only two variables, sex and Sem5 that have a complexity of greater than 1.

A total of 47 of the original 59 variables load significantly on the three rotated factors — 16 on factor 1, 15 on factor 2, and 16 on factor 3.*

Identified factors were subjected to an oblique rotation, to provide an empirically more realistic cross-check on the information which the mathematically simpler orthogonal rotation had revealed. Through the oblique rotation, 60 variables became listed on the three principal factors, 24 on each of the first two, and 12 on the third. Fifteen of these variables appear twice giving them a complexity of 2. Eight of these have a positive loading on one factor and a negative loading on another. Following the reasoning outlined above, we then limit the complex variables to 7.

Interpretation of the Factors

In addition to the rotated factors using the data from all students combined, it seemed wise to run similar factor analyses on the data from each of the student groups, individually. This yielded 10 factors for further analysis, three from the combined student data, three from Oneida-only student data, and four from the Ute-only student data. Since this study is primarily concerned with the description of dimensions of math avoidance, it seems appropriate to concentrate on those factors which show a high level of significance for the variable "score". Doing this hinges on an assumption — that something like the variable "score" within or between tribal populations will yield meaningful comparisons regarding relative math skill attainments

*Appendix IV displays the relevant factors and the variables listed on each one. Variable are listed in descending order, the variable with the highest loading value at the top, progressing to the variable with the least loading at the bottom.

within or between those populations. Considered in isolation, such a statement seems quite suspect, given all that is known about the implicit class- and ethnic-biases found within formal testing processes. But tests similar to the one included in the students' instrument package are used in schooling programs, biased or not, to draw generalizations about student abilities and to place students into groups according to ability levels. Test scores influence the image which parents and teachers construct about the individual student strengths and weaknesses. Test scores certainly contribute to the image the student him/herself constructs about his/her own academic potential. In that sense, sorting out measures of attitude in terms of a formal measure of student math "attainment" is not inconsistent with the interests of this project.

To begin the analysis of the attitudinal factors in terms of the indicated measures of student math skill, we first recognized that students who are associated with positive "score" variables are students who, considered objectively, would be said to have "passed" the math test. Similarly, students associated with negative "score" variables are those who would be said to have "failed" the math test. Again, because the project was interested in studying dimensions of math avoidance, it seemed appropriate to center the discussion around the attitudes and which group together with negative "scores".

The levels of significance for the variable "score" on the most heavily weighted factors generated by the analysis are as follows:

ALL STUDENTS

Factor 1 - .29

Factor 2 - .52

Factor 3 .31

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UTE STUDENTS

Factor 1 .16

Factor 2 - .025

Factor 3 .38

Factor 4 - .80

ONEIDA STUDENTS

Factor 1 - .43

Factor 2 - .60

Factor 3 .45

We now consider what these levels of significance tells us regarding the relationship between each factor and evidenced (in the sense just detailed) student math abilities. In each instance, we need to determine whether the level of significance is high or low (indicated by the absolute value of the number); then whether, at that level, that attitudes contained within the factor contribute to high math attainment (associated positive value), or low math attainment (associated negative value). Taken together, the numerical levels of significance indicate, for each variable, the extent to which the attitudes identified by the factor will or will not contribute to student math avoidance.

The low level of significance on All Students Factor 1 suggests that the attitudes reflected within this factor associates with a lower math skill test score; the low numerical value of the score suggests, however, that the attitudes associated with this factor may not play as great a role in inhibiting math achievement as will other attitudes associated with other variables.

__All Students__ Factor 2 reflects the same tendency, though the likelihood that association with these attitudes will lead to lower math scores is greater since the level of significance of the variable is higher. __All Students__ Factor 3 reflects a third pattern: those attitudes will generally be associated with higher math scores, but since the level of significance is low the correlation of these attitudes with __high__ math scores is not great.

Turning to the factors derived from the Ute students data: attitudes found in the first factor have a low correlate to math score, but they tend to influence a __higher__ math score (since the factor loading itself is positive). In Factor 2 there is very little correlation, but what correlation exists is associated with a lower math score. In Factor 3 we see a nearly significant level of correlation between the attitudes found on the factor and a higher math score. Factor 4 carries the highest level of significance of all the Ute-only factors; and its influence appears to lead in the direction of a low math score.

The factors derived from the Oneida-only student data reveal significant loadings of the score variable for factors 1 and 2. In both cases, the attitudes reflected by the other variables of the variable will tend to be found with lower math scores. Factor 3 has a positive level of significance, indicating that these attitudes will tend to be found with higher math scores.

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3a. Interpretation of the Data: Attitudes influencing negative math scores.

In all of the cases just examined, the factors with the highest loading (that is, the factors associated with the highest absolute value for "score") are also factors associated with negative loadings for "score". This suggests that an analysis of these data will tell us more about the student attitudes associated with low math scores, and hence higher tendencies toward measurable math avoidance, than they will tell us about factors favoring higher scores and lower tendencies toward math avoidance.

We focus now on the variables associated with All Students Factor 2 (-.52 score), Ute-only Factor 4 (-.80) and Oneida-only Factor 2 and, in less detail, Factor 1 (-.60 and -.53, respectively). Here it will also be meaningful to return to the information gleaned from the preliminary factor run, to re-examine the attitudes which are individually associated with the highest loaded variables on each of these factors.

All Students Factor 2

The attitudes associated with this factor which appear to favor lower math scores (hence which may be said to associate with higher incidence of math avoidance) are:

* high semantic differential between "myself" and "my school";
* student feeling that they do not learn much in math class;
* high semantic space between "myself" and "my Tribe's way of life";
* high semantic space between "school classes" and "Tribe's way of life";
* student belief that "most students in the class are not friendly";

* high semantic space between "my family" and "my school teachers";
* belief that "no one pays attention to me at school";
* belief that "kids usually pick on me."

Also associated with this factor are:

* high semantic space between "myself" and "my family";
* belief that "no one pays attention to me at home".

It is also felt that:

* "The teacher does not help me enough";
* "My friends do not like the teacher";

And finally, associated with this factor are the attitudes:

* "I usually do what my parents want me to do"; and
* "There are times I would like to leave home".

Here, then, is one configuration of attitudes which, according to the analysis being offered here, closely associates with low math scores and therefore with high incidence of math avoidance. It is worth noting that the attitude configuration is evidenced across Tribes and is not peculiar to conditions within one of the student populations exclusively. It is also worth noting that the students who reflect attitude patterns within this configuration — that is, the students whose aggregate responses to questions in the field instruments come closest to the overall patterning of variables on this factor — tend more consistently to be Female. Since Females predominate within the sample, we were curious to discover whether this apparent correlation of girls with low math scores was caused by the imbalanced nature of the sample. We therefore equalized the sample by randomly selecting seven girls to go with the seven boys, then ran an orthogonally rotated factor and found that even with a balanced sample there <u>was</u> a significant correlation between female students and low math scores.

More will be said about the distribution of all of these attitudes according to sex later in this chapter.

Additional confirmation for the patterning of information being provided through this factor can be obtained by consulting Factor 3 from the oblique rotation. The attitudes associated with this factor are:

* "The students in math class are not friendly";
* The student "usually does what his parents want him to do";
* High semantic space between "myself" and "my school classes" and between "my school classes and my Tribe's way of life";
* Most of the students close friends like the teacher;
* High semantice space between "myself" and "my Tribe's way of life";
* It is important to be respected for what you have;
* It is not important to be free so no one can tell you what to do;
* It is important not to run away from difficult things you are asked to do.

Also associated with this factor are the attitudes:

* I do not ususally do the right thing;
* It is important to be respected for what you know; and
* No one pays attention to me at school.

In essence, then, All Students Factor 2 and oblique rotation Factor 3 are quite similar. Both factors associate high semantic space between the child and his school classes, between the child and his Tribe's way of life, and between the child's school classes and the Tribe's way of life. Both suggest a linkage between a belief that most children in the math class are not friendly to the child; that no one pays attention to him at school; that he usually does what his parents want him to do; and that most of his friends like the teacher. This listing closely approximates the configuration of attitude suggested in All Students Factor 2. This suggests, in turn, that the analysis may proceed based on the conviction that the Factors derived from the orthoginal rotation accurately represent the configuration of attitudes corresponding to lower math scores. Comments about the corresponding configurations which may be derived through the use of oblique rotation will now be made only when the comparisons enrich the perspective on the given analysis.

Now we look more closely at the seven most highly loaded variables associated with All Students Factor 2. As part of this study we will return to the first factor run and consider additional variables which significantly associate with each of them. Those additional variables are:

Variables on the factor	Other Variables with which they correlate
*Sem 3	Sem 1 Sem 2 Sem 4
-Math 5	Sem 3 Sem 4 Math 6
Sem 1	Sem 3 Sem 2 Sem 4
Sem 4	Sem 3 -Math 5 Sem 1

* A full statement of the variables identified by these abbreviations — Sem 3, Math 5, Like 14, is listed in the table of Appendix IV.

(continued)

Variables on the factor	Other Variables with which they correlate
-Math 10	-Math 1 -Like 20 Sem 1
Sem 5	Sem 2 Sem 3 -Math 5
Like 11	Math 6 -Like 14 -Math 5

Also a part of the All Students Factor 2 configuration, then, is high space between "myself" and "my school classes" found in conjunction with high semantice space between "myself" and "my Tribe's way oflife," between "myself" and "my family" and, between "my school classes" and "my Tribe's way of life." The child who scored low on the math is relfecting an awareness -- rightly or wrongly -- of a lack of consistency between the way he views himself, as compared to the way he views his school and his tribal environment. This is what is implied by the association, as shown in the table, between Sem 3 and Sem 1, Sem 2 and Sem 4.

Math 5 is the next most highly loaded variable on All Students Factor 2. Math 5 measures the child's response to the question "Do you learn a lot in Math class?" The variable loads on this factor with a negative value. This indicates that, part of the attitude configuration accompanying doing poorly on the math test and feeling separation between self, school classes, and Tribe's way of life is the feeling that the student does not learn from the semantic differential (Sem 3 and Sem 4) show, as before, that high semantic space between "myself" and "school classes" and "school classes" and "my Tribe" are closely associated with this attitude. Not surprisingly, the response to the question (Math 6) "Do you ever feel like staying away from this class?" is positive; the variable is also associated with this configuration.

Sem 1 is the third most highly loaded variable on All Students Factor 2. This variable measures perceived distance between "myself" and "my Tribe's way of life". Associated variables are, once again, concistant with the attitude configuration which has thus far been developing: high semantic space between "myself" and "my school classes", between "myself" and "my family", and between "school classes" and "the Tribe's way of life" all accompany a negative math score.

Sem 4, the measure of semantic space between the student's classes and his Tribe's way of life, is the fourth most highly loaded variable on All Students Factor 2. Grouping with this variable, as before, Sem 1 and Sem 3, again reflecting the configuration seen with previous variables. Evidence of negative response to the question about amount learned in class is again attested.

A bit of new information is indicated in the variables associated with the fifth most highly loaded variable on this factor. Math 10, a measure of students' responses to the question "Are most of the students in math class friendly to you:", loads on All Students Factor 2 with a negative score, indicating student feeling that other students in the class are not perceived to be friendly. Closely correlating with this attitude is student displeasure at being in math class (-Math 1), a feeling that "I do not usually do the right thing" (-Like 20), and a high semantic space between "myself and "my Tribe's way of life". Recall that the presence of the new associations on the fifth most highly loaded variable means that these attitudes do no hold a highly significant association with the overall direction of this Factor's attitude configuration; for them to be more significantly associated, these two variables would have had to have been evidenced in conjunction with more highly loaded variables on the factor. Still their presence, even at this point, helps round out our understanding of the point of view of the All Students which the All Students Factor 2 is reflecting. And the attitudes identified by these variables are certainly not inconsistent with the sense we have already developed regarding that configuration.

The same can be said about the variables associated with the sixth most highly loaded variable on All Students Factor 2 — the measure of semantic space between "my family" and "my teachers". The variable loads positively, showing student perception of high semantic space between family and teachers. Sem 2, Sem 3, and -Math 5 are once again attested . The overall pattern is still being confirmed even at this level of loading.

The last variable loaded on the All Student Factor 2 is Like 11, "No one pays attention to me at school". The positive loading indicates student agreement with this statement. And associated with this attitude at this level are several other variables — the child feels like staying away from math class, finds he cannot make up his mind without difficulty, and (once again) the child feels he does not learn a lot from his math classes.

The orthogonal rotation which generated All Students Factor 2 revealed an association between poor student math performance and a given set of attitudinal variables. Our inspection of the variables has shown that those variables contain a rather consistent internal content patterning. Each of the variables associated with this factor points in a direct way to a student attitude which sees separation between self and family/Tribe on the one hand, and between self and school, on the other. We recognize that, as in all constructs generated through computer-assisted data analysis, All Students Factor 2 is not a "real" configuration. That is, no single student or set of students evidenced an association between all of the variables on this factor of the sort just identified here. But the factor itself would not have been generated by the orthogonal rotation, had some students not evidenced consistent association between several of these variables in their interview responses. All Student Factor 2 highlights the overall direction of association which underlies each of those variable "groupings. And in that way, the attitude associated with the factor helps predict the sorts of attitudes which real students are evidencing, attitudes which in this case are evidenced by students with poor math performance skills.

Ute Students Factor 4

The attitudinal configuration identified through the analysis of All Students Factor 2 is precisely what its name implies — a set of attitudes which were found to be evidenced most characteristically by students from both Tribal backgrounds. Stated another way, Tribal background has not, at this point in the analysis, been found to be a relevant consideration when determining, or predicting, attitudes held by Indian students reflecting poor math performance skills. Yet some Tribally specific attitude patterns were generated by the preliminary factor runs and two of them — Ute Factor 4 and Oneida Factor 2, were found to have close association with our measure of poor math performance. So we need to pay attention to the attitude configurations associated with Ute Factor 4 and Oneida Factor 2, to determine how difference in Tribal backgroun affects difference in association attitudes about self, math, and school.

The variables which are loaded on Ute Factor 4, and the other variables which closely associate with each of them, are as follows:

Variables on the Factor	Other Variables with which they correlate
Like 10	-Score Math 6 Sex
Like 14	-Score Math 6 Sex
Like 9	-Age Likes 17 Ways 13 Ways 10
Sex	-Math 1 Like 10 Like 14
Like 12	-Math 9 Ways 8 -Score
Ways 8	Like 12 Ways 15 -Score
Math 6	-Like 16 -Ways 18 -Like 4 -Like 10 Like 14

The first variable on the list (ie, the one with the highest loading on this factor) indicates that, as a part of this factor, the Ute child feels that he can get things he needs by himself. This attitude show a high correlation with a low math score; and with a desire to stay away from math class; and the variable indicating sex, in this case, mostly males.

The second variable on Ute Factor 4 indicates that the Ute child feels he can make up his mind without any trouble. Associated variables here are precisely the same ones which grouped with the first variable on the factor low math score, a desire to stay away from math class, and a higher tendency

That a group-level orientation is contained within these attitudes is clearly expressed within this listing. Notice in particular the treatment of the family issue within this context. The configuration acknowledges that people pay attention to the student at home, that the student does not feel "left out" of things, that it is not important to be free so no one can tell you what to do. The configuration references the idea that parents expect too much of students. But, associated with that variable is the idea that it is important to be respected for what you have; so in that sense, parental expectations, even if overbearing, are not inconsistent with the way these students feel individuals should be treated by other parties within their immediate social context.

3b. Attitudes influencing positive math scores.

To conclude the discussion we now briefly consider what the factor analysis can tell us regarding the attitudes which appear to favor high performance on the math test and, by this analysis, lesser tendencies toward math avoidance. Two of the factors with high, positive loadings for score will be considered — Ute Student Factor 3 and Oneida Student Factor 3.

Variables which load onto Ute Student Factor 3 are:

Variables on the factor	Other Variables with which they correlate
Math 4	-Like 11 Like 16 Ways 5
Like 11	-Math 4 -Like 16 Like 8
Like 16	Math 4 -Math 6 -Like -Like 11

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of attitude which are associated with those factors, reveal additional examples of the same contrast. Ute Student Factor 2 and Oneida Student Factor 1 can be meaningfully compared for this purpose; these are factors which show the weakest overall correlation with the score variable for each student group. The attitude configuration associated with Ute Factor 2 includes awareness that the student has a difficult time making up his mind;
and the belief that the student usually does the wrong thing; the feeling that no one pays attention to him at home. These then are grouped together with the admission that the student does not feel like leaving home and the belief that parents do not expect too much out of him. All of these variables reflect student-specific attitudes, revealing facets of the stress on individual self-dependence so clearly characteristic under Ute Factor 4.

The attitudes within the configuration maintained by the corresponding Oneida Factor (Factor 1) contrasts directly with those characteristics. A long list of attitudes are associated with Oneida Student Factor 1, includings:

Like 19 - My parents expect too much of me.

Ways 15 - It is important to judge others for what they are worth.

Ways 8 - It is important to take from nature what you want, when you want it.

-Ways 12 - It is not important to work hard and achieve so that everyone can live better.

Ways 18 - It is important to be respected for what you have.

-Like 7 - People pay attention to me at home.

-Math 6 - I do not feel like staying away from math class.

-Like 8 - I do not feel left out of things around here.

-Ways 4 - It is not important to be free so that no one can tell you what to do.

Students Factor 4. The Oneida configuration does not include student awareness of semantic space between self and family. Some rather clear-cut contrasts are being suggested, where perception of home vs. school is concerned. As was suggested in the loadings on All Student Factor 4 the school environment is here being viewed in rather negative terms. The content of specific variables suggest, for example, that students holding this configuration do not have fun in school, feel like staying away from math class, estimate that they do not do well in school, and claim that no one pays attention to them there. Ute student configuration also included several of these sentiments. Though the context in which these "paralleled sentiments" are being expressed is still found to differ. The negative reactions to schooling offered by the Ute students comes as a part of an attitudinal configuration which stresses self-reliance and self-dependence. School, and the demands of the classroom, appear to be perceived as things which conflict with those qualities of self. In the Oneida case, relation between self and family becomes contrasted with school and schooling experiences. Self-dependence of the Ute students is replaced by a strong affirmation of the close relationship between self and family. And it is that social, rather than personal-level characteristic which ends up being contrasted with school and school experiences under the loadings on Oneida Factor 2. Data in description of traditional Ute and Oneida cultures might profitably be brought in at this point to show that the contrast generated by the comparisons of factors is not totally an artifact of the analysis. The fact that Ute Factor 4 is heavily loaded in favor of male Ute students, while Oneida factor 2 is heavily loaded in favor of female Oneida students, might also be seen as quite consistent with the ethnographic facts as we know them.

Comparisons between additional Ute and Oneida factors and the configuration

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The third variable loaded on Factor 4 indicates an attitude noted above: student feels that other students are not friendly. This attitude correlates closely with a feeling that "no one pays attention to me at school", and with great semantic space between "my classes" and "Tribe's way of life" and between "myself" and "my Tribe".

The fourth variable, <u>Sem 1</u>, again correlates highly with the feeling that the other students are not friendly in class, with high semantic space between classes and Tribe's way of life, and with the feeling that math class is not very enjoyable.

The fifth variable on the factor idicates that the student does not learn a lot in math class. Grouped with this attitude are the feelings that the student does not do alright in school, that other student are not friendly, and the teacher does not give him enough help.

The sixth variable "-Sex" indicates that the students who tend to hold the attitudes loaded on this factor are female.

The next variable, reflects the semantic distance perceived to exist between "my family" and "my teachers." Correlating closely with this attitude is high semantic space between "myself" and "my classes", and between "my classes" and "my Tribe's way of life". Again, students who tend to hold these attitudes are female.

According to these data, Oneida-specific attitudes which co-occur with poor scores on the math test, and thus which are said to be favoring higher incidence of difficulties in math learning, center around high evidenced awareness of disparity between self and school, between self and Tribal way of life, between school and Tribal way of life, and between family and teachers. One thing makes this configuration different from that associated with All

(continued)

Variables on the factor	Other variables with which they correlate
Sem 1	-Math 10 Sem 4 -Math2
Sex	(see comments)
-Math 5	-Like 6 -Math 10 -Math 4
Sem 5	Sem 3 Sem 4 -Sex

Initially it may seem as if Oneida Factor 2 and All Students Factor 2 are similar in content. Some of the specific variables which showed up in the loading on All Students Factor 2 also show up in the loading on this factor. But closer inspection of the configuration of variables suggests quite a different set of attitudes are at issue in the present case. And a review of the individual variables, and the variables which individually correlate with them, will help clarify this point.

Sem 4, the first variable loaded on the Oneida Factor 4 indicates a high semantic space is perceived between "my classes" and "my Tribe's way of life". This attitude correlates closely with a feeling that the other students in the class are not friendly and is also closely associated with a high semantic space between "myself" and "my Tribe's way of life". Female students also tend to be more closely associated with this attitude.

The second variable on the factor is Sem 3, reporting high distance between "myself" and "my school classes". Sem 3 correlates closely with a low math score and the feeling that other students are not friendly to them. Again, the attitudes are more typically expressed by female students.

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classes and math instruction, infrequent talking within math class, and the feeling that other students in the school are "picking on me". It is important to note that the pattern of high semantic space between student and classroom, found to be so basic to the configuration of All Student Factor 2 is _not_ attested _at all_ within this Ute-specific factor. This implies, in spite of the rather negative comments about schooling which Ute Factor 4 does contain, that students reflecting this attitude do not hold negative thoughts about formal education experiences, _per se_. The _idea_ of schooling is not the problem. Instead, perhaps, it is the conflict which results when students holding "self-dependence" attitudes are required to function within a context where inter-personal competition is the more commonly relied upon theme.

Oneida Students Factor 2

The variables which are loaded on Oneida Factor 2, and the additional variables which closely associate with each of them, are as follows:

Variables on the factor	Other Variables with which they correlate
Sem 4	-Math 10 Sem 1 Sex
Sem 3	-Score -Sex -Math 10
-Math 10	Like 11 Sem 4 Sem 1
Like 11	-Math 10 Math 6 Sem 4

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specific Ute low-performance pattern: The variable itself, that "it is important to take from nature what you want, when you want it", associates with the feeling the "other kids pick on me", that it is important "to judge other people for what they are worth".

The final variable on the factor indicates that the child likes to stay away from math class. This was one of the variables associated with the most highly loaded variables on the Ute factor. Associated with it are other attitudes -- "others do not have to help me with the things I need", "it is important to be respected for what you have", a feeling that "I am not much like other children", that "I am not able to get the things I need by myself", and "I can make up my mind with little trouble".

One predominant theme associated with Ute Factor 4 seems to be independence. Included within the attitude configuration of the factor as such ideas as the student can get what he needs from nature and can make up his mind. "Self-dependence" may be a better way of expressing the theme, however, given the content of other associated variables -- it is important to know and understand the ways of nature, it is permissable to take what you want from nature, it is important to tell others what to do, but it is important to judge people for what they are worth. Each of these attitudes reflect themes quite basic to Ute Tribal culture as it is explained within the literature. Each of them point to an idea of "self" which involves stress on personal initiative and responsibility combined with respect for other person's rights to their own initiatives.

What is interesting for project purposes is the association between this Tribal attitude about the self and specific comments about school and classroom also loaded onto Ute Factor 4. Holding this Tribal attitude correlates with student desire to stay away from math classes, students dislike of math to see these attitudes held by male, rather than female Ute students.

The third variable on this Factor, Like 9, indicates student desire to leave school. Correlating with this is the variable measuring age. Younger children evidence this factor more consistently than older students at this point. Associated with this variable are other attitudes: that Ute students do what their parents want them to do; that it is important to know and understand the ways of nature, and that it is <u>not</u> important to tell others what to do.

The next most highly loaded variable on Ute Factor 4 is sex. Its positive loading reflects the tendency, cited above, for the attitudes of male students to be included within this factor, and hence the tendency for male students themselves to be more closely associated with the attitude configuration that factor represents. This observation alone is interesting, when it is remembered that, female students evidenced greater measured association with the more highly loaded portions of the All Students Factor 2. Apparently, when Tribe becomes a relevant variable, the distribution of attitudes (and, perhaps, math avoidance) takes on a different patterning.

Other attitudes correlating closely with the sex variable on Ute Factor 4 point to what is beginning to be a familiar theme. e.g. the student does not like to be in math class, the student can get things he needs by himself, and he can make up his own mind without great difficulty.

The fifth most highly loaded variable adds new information to this pattern. <u>Like 12</u> suggests that the student feels others pick on him. Associated with this attitude are the variables: "I do not talk in math class", and "it is important to take from nature what you want", and, as before, low math score.

The sixth variable also suggests other facets of the emerging Tribe-

(continued)

Variables on the factor	Other Variables with which they correlate
Like 8	-Like 16 -Like 18 -grade
Ways 5	Like 4 Math 2 -Age
Like 3	-Ways 10 Ways 13 -Like 4
Like 2	Sem 5 Like 18 Math 1

Several of the attitudes associated with this factor need to be highlighted. First, and quite unlike the situation found for Ute Factors previously discussed, Ute Factor 3 denotes perceived distance between family and teachers. On Ute Factor 4, family/school distance was not judged to be relevant to the associated attitudes. Close examination of other attitudes associated with this factor will help clarify why the distance is deemed relevant here.

Attitudes which group on this factor and are associated with higher math scores include the following:

* the teachers provide enough help in-class;
* people pay attention to me in school;
* others need to help me in the things I do.

These are three attitudes which jointly suggest a sense of dependency, not on self (as was the case for Ute Factor 4 and lower math scores) but on outsiders. Other variables suggest that the content of this factor's configuration suggests:

* The student does not feel left out of things at school;

* He does not feel like staying away from math class;
* He believes it is important to tell others what to do;
* Math class is fun and he enjoys being in it.

These suggest that such students have made considerable effort to work their way into the social opportunity network provided by the school. These students are self-motivated, as indicated by the high significance of variable Like 18, "I can make up my mind without having too much trouble". Still (Like 2) the configuration suggests the student often does the wrong thing, something which relates to the other-directedness of the first variable discussed on this factor.

Overall, as suggested by this factor, high math score, and greater interest in math-learning, are associated with student attitudes quite distinct from the students attitudes associated with low scores. Before, student reliance on self was the core of the attitude. Here, reliance on self has been de-emphasized in favor of dependence on outside sources of support. Equally importantly, such students feel that they receive support from these outside sources and this may be the most telling point within the whole configuration.

We now turn to the variables loaded on Oneida Student Factor 3, to determine, first, what attitudes associate with higher math score within that student sample; and second whether those attitudes parallel or depart from attitudes identified at Northern Ute.

The variables which load onto Oneida Student Factor 3 include:

Variables on the factor	Other Variables with which they correlate
Like 3	-Ways 9 -Ways 18 Like 9

(continued)

Variables on the factor	Other Variables with which they correlate
Math 9	Ways 19 Sem 2 -Math 8
Like 1	-Math 3 Like 13 Ways 2 Like 3 Like 6 Like 7
Sem 2	-Sex Math 9 -Like 5
Ways 20	Math 8 -Like 16 Like 3
Like 9	-Like 19 -Ways 15 Ways 4
Like 5	-Math 3 Sem 2 Ways 10

A review of the associated variables suggests several things. First, the importance of the family is still being affirmed. Family-centered issues are as evident here as they were within the Oneida configuration associated with lower math scores. But again, the context of surrounding variables show that the family principle is being treated differently under these circumstances. Also associated with this factor are the following variables:

* It is important to be free so no one can tell you what to do;
* It is not important to work hard or be industrious; other people's respect is not based on your commitment to work;
* It is not important to know when to take advice.

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At the same time, there are the following variables:

* Student has difficulty making up his mind without assistance from other people;
* It is important to get along with people;
* It is also important not to let your friends and family down.

Within this context, it is hardly surprising to find a positive loading for variable Math 4: "Does the teacher help you enough?" Ties and linkages with outside parties appear to be important for the high-scoring Oneida students much as they were for the high-scoring Ute Students. But there still is a contrast between the Tribally-specific configurations. Ute Student Factor 3 saw the stress on outside assistance replace the stress on self-reliance closely associated with lower levels of math performance under Ute Factor 4. In the Oneida case, the emphasis on family and family associations has not been weakened by the shift from low to higher math scores. Apparently, according to these data, increases in mastery over math skills at OTS does not associate with a rejection of a more traditional Tribe-centered attitude. This is one of several specific issues which need to be examined, when profiles of math instruction at both school sites begin to be compared.

Chapter Eight: What Happens in the Classroom?

It was assumed at the outset of this research that whatever information was gathered during the in-field research process would be useful to project interests only to the extent that it helped us better understand what goes on during math instruction at Todd Elementary and Oneida Tribal Schools. The discussion in the preceding chapters has shown how useful to project interests the information gathered in the field turned out to be. Now to help focus that information, attention must be turned to the classroom settings themselves, to an examination of the sequence of events characteristic of formal mathematics instruction at each site, and to an attempt at analysis of the content and patterning underlying those events.

Math Class at Todd Elementary School

For this project we observed three math classes regularly, two third grade classes and one 4th-5th combined class. The third grade has three sections at Todd. The teachers cooperate in an effort to do some team teaching. They all have scheduled math class at the same hour so that the whole third grade can be divided into three homogeneous math sections. The team leader took the "highest" group. A second teacher took the middle group, and a third teacher, replaced by a temporary teacher in mid-January, took the "lowest" group. After math class the children would return to their homeroom classrooms.

The fourth and fifth grade class combined stayed together during math class. The whole classroom was divided into three math groups, low, middle, and high. It did not matter whether a child was in fourth or fifth grade; he was placed in the math section appropriate to his level in math.

In general the third grade teachers opened math class with an explanation of the lesson, some discussion, and a question and answer period (that is, the teacher asked the question and called on a student to answer it). Then the assignment was given and the children worked on it for the remainder of the math class. The students were free to ask the teacher for help and the teacher usually circulated around the classroom, making certain that the students understood what they were doing. In general, the third grade teachers used the Holt & Co. textbook as a guide and it was from the textbook that they made their assignments.

In the fourth and fifth grade combined class, the teacher made use of mimeographed sheets that he had put together for specific lessons and exercises. At the beginning of a class this teacher would either ask for the attention of the whole class, if there was a point of review or a general remark that he wanted to make, or he would ask for the attention only of the section that he wanted to address. Then, either before or after his opening remarks, he would hand out the mimeographed sheets, which were also the assignment for the day. He would then circulate around the classroom and make himself available for questions.

In all calsses, part of class time (about forty minutes) was used to accomplish the day's assignment. If several students appeared to be having difficulty with a specific problem or concept, the teacher in all classes would address the whole class, or in the case of the 4th-5th, a whole section of the class, to clarify the issue.

It was the observer's impression that the "highest" math class was the only one in which the papers were graded and the grades were read out loud in class. The other classes handed their papers in to the teacher, and presumably the teacher graded them, entered the grades, and handed the papers back.

The other math classes observed were Title I in elementary and in junior high. In elementary Title I, the teachers concentrated on drill of basic addition and subtraction facts, usually with an emphasis on speed. Most of the exercises were part of a competetive game, where the child who got the answer first got the most points, beans, moves, whatever. The principal emphasis here seemed to be preparation for the CAT tests. There was some instruction, and explanation, but mostly the class time (about one-half hour) was spent on drill.

In junior high, the Title I students would bring their day's assignments to Title I and the teachers would help

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them finish their assignments first. Then, if there was time (these were, apparently, fifty minute classes), the teacher would go over some review questions or answer other questions that, the students might have. The principal emphasis in this class was to help the students keep up with their regular math classes.

There were four teachers in Title I in elementary and four also in junior high. When Field Staff was at Todd Elementary and West Junior High in May, it appeared that Title I funding was to be withdrawn from West and the Title I teachers from West would go over to Todd to teach. It was unknown at that time whether parental and community pressure could be brought to bear to retain the Title I funding at West.

Math Class at Oneida Tribal School

The class to be described here was taught by a non-Indian woman who was trained in education and worked previously in the Racine public school system. The class consisted of 14 children, two of whom were fourth graders and the remainder of whom were third graders. There were six boys and eight girls at the outset; unfortunately, one of the girls was seriously injured in a bicycle accident after the first class, so she did not play a part in the classroom observations for the remainder of the project.

Student seating was fixed from May 19 to May 29. After that date, and for the remaining days of class, the children were allowed to move their seats to positions next to their friends. Classes were last conducted on June 2. The following two days were set aside for a field trip and a clean-up day.

Math class is the first class of the day. Three math stations comprise the class; the teacher-assisted station, the independent work station, and the math games station. Each has designated areas within which the group stays during the time period allotted for work at that station. The teacher-assisted group is situated in area 1, the independent group in area 2, and the games group in area 3. The group of children at each particular location is rotated from 1 to 2 to 3, according the the teacher's assessment of who needs to be worked with more intensively. Ideally, each group should have twenty minutes at each center.

Math activities in this classroom are, by and large, individual and individualized activities. There are no general class discussions of math issues and there is little opportunity for joint participation, even by small groups of students, in problem-solving. Students have individual assignments, pursue them on their own, and get technical assistance from the teacher on a one-by-one basis.

The children are assigned to fixed math groupings according to their evidenced math abilities. These groups are used only for math-related class purposes. Different student groups are structured for different activities and topics, again using evidenced mastery over the given topic as the determinant of student placement. The AS10 group, which is comprised of six children, is the slowest group, not having mastered third grade multiplication and division skills and still perfecting addition and subtraction skills. The MD3 group, the high achievers, are working on third grade level in multiplication and division and have no trouble with adding and subtracting. This group contains four children. The final group, the mixed group, is composed of children of mixed math skills. They also are working on division and multiplication skills. The two girls are average-above average in skill, and the one boy is above average. He is in this group because he could not fit in the MD3 group. The fourth child, also a boy, wont take standardized math tests and does not respond well to questions. Overall, his math ability is in question. The teacher feels that he is playing the dummy.

When math class begins, the teacher names the group assigned to each station and then they rotate in the regular pattern described above. The teacher-assisted group reports to area 1, where the teacher is surrounded on three sides with children and on the fourth with a blackboard for instruction. The independent group in area 2 sits at tables and removes the lexes (the math packets designed for individualized instruction) that are located on a movable bulletin board. They also remove their individual folders recording the lexes that have been completed previously. The math games group in area 3 plays cards, number games, and see-and-do math pages that have been devised and taught by the teacher. These games include 500 rummy (for addition skills), slapjack (for number recognition), dice games, and a card form of the game show, "Concentration". This takes place in a carpeted place on the floor. Sometimes children sit at a table as well.

For all of the classroom observations, except when the researcher began to work with the children in the independent group, the researcher was seated at a desk just to the left of area 1.

A good portion of the day is spent broken up into groups of one kind or another. Not all of these groups necessarily meet in their home classrooms. For example, at 9:30, when math class ends, half of the children go to a second classroom and the other half stay with the teacher to discuss things going on in class. The class splits up again after the 10:00-11:00 break is over (this break consists of outdoor recess from 10:00-10:20, and the milk break accompanied by a story from 10:20- 11:00). This time, the class divides into thirds for Language Arts. One third stays with the teacher and the other two groups each go to another teacher to work on creative language skills. The class is also divided up when formal testing is going on (this is usually reading tests to check reading progress) and when certain children need to go for specialized instruction in reading. Some students have special problems which only can be dealt with individually. They may move in and out of the classroom even more frequently than the other students. Students also move out of their homeroom as a group to attend the Oneida Language class. Children are generally quiet and restrained during this special class. The native speakers who attend these sessions are quick to be stern with the children, so they are generally respectful and do not talk back.

These are some general comments about a typical day in this third grade class. The following comments are more math specific. They refer to issues which either are part of, or affect, math performance.

The first thing that one notices when math class begins is that the childreh have to scrounge for pencils to do their work. The teacher says that the school supplied the pencils at first, then it provided them only if the child forgot to bring one. But by the last weeks of school, the administration said thy could no longer afford pencils for everyone, so each child must bring his own. Unfortunately, the children had become so accustomed to receiving pencils, they did not always remember to bring them from home. The teacher said she was unable to supply then and a lack of materials often delayed math class until everyone was equipped.

Another thing that one notices right away is the reluctance on the part of the children to use scrap paper to help them figure out math problems. When they do use scrap paper, they erase the figures before anyone can see them. When asked why they do this, the children would respond with "I don't know", or "because". Generally, they seemed embarrassed by the question. The teacher says that she has tried to get the kids to use scrap paper, but they resist it. Other teachers in the school report this also. Other methods for figuring out problems are available, and the children do not hesitate to use them. These methods include: counting sticks and coins, using fingers for computation purposes, and using one of the abacuses scattered about the room. A number of lexes insist on student use of these counting methods to aid the children. This can cause confusion when the child knows the answer without referring to implements. In one case a student was instructed by one lex lesson to use sticks to help her master a series of division problems. Use of the sticks turned the exercise into one that practiced counting skills. What division is as a mathematical process was lost when the sticks had to be counted out. It was explained to the student that when she counted the sticks into groups she was actually dividing. Only then did the exercise make sense to her. This situation is one example of why the teacher feels that math class would be more productive if there was an aide to work with the children in the independent section.

There is one more math-related action which occurs during each class, regardless of whether math class has been held: counting how many children are going to have milk at milk break time. The teacher reads off each name and the number of cartons each child is to have (they have a choice of one or two milks). The class is supposed to listen and note down how many cartons of milk the class will order. Then they are to give an answer. If several students respond, and if the answers do not coincide, the process is repeated until the class gets it right.

Preliminary Comparisons

Comparisons of field data identified several points of contrast between the ways math instruction was provided to students at each school site. We will use data from the third grade math classes to point out some of these differences.

Math classes at both sites are structured through the use of "ability groupings". At TES, each group contains students from several homerooms and the beginnings of each math "class" involves a considerable amount of student movement, relocation, and rearrangemnt. Scheduling time for math classes later in the morning only added to the confusion, since students had already gone to their homerooms and become settled, then had to change classrooms and become settled again. Math instruction at OTS did not have to face these problems. Math instruction occurs as the first academic task of the day. All students in the homeroom remain in that room for math instruction.

The criteria used to place individual students into the appropriate group for math instruction also differs, site to site. The placement at Tes is determined by standardized test scores and other formal measures of student math achievement. So the groups contain students sharing general, aggregate, or global similarity in mathematics skills. Test score results and other formal measures may have a hand in determining student group-placement at OTS. However the nature of the group differences were explained to field team in task-specific terms. That is, students in one group had not yet mastered certain skills while students in a second group had mastered them and were now exploring topics in a different skills area.

Interaction between student and teacher also differs markedly, site to site, when math instruction occurs. At TES, each teacher works with one student group, the one group assigned to him/her. It is possible to have group as well as individualized instruction during the forty minute math class. All three teachers observed at TES were found to use part of each class session to introduce facts and concepts to the whole group and to encourage the whole group to participate as a group in this process. On some days, subdivisions within each ability group were constructed, usually to allow some students who had not finished assignments from previous class sessions the opportunity to complete their work. Students involved in task-specific seatwork of this sort were expected to do their work as individuals, while the remainder of the group faced the board and participated with the teacher in the day's math lesson. Often, students completing individual assignments "paired up" with friends --either to work on their exercises together or for other, less academic, purposes. Having students from several homerooms' classes jointly participating in each class meeting greatly assisted in the formation of those pairings. So any number of centers of activity may emerge during a single forty minute math class. And from an outsider's perspective, the number of activities and the volume of noise which accompanies them can truly be overwhelming.

Math instruction at OTS is considerably more sedate for several reasons. First, there are three ability groups in each classroom, and all three are working on different topics during each class. There is no single lesson to be presented, or is any attempt being made to exclude certain students from direct interaction with the instructor while the "main lesson" is being presented. Individuals in each group have their assignments and are responsible for completing them. The teacher remains stationary at one area, and over the course of the class session, all students will meet with her in a small group, almost one-to-one basis. No large aggregate of students jointly involved in an oral math learning exercise masks the sounds of individuals, or pairs or individuals, as they pursue their studies or make jokes with their friends. Certainly joking, clowning, and other forms of interaction between students will occur during the math class, but such incidents become noticable when they occur and the teacher can quickly bring students in line, should it become necessary to do so.

The format of instruction at each site is quite distinct. At TES, students doing "catch-up assignments" excepted, a math class contains two parts; first, time for presentation by the teacher of specific facts, issues, or ideas, accompanied by group recitation-like participation in problem-solving or related discussions. Then the group is given a set of assignments to complete and the remainder of the time period is devoted to seatwork. Ordinarily, the teacher moves around the room during this part of the class, to answer questions which individual students might want to raise and to make certain that students are doing the work they were assigned. On some days, lesson-planning, the need to correct student papers, and other administrative demands require that the teacher stay at his/her desk while the students are working. So, if assistance is required, students must go to the teacher and formally request his/her assistance. The symbolics involved in that process -- asking the teacher to shift from "teacher-work" to "student-work" cannot be disregarded.

The format of math "instruction" at OTS deals with this matter more directly. Interaction with the teacher is already built into each day's math class activities, since each of the three groups rotates into the teacher's activity area during one part of every "class". This does not guarantee

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that all students will receive one-on-one instruction, to be sure, but it does mean that students are able to solicit help without having actively to pursue it, and it also means thatthe teacher remains visually and spatially involved in math instruction for the whole of the class period. There is, however, no opportunity here to give a single presentation describing a set of basic concepts to all students at once. A certain amount of repetitition of explanation accompanies the teacher's work with the groups, and this can restrict the amount of time the teacher may be able to spend listening to an individual student's problems and responding directly to them.

Both classes rely on a seatwork component within the math instruction process. But again, different treatment is given to seatwork at each site. At TES, as noted above, seatwork is usually preceded by a group-general explanation of concepts or topics relevant to the work the students are doing. Seatwork follows, builds on, and augments the teacher's formal presentation. Time is set aside each day for the completion of assigned exercises. If these are not finished when math class ends, students are expected to take the remaining exercises to their homes and complete them overnight (otherwise, the work will have to be completed during the next day's class, while the rest of the class participates in the teacher's formal presentation). Other than this, take home assignments in mathematics are not given. Homework under this system becomes a direct extension of in-class activities, something the student has to do when, for one reason or another, the student does not complete an assignment within the class time alloted for it. Teachers do not assign homework; students, because of their own in-class circumstances, "assign" it to themselves.

At OTS, seatwork plays a more integral part in the instruction process and the use of seat-based activities is considerably more varied. Students, during each math class, are expected to do some work within the formal set of assignments and exercises (the "lexes") which constitute much of the core of the math curriculum. Students work at these activities at their own pace, setting their own goals within the materials available for use during the year, moving on to newer topics when interest wanes on older topics, when skill mastery is evident, or for other reasons. What is learned, and how well it is learned, becomes assessed by the teacher against the student's own evidence of progress. Completed activity sheets are placed within the student's math file, something the student compiles and maintains himself; the teacher reviews that file at regular intervals, again as part of the student-teacher, one-on-one dialogue.

Formal exercises are not, however, the only form of seatwork included in the math class. Several card games and other seemingly less serious, pre-packaged activities are also available for student use. And just as time is scheduled for work with the lexes' assignments, time is also set aside for student game-playing. There are academic and cognitive contents to these games; Concentration, for example, helps reinforce memorization skills and word/form/shape recognition. But their "fun" quality makes them appealing to students, only a few of whom seemed to recognize that activities in the games area was math-learning, too.

One other contrast in the use of seatwork at both sites needs to be drawn. As just noted, student activity sheets and other on-paper exercises, when completed, are then stored in a permanent file which the student has responsibility for maintaining. Some attempts to keep such concrete records of student progress at TES can be noted. Unfortunately, the opposite was also noted by the Field Team. On several occasions, students would bring completed seatwork to their teacher for review, and after his review (and sometimes, instead of it), the teacher discarded the students' exercises in the classroom's wastepaper basket. Field Team asked if this was a deliberate gesture move on the teacher's part. Two responses were made: first, there is no place to store the papers, and second, once they are filled out and graded, the papers cease to have any value.

Formal Analysis of Teaching Styles

Other contrasts between classroom-based math instruction at TES and OTS can be found in the field data. And many of them, as is the case for the contrasts just presented, show intriguing parallels to the characterization given to math instruction at each school during the teachers' parents' and students' interviews. Some of those parallels will be explored in the final chapter of the report.

But project goals demanded more than just characterization and impression about in-class activities. We needed to use some formal means for identifying points of similarity and difference in math instruction at each site. When the research design of the project was originally being prepared, we had searched for, and ultimately found, a techinque which seemed suitable for this purpose. Bellack (1963) had developed an objective recording and scoring system which could be used to determine particular characteristics of a given instructor's mathematics teaching style. Bellack's system built upon observations made by Wittgenstein regarding language "...(as) part of an activity, or of a form of life". Bellack et. al. (1966) summarized these observations in the following terms:

> In his view, ...(l)anguage is adaptable to many uses and functions in carrying on various types of activities that are essentially linguistic in nature. Wittgenstein refers to these activities as "language games", a metaphor used to point up the fact that linguistic activities assume different forms and structures according to the functions they come to serve in different contexts. A game has a definite structure, and there are certain moves that a player is bound to make insofar as he is playing the game at all. ...Carrying the game

> metaphor a step further, Wittgenstein observed that verbal activities in various contests follow certain rules or conventions appropriate to the activities under way. Learning to participate appropriately in various kinds on language activities is very much like learning to play a game. Players have to learn the rules, the purpose of the rules, and how the various parts of the game are related. Only by learning these rules can one play the game successfully. Similarly, successful communication in various types of linguistic activities depends on understanding the language rules that govern the use of words in these activities.
> (Bellack, et. al., 1966:3)

Then Bellack and his colleagues explained the implications Wittgenstein's observations hold for classroom-related research:

> Viewing classroom discourse as a kind of language game was a useful approach for purposes of this research, in that it suggested a framework of analysis within which we could identify verbal expressions that communicate various kinds of meaning. Teaching is similar to most games in at least two respects. It is a form of social activity in which the players (teachers and students) fill different but complementary roles. Furthermore, teaching is governed by certain ground rules that guide the actions or moves made by participants. We reasoned that if we could identify the various types of verbal moves teachers and students make in playing the game of teaching and the rules they implicitly follow in making these moves, we would be in a position to investigate the functions these verbal actions serve in classroom discourse and hence the meanings that are communicated.
> (Bellack, et. al., 1966:3-4)

So, a typology of "moves" was developed and a technique was created which would allow that typology to describe the "style" of student-teacher interactions within a given classroom. Central to the use of that typology were two observations: first, "(t)he basic verbal maneuvers that the teacher and the pupil make in playing the game are pedagogical moves: structuring and soliciting, which are initiatory moves; and responding and reacting, which are reflexive moves" (1966:238). Second, "(t)he teacher is the most active player in the game. He makes the most moves; he speaks most frequently; and his speeches usually are the longest: (1966:238). When this frame of analysis was applied to data from several senior high school social studies classes, Bellack et.al. found teacher-student rations of 12:1 for structuring moves, 13:2 for soliciting moves, 1:7 for responding moves, and 4:1 for reacting moves. Clearly, by these data, the teachers are the active respondents, following more frequently the direction set by the teacher's structuring and soliciting, and only less frequently initiating structuring or soliciting moves on their own.

Shortly after the publication of Bellack et. al.'s study, James Fey applied an adapted form of their technique to the analysis of teaching styles within junior high school mathematics classes. Even though the content of class instruction had shifted and the grade-level of the classroom had changed, Fey still found in-class styles of teacher-student moves to be consistent with the patterning Bellack et.al. had identified. They had found that 5% of the total number of observed moves were structuring moves; 29% were soliciting moves; 25% were student-responding moves, and 24% were student reacting moves. Fey found, within his sample: 4% structuring, 30% soliciting, 31% student responding, and 25% student reacting. The remaining 10% of the total moves were taken up by student structuring, soliciting, and reacting moves, again consistent with Bellack's findings (1970:50). Overall, Fey's data reported what Bellack's study had found: teachers' teacher-centered "moves" dominate the classroom. Fey did, however, find noticable variations in the extent of teacher control from class to class (1970:73), and this led him to caution that the patterns identified in his data, and presumably in Bellack's data as well, should not necessarily be viewed as "typical" of all such classes, nor necessarily that patterns which will, or should, be attested within "good" math classes (1970:72).

Fey's adaptation of the Bellack technique seemed ideal for the purposes of the Math Avoidance Project. Use of the technique would give us a way to analyze classroom activities and styles of participation in those activities in concrete terms; here perhaps would rest a quantitatively based framework around which the more qualitative insights into schooling and math-related interests could then be organized.

The Bellack-Fey technique was employed during fieldwork and analysis periods in the following manner. In the field, audio tape-recordings were made of activities going on during several mathematics class periods. At TES, the tape-recordings included both the teacher's general presentations to students and, where possible, the dialogue between teacher and individual students which emerged once further assistance with the seatwork had been requested. At OTS, we made a point of audio-taping discussions between the teacher and members of differing "ability groups" during the time each group was positioned at her station In all, 7 math classes at TES and 8 math classes at OTS were tape-recorded.

The next step in the analysis required a review of the audio-tapes, listening to the events on the tape at second intervals, then identifying the kind of teacher-student interchange which was going on at that interval. Classroom noise (especially at TES), microphone placement, and other technical factors made the identification process difficult at times, but sufficient material was presented to allow certain judgements to be made. Sections of each audio tape with passages of particular interest to the project were then transcribed verbatim.

We found, in the initial hearing, that it was difficult to determine which of Bellack's categories of "moves" were being attested within some of those interchanges. In order to add greater flexibility to the description, we decided to insert an additional step in the analysis process and first categorize the content of the given interchanges according to the "Categories for Interaction Analysis" which Flanders (1970:34)

SUMMARY OF CATEGORIES FOR INTERACTION ANALYSIS

TEACHER TALK	INDIRECT INFLUENCE	1. * ACCEPTS FEELING: accepts and clarifies the feeling tone of th students in a nonthreatening manner. Feelings may be positiv or negative. Predicting or recalling feelings is included.
		2. * PRAISES OR ENCOURAGES: praises or encourages student action c behavior. Jokes that release tension, but not at the expens of another individual; nodding head, or saying "um hm?" or "g on" are included.
		3. * ACCEPTS OR USES IDEAS OF STUDENTS: clarifying, building, c developing ideas suggested by a student. As teacher brin more of his own ideas into play, shift to Category 5.
		4. * ASKS QUESTIONS: asking a question about content or procedu with the intent that a student answer.
	DIRECT INFLUENCE	5. * LECTURING: giving facts or opinions about content or proc dures; expressing his own ideas, asking rhetorical questions.
		6. * GIVING DIRECTIONS: directions, commands, or orders with whi a student is expected to comply.
		7. * CRITICIZING OR JUSTIFYING AUTHORITY: statements intended change student behavior from nonacceptable to acceptable pa tern; bawling someone out; stating why the teacher is doi what he is doing; extreme self-reference.
STUDENT TALK		8. * STUDENT TALK - RESPONSE: talk by students in response teacher. Teacher initiates the contact or solicits stude statement.
		9. * STUDENT TALK - INITIATION: talk by students, which they init ate. If "calling on" student is only to indicate who may ta next, observer must decide whether student wanted to talk. he did, use this category.
		10. * SILENCE OR CONFUSION: pauses, short periods of silence, a periods of confusion in which communication cannot be unde stood by the observer.

* There is NO scale implied by these numbers. Each number is classificatory; it des: nates a particular kind of communication event. To write these numbers down dur observation is to enumerate--not to judge a position on a scale.

had previously developed. A list and full description of those categories is given on the following page.

Including Flander's categories in the analysis allowed for an additional benefit. Flanders himself used the content of the categories, once applied to analysis of specific kinds of classroom interchanges, as a way of developing a general typology of teaching styles. His typology is deliberately incremental, because he believes that "higher leveled" teaching styles are more creative and more effective than are the "lower leveled" teaching styles.

Level One patterns are the lecture, drill-review and giving assignments, and according to Flanders,

> ...there are educators who prefer to view level one problems in terms of teacher domination, rigid patterns which suppress pupil independence, and lack of pupil initiated participation (1970, 283).

Level Two patterns consist of open questions, developing pupil ideas and extensions ("because," praise, criticism and directions) and

> "...tend to invite more active pupil participation or tend to soften the use of teacher authority by making it more reasonable, understandable, and less arbitrary (1970, 286)."

Level Three patterns are more complex, including "affective and cognitive components" which result in creativity and independence:

> ...classroom learning activities should involve as much self-direction and independence as the maturity, self-control

had previously developed.

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Consider the data in the following table:

	Bellack	Fey	T1	T2	T3	T4	T5
T/STR	5%	4%	13%	17%	34%	23%	42%
T/SOL	29	30	39	11	3	17	7
T/REA	24	25	5	6	1	9	7
S/RES	25	31	17	9	3	15	19
Other	17	10	26	57	59	36	25

It is apparent that a wide discrepancy can be found in the percentages found by Bellack and Fey in their studies and those found in the Indian math classrooms. According to Bellack's and Fey's data, approximately equal amounts of moves (between one-fourth and one-third) are spent in soliciting and responding tasks by teachers and responding tasks by students. A smaller percentage of moves is directed toward "other" tasks, still smaller percentage (4-5%) to lecturing, giving directions, criticizing, justifying authority, or other structuring tasks.

Data from the classrooms examined in this study do not reflect the same patterning of percentages. Both at TES and OTS, there is a decided shift away from a greater reliance on "teacher soliciting", "teacher reacting", and "student responding" moves. Instead, in each instance, teachers are placing much greater emphasis on the use of "teacher structuring". Moreover, the number of miscellaneous moves -- e.g. those which fulfill functions other than the ones identified in the typology, and hence are viewed as involving actions less integral to the instructional components of the teacher-student classroom "game" -- has also increased sharply, when compared to the equivalent percentages in Bellack's and Fey's data.

Considered on a group-general basis, there seems to be far less interactive teaching going on at TES and OTS than was reported in the earlier studies. To a certain extent, this is not surprising. The OTS math classes observed by project staff were not set up to emphasize aggregate group-focused teaching and learning activities. Classes were divided into smaller, ability-focused groups, and these groups had their own work to do and spent their time focusing on it. The TES math classes, in contrast, did include opportunities for group-general instruction, but the size of the classes, the numbers of participating students, and other factors already described in this chapter made attempts at interactive teacher-student dialogue rather unmanageable.

Careful examination of the audio-tapes did reveal the presence of some "teacher soliciting", "student responding" and "teacher reacting" sequences. Characteristically, these sequences occurred, and the accompanying teaching style was employed, during one-on-one interchanges between teacher and individual student.

At this point, if we want these generalizations to continue to have any validity, it is necessary to recognize another fact contained in Table : the amount of variability between individual teachers and their individual teaching styles, when measured in terms of the Bellack-Fey framework. The differences in percentages speak for themselves; those differences alone assure that, while "teacher structuring" may be the type of "move" more frequently relied upon in these classes, what is involved in "teacher structuring" in one classroom may contrast drastically with the "teacher structuring" observed in a second.

Consider a concrete example, two passages of dialogue from the audio-tapes, the first from teacher T-3, the second from T-4:

Passage 1 -- Teacher T-3, TES:

T: At your desks! Those of you who have multiplication to do, look at the board, please! Those of you who are going to do fractions, go ahead! All those with fractions to do, go ahead -- all others keep your eyes on the board. Those who have to multiply, can look up here! As promised, the third quarter has begun and in the third quarter we begin fractions. Turn your multiplier sheet on its back -- turn it over on its back! I want you to write some things for me. On the back, write -- "Fraction means part of something".

Passage 2 -- Teacher T-4, OTS:

T: What is 9 times 9?

S: 90.

T: No, that is too big. We know that 9 times 9 is 81. What is 9 times 9?

S: 81.

T: 81. You know that 9 times 9 is 81. Can you get a 9 out of here (motioning to 90)?

S: yes.

T: OK. What if we take 9 out of here, what do we have?

S: 81.

T: What about 83 divided by 9?

S: 10.

T: 10? ... .

And the interchange continues in the same style and tone.

Each of these passages involves what Bellack and Fey term "teacher structuring" behavior, and what, in Flander's terms, includes "lecturing", "giving directions", and "criticizing/ justifying authority". The real contrast is revealed under Flander's terminology: The amount of teacher-centered statement, the selection of words and phrases, the use of commands rather than questions, and related factors all make it clear that T-3 is re-establishing rights to power and this is his right to require seatwork as he is beginning the class lesson for the morning. Perhaps, given the complexity of the OTS classrooms during math instruction, such assertions are understandable. The point is, the strongly assertive tone, and with it the justification of authority, is not nearly so evident in the passage involving T-4. It is clear from the content of the dialogue that the teacher is structuring the discussion and that the student, far from actively participating, is responding at appropriate moments and thereby keeping the lesson moving. T-4 reminds us that an emphasis on "teacher structuring" need not always be accompanied by acts of teacher dom[illegible].

There may be classroom-specific issues underlying T-3's use of the more authoritarian manner during group instruction, as was just noted. And, there may also be actor-specific considerations influencing T-4's less assertive "teacher structuring" style. Consider the following passage, where again T-4 is describing for a student the way to solve a particular math problem:

<u>Passage 3 -- Teacher T-4, OTS:</u>

T: Two times forty and two times eight are ninety-six. Then thirty times forty and thirty times two equals one thousand and sixty. Add these two numbers up and you get the answer, one thousand three hundred and fifty six.

S: Oh!

T: Now, that is the long process. The shorter way is two times eight is sixteen, put down a six and carry the one up here and add that one and get nine. Now these are the tens and the zero is over here. Etc, etc...

The <u>amount</u> of teacher-centered comment in the interchange has increased; the non-assertive tone of the teacher-student interaction remains similar to that before.

Another instance of individual variation on the predominately "teacher structuring" theme is reflected in the following passage:

<u>Passage 4 -- Teacher T-2, CES:</u>

T: Let's go to the top again. Next?

S: (Group) Forty-five!

T: Seven times seven is?

S: (Group) Forty-eight! (Individual) Forty-nine!

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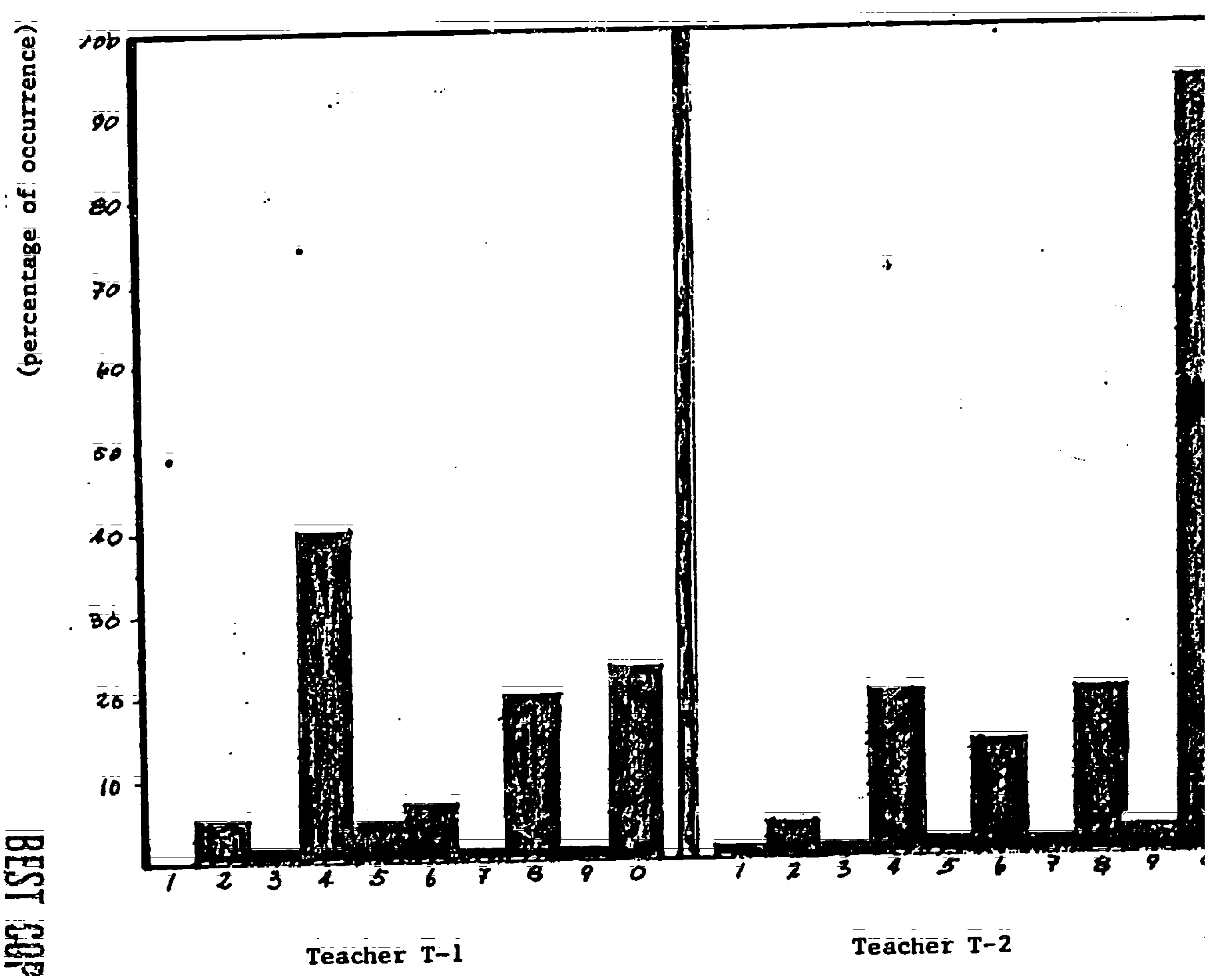
(percentage of occurrence)
100
90
80
70
60
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40
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Teacher T-1
Teacher T-2

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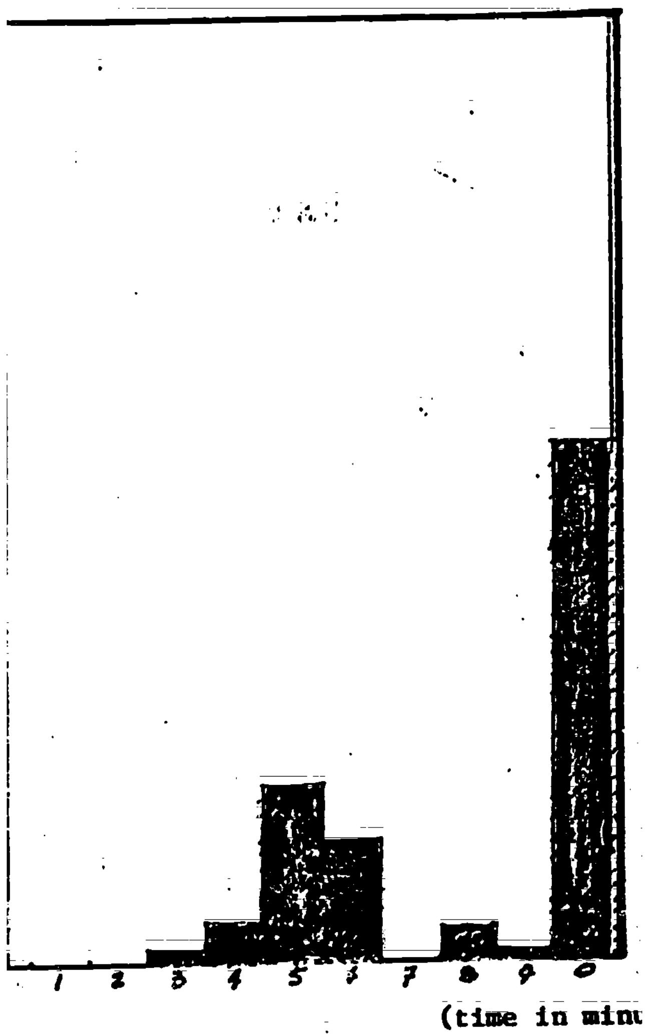


Teacher T-3

T: Seven times seven is forty-nine. Next!

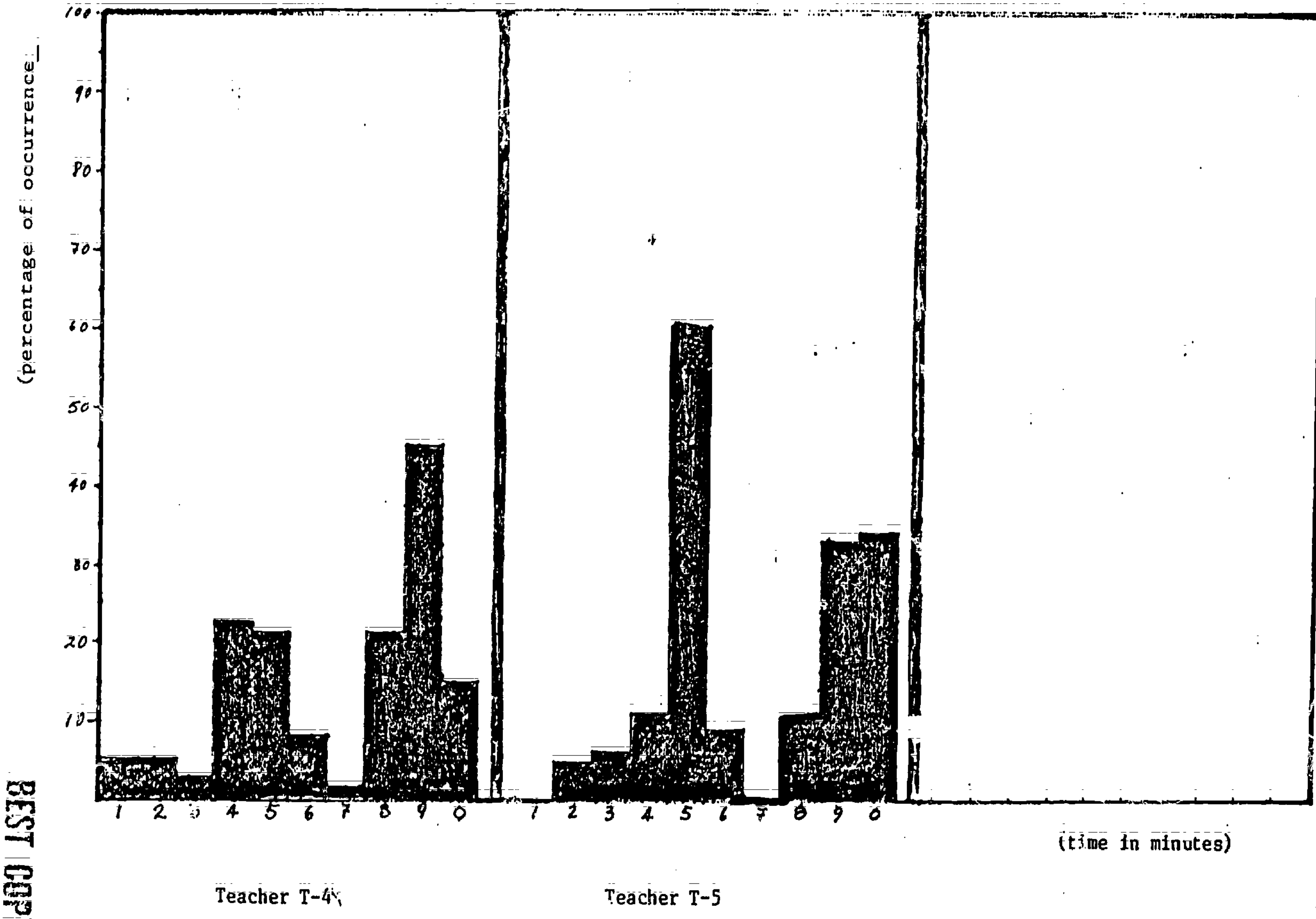
S: (Group) Forty-two!

T: Good --- let's see if we can do it again without having a lot of idiots shouting out!

The passage was audio-recorded during one of the group-general lessons. The teacher was standing at the board, with all members of the class facing him. Multiplication tables are being reviewed. The dialogue speaks for itself. Note the interjection of a "teacher reacting" comment within the otherwise "teacher structuring" mode of the interchange. The comment in the final line is ambiguous out of context; project observations showed that T-2 uses words like "idiot", "numbskull", "dummy", and the like as terms of affection, not derision. Students seem aware of this; none of the students enrolled in this math class and participating in the project interviews had negative things to say regarding this teacher's attitude or behavior towards his students. The same thing unfortunately cannot be reported regarding student reactions to T-3's in-class demeanor.

Another sense of the amount of difference which can be found when comparing individual teacher's classroom styles is seen in the charts on the following pages. Displayed in the bargraphs are percentages of "teacher structuring" moves noted at minute-by-minute intervals over a given ten-minute period of in-class math instruction. The data are presented, merely to show how greatly the use of any one strategy (and in this case, the statistically most favored strategy of all teachers

FLUCTUATING RATES OF TEACHER-STRUCTURING BEHAVIOR



in the sample) can vary over a given period of time. We do want to emphasize that the predominate style of teacher "moves" within all of these classrooms is "teacher structuring" and not "teacher soliciting/responding" as previous studies might otherwise have predicted; be we do not make this point blind to the teachers' use of other "moves" during the math lessons, or to the teachers' abilities to shift between "move" options at various points in the math classes, when student needs, lesson plans, or other considerations required them to.

We might wonder what the students' reactions are to these teacher-centered "moves" and to the instructional sequences which emerge when "moves" like these are made within the classroom. Student response to Kleinfeld's "math class questionaire", described in detail in the preceding chapter, may be re-examined for the light they shed ... this question. The instrument presented a set of st... ents describing possible student attitudes toward their math classes (see the instrument in Appendix for the exact wording of these statements). Students were asked to select between four alternatives — always, most of the time, sometimes, and never, to show how closely they agreed with the comment in each statement. The responses were quantified on a four point scale, scoring "always" as a 3, "most of the time" as a 2, "sometimes" as a 1, and "never" as a 0. The median response for each question, measured in those terms, would be 1.5. Comparing actual responses to the ·dia, and to each other, yields some generalizations about relative student perceptions

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about math class at their school.

Ute student response to eight of the ten questions yielded scores which were above the median suggesting that, in global terms, Ute students:

- like to be in their math classes
- have fun in math class
- receive sufficient help from their math teacher
- always do their best in class
- try to talk in class discussions
- find the other students in the class are friendly.

At the same time, these students, again considered as a general group:

- do not find that the s like the teacher
- are not especially pro to be involved in the class.

The contrasts between these two sets of attitudes may help explain why greatest (an average of 2.8 out of 3.0 as the aggregate score) negative sentiment expressed by the Ute students through this instrument came in response to qusetion 5 -- "I feel like staying away from this class". Review each of the statements reflecting high student agreement against the information we now have regarding class activities during math class meetings, and additional reasons for this sentiment will be clear. The students see themselves trying to function appropriately within the classroom (the self-dependence idea highlighted in the factor analysis is reflected here), yet the structure of the class sessions seems designed totally to downplay personally-based learning initiatives. Group-focused instruction emphasizes the use of collective recitations and dialogues between teacher and students (see passages from T-3 and T-2 cited above). This provides little opportunity for individual students to display individually acquired math knowledge or to receive feedback to build confidence that individually acquired skill have been correctly mastered. The one opportunity through which students can display what their self-dependence has helped them acquire, their seatwork exercises, becomes the one aspect of the math lesson which instructors choose most consistently to devalue.

The Oneida students' responses to this set of questions yield a different patterning altogether. For one thing, only three of the aggregate responses fall above the median; the remainder fall below it and the overall impression those responses give regarding student impressions of math class seems negative at best. Oneida students, according to the responses to the instrument:

- do not like to be in math class
- do not have much fun in math class
- are not especially proud to be in math class
- do not think they do their best in math class
- do not feel that other students in math class are friendly.

Oneida students do, on the other hand:

- feel they get sufficient help from the teacher
- participate in class discussions
- feel that their friends like their math teacher.

As with the Ute students, Oneida students strongly asserted that they, too, often feel like staying away from math class; as before, the responses to this item scored the highest of all responses on the instrument -- 2.4 out of 3.0. Given the number of negative feelings these students direct toward the math class, a forceful reaction to this question is not surprising. Again, when the attitude is viewed holistically, a clearer sense of what is at stake in the attitude is obtained. What is interesting, given the high degree of semantic space between student and school which was highlighted for "math problem" students in the Oneida factor analysis, is the presence of the two positive attitudes. Both of them imply that -- perceived semantic space notwithstanding, students as a group may see themselves able to function on an interpersonal level within the math classroom even if the content of the class setting is not viewed so enthusiastically. Whether this particular combination of responses reflects an attempt to extend the Oneida student "home/family"-centered attitudes revealed to be strongly present within the student sample during the factor analysis, into the interpersonal domain of the school can only be a point of speculation at this time. But it is worth noting that feelings about the family and family support remain an integral part of the attitude configurtaion associated with higher math performance at OTS. Perhaps in this case, as at TES, it is not student-based attitudes, but the context within which students function in terms of those attitudes, which has the more significant hand in determining math achievement.

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Chapter Nine: Conclusions

> It can perhaps be agreed that the learning of arithmetic fundamentals or computational prodecures is much more within the control of the school than is true of arithmetic reasoning. Number combinations have been traditionally taught in schools with the aid of drill procedures. Seldom does a child learn these combinations or routine arithmetic procedures in the home to the same extent as we have pointed out may happen in the case of word meanings. If this is true, then the child with the more culturally sparse home and community background is not at as much of a disadvantage, when his achievement in arithmetic fundamentals is compared with that of other children, as he may be in the case of vocabulary. What, however, of arithmetic reasoning or problem solving? Here quantitative concepts come into play as well as the relationships between factors in a problem. The grasp of such concepts and the understanding of such relationships may be greatly influenced by the child's background experience. For example, one of the items in the arithmetic reasoning section of the elementary battery reads, "Bob paid $2.25 for a new tire, 75 cents for a seat, and 50 cents for paint. He had $4.00 to repair his bicycle. How much did he have left?" It seems likely that the child who owns a bicycle or some other property and has had the responsibility for repairing it out of his own allowance might have an advantage in solving this problem. (Coombs et al., 1958:93)

Using this analysis, Madison Coombs and the other authors of this now classic study of Indian Education, The Indian Child Goes to School, attempted to account for a particular problem in the mathematics education of Indian students as revealed through their comparisons of Indian and non-Indian scores on the California Achievement Test (CAT). Why, these educators wondered, did elementary-school aged Indian students show such "favorable comparisons" with the CAT scores made by Anglo age-equivalents when the Indian students' scores in the area of arithmetic reasoning were so divergent from the Anglo counterparts? As this passage shows, their analysis drew upon contrasts between Indian and Anglo cultural inventories, details of home background, relative richness of available life experiences, and between other details, all in an attempt to explain the evidenced patterning.

Studies, carried out since the completion of the Coombs report in 1955, have found it useful to focus their analysis of Indian student school-related problems on the same set of factors. (See references in Chapter Two of this report.) And to a certain extent, this project also operated in similar terms. We began the analysis by recognizing that Indian students, and specifically Northern Ute and Oneida students, could not be viewed merely as dark-skinned replicas of their Anglo school mates. And, we were prepared to accept the possibility that differences in background might be contributing to student educational (and in specific, student math learning) difficulties in any number of ways. But we were not willing to accept that cultural and sociological differences alone were serving as the sole causes for math-learning and math-avoidance problems. Math skills of the sort discussed by Coombs and of interest to this project, is part of the knowledge which is acquired <u>within</u> the classroom and <u>outside</u> the domain of the home, family, and tribe. Any number of influences <u>in addition to</u> details of student background may be found to be in operation within those classrooms. And it was toward that full range of influences and not just to arbitrarily selected portions of it, that project interests needed to be directed. Hence the reason for the title given to the project -- "Dimensions of Math Avoidance Among American Indian Elementary School Students".

<u>What "dimensions of math avoidance" did we find?</u>

Various chapters in the report have already made individual responses to this question. Here let us highlight only the major themes. Chapter Two's discussion of the linguistic structures underlying counting vocabulary in various Indian languages identified some of the ways in which enumeration, grouping, and other quantitative relationships between objects can be referred to, and presumably conceptualized, within different Indian language traditions. Contrasts between Indian language enumeration and western math are not always self-evident as might otherwise be assumed. The important role played by sentence (syntactic) form as well as sentence semantic (expressive) content in establishing those contrasts cannot be overlooked. Fluency in an Indian language, whether actively or passively maintained, may add its dimension to the math learning process; more importantly, as these contrasts show, the dimension of "linguistic interference" will touch on many issues other than those in the realm of cognitive classification.

The cross-cultural studies in Chapter Three helped to place the linguistic-based contrasts into broader perspective. There it was seen that many of the details which might otherwise be assumed to be "Indian" in basis are characteristics shared by any number of cultures and societies around the world. The design of a tribe's computational system is not the product of the people's historical, geographic, and ecological experiences exclusively. Situational need combines with more general constraints on cultural evolution and development to generate a series of quantitatively based "levels" of mathematical skill.

So the cross-cultural dimension plays a critical limiting role both in math development and math innovation within all societies. Yet, as the analysis showed, the limits which cross-cultural factors impose are not insurmountable ones. A culture's membership at one level does [illegible] skills characteristic of a second level from becoming integrated into the culture's mathematical inventory. But such innovations have to be seen as precisely that -- local level variations on the more predictable, universal pattern. Exposure to influences from outside of the culture (or outside of the "level") may or may not bring about such innovations. So cross-cultural limitations on the design

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of mathematic systems may also contribute to the math-learning process within the classroom; but <u>how</u> they contribute, -- that is, whether they restrict or reinforce the mastery over new computational and reasoning skills -- will depend on any number of factors in addition to the cross-cultural details.

The interaction between teachers' and parental perceptions of education and responsibility for education also contributes heavily to the math learning processes, at least at the two sites where field work was undertaken. Teachers at TES and OTS both observe that the school is an institution <u>different</u> from the home and that the school has its unique responsibilities to play in the overall education of Indian children. Teachers have particular impressions about the content of these home-school differences as well. Unfortunately, these impressions do not always link up with parental perceptions of home-school relationships, nor do they always prove to be empirically accurate when subjected to other, less partisan investigations. Parents at both sites readily admit to a distance-factor, separating home from school. Part of the difference is traced to parental educational experiences, their fear or uneasiness about returning to a school environment, and their recognition that the skills are demands of students today are quite distinct from those in the curriculum when they were students. Part of the difference can also be traced to parental feeling that the school does not want parental "interference" in its activities. Accompanying that is the attitude that the school should not have to rely on parental input; the school, afterall, is the environment where academic skills development is supposed to take place. The home, in contrast, has responsibility for the development of other skills -- cultural, spiritual, linguistic, ecological, and the like, within Indian students.

All of these attitudes jointly contribute to contradictory feelings evidenced in the teacher and parental responses at both research sites. <u>Home/</u>

school, and parent/teacher interface becomes another of the dimensions contributing to math avoidance within our research population, at both sites. Awareness of these cross-currents, and responses which parallel the ambivalence and contradictory attitudes expressed by teachers and parents, also found their way into the comments about school and interest in schooling which students shared with the field teams at both sites. This was particularly the case within the comments of students who scored less satisfactorily on the problem-solving test completed as a part of each student interview. In this way alone, home/school, and parent/teacher interfacing emerges as a critical dimension of math avoidance within the research population.

Mechanical considerations enter in here as well. Descriptions of the way in which math "classes" were managed at each site shed interesting light on student comments about interests in school and in math classes in particular. The situation was perhaps more clearly evidenced within the Ute Student responses. Factor analysis of student interview data generated a profile of attitudes emphasizing student self-dependence, while classroom operations were being managed in ways which minimized all but the most assertive of student expressions for that theme. The mechanics of math instruction as well as attitudinal priorities shared by individual students are also relevant dimensions for this question.

The schooling situations themselves, of course cannot be overlooked. Any number of factors were identified by the field team and recognized by school staff as contributing to the process and to the problem of education at TES and OTS. Budgetary limitations are one such factor; neither TES as a public school, nor OTS, as a contract-funded tribal school, have access to nearly the amount of funding which effective operation of their facilities and programs require. TES is located on the "west side" of the county, far from the county seat, the preferred community for teacher residence, and from the majority of the county's population. All these factors seemingly combine to give TES less than favorable treatment within county educational politics. Over-crowded classrooms and high rates of teacher-turnover each year are only two of the by-products of those details.

OTS has not been immune to the influence of such political deatils either. The school had been in operation for less than a full calendar year at the time of the research. So many of the operating procedures had yet to stabilize and many of the questions for which established schooling programs already have answers (what are the priorities in remediating in-class or schoolyard disciplinary problems?), are only beginning to be raised there. The process of teacher/parent and school/parent interfacing was made more complex as a result of these conditions. At both sites, then, institutional dimensions play their part in structuring, and affecting, the success of classroom instruction.

Why are these "math avoidance" dimensions?

A review of these highlights of the project's findings, may not make it clear why — or rather, what sense, these considerations are said to promote "math avoidance" among the Indian students within the research population. That these factors may lead to problems in Indian education, and in the education of any number of students, regardless of political background, is clear. The math avoidance component of these details may at first seem less evident.

We argue that the identified dimensions are contributing to math avoidance within the two school sites for several reasons. Each of the identified con-

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siderations is already having unmistakable influence on the process of instruction and dynamics of schooling with the TES and OTS classrooms. Instruction in mathematics, as one of the components of the curriculum, cannot help but fall under the influence of these factors. Anecdotes from research team observations combined with comments made during the teacher and parent interviews validate this observation. They notice the troubles these factors create and so do we.

The factor analysis described in Chapter Seven provided any number of specific examples of the ways in which awareness of these considerations have come to be a part of the students attitudes, perceptions, and interests in education and schooling. It is especially significant to note that students who scored poorly on the math problem-solving tests during the student interview were the students whose perceptions about school and interests in schooling most directly reflected those sentiments. This association does not prove that things like parent/teacher interface problems or teacher specific styles of operating or managing their math classes are directly promoting math avoidance. But the existence of an association between lower test scores and more evidenced tendency to express concerns of this sort (either directly, or through patternings revealed when answers to several of the interview questions were compared), combined with the marked decrease in the extent of such associations being evidenced among students with higher math scores, suggests that these considerations are affecting the possibilities for math achievement at some level. It remains, either through reanalysis of student responses on a case-by-case basis, the construction of a broader data base, or through other means, to develop a research agenda which will specify

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the level of that affect and its implications more concretely. Whether these details impact directly on student achievement, or whether they contribute to an attitude about education which itself then impacts negatively on student performance, also needs to be clarified.

The analysis could be challenged for its apparent willingness to use scores on a two-part mathematics test as an index of student math achievement, and to draw conclusions from those scores as to each student's tendency toward "math avoidance" behaviors. This seemed a reasonable decision, given project interests. First, we had a sufficient amount of data on each of the students participating in the interview process to be able to cross-check and see if the relative ranking of his/her score was consistent with other measures of his/her mathematics attainment. (In almost every case they were). We also recognized that both schools used general measures of this sort, when grouping students into "ability levels" for purposes of in-class mathematics instructions. Standardized tests, or equivalent "one-time-only" assessments of student skills and abilities, certainly feed into the evaluation each teacher makes, both consciously and unconsciously, regarding each students' academic ability and academic potential. Our categorization of students as "high" or "low" math achievers based on test scores and anecdotal evidence is consistent with the categorization the students are already receiving within their schools.

We are, then, treating "math avoidance" more as a by-product of some externally-based classification of ability than as a reflection of some empirically "real" condition of skills mastery. The findings of this report leave us with little other alternative, where students from both Tribes are concerned. Data from the classroom observation and from the student

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interviews make it clear that "math avoidance" may refer to a condition evidenced _only_ with regard to math-related activities within school classrooms. Outside those classrooms, student competence in cooking, beadwork, butchering, woodcarving, gardening, and other math-related activities may already have been established and reliance on math skills in those areas may _already_ have been mastered -- "math avoidance" tendencies not withstanding.

It can also be pointed out -- and rightfully -- that almost everyone of the math avoidance "dimensions" summarized in this section could apply just as easily to instruction in language arts, social studies, natural science or elsewhere within the school curriculum. We agree -- and herein lies another of the important findings of this report. Mathematics seem to be a separate and autonomous area for skills development in western society. People speak of "theoretical mathematics" (as contrasted with applied or practical) and solve problems where letters stand for numerals and even the numerals, when introduced, represent quantities or conditions of unspecified segments of reality. The isolation of the problem content in no way inhibits its solution; in some cases, in fact, it may assist it.

Mathematics in Tribal contexts cannot be said to operate in such a contextual vacuum. All of the instances of Tribal, pre-state, or non-western mathematical systems explored in Chapter Three evidenced close connections to functional or practical tasks, In Ute language, in Oneida language, much as in other languages, a perosn does not "count", a person "counts something". Hence, as shown in Capter Two, the frequently encountered presence of different number-words, each to be employed only when particular items are being enumerated.

Carried over into the school and classroom, the implication is clear. If a student's Tribal mathematics background is one which integrates mathematical process with other facets of daily experience, we might expect that the math learning within the school (from the student's point of view at least) also operates in terms of that same, situational integration. Hence conditions which favor math learning should be conditions which favor the acquisition of skills in other content areas. And similarly, the conditions which inhibit math learning, and promote math avoidance, would be expected to cut across the domain of other content areas.

We suggest at this point, much as was noted in the opening comments of this chapter, that previous attempts to study Indian student "math avoidance" have overlooked this issue, and the quality of their research has suffered, accordingly. A search for the conditions which create problems in Indian student math learning had become, in most cases, a search for math-specific variables. Such compartmentalization of topic and content violates the very essence of the holistic organization of all Tribal societies. Whether the subject-by-subject compartmentalization of the classroom can ever be brought in line with the intellectual holism prized by Tribal societies is a topic for continuing debate. Whether researchers should take pains to design research agendas which will not stand at variance with the very conditions they seek to describe is another matter entirely.

Were there any surprises?

Two aspects of our findings produced observations we had not expected to be able to make. Each of these needs to be discussed briefly at this point, both to explain why we expected to see evidence of the condition and why the evidence appears not to have emerged.

First, there is the question of the overlap between math achievement and student traditionalism. Traditionalism (that is, willingness to associate more directly with tradtional, Tribal attitudes and ways of life than with attitudes and activities judged to be more "Western" or "progressive" in basis) has long been assumed to play a critical role in all areas of Indian interaction with non-Indian, surrounding society. Traditionalism is often viewed as a barrier to modernization, especially because of the more conservative mind-set which always seems to accompany traditionalist behavior. So it has seemed reasonable for researchers to use traditionalism, or degrees of traditionalism, as one of the "constants" around which other attitudes toward education, economic development, or other change-related activities can then be measured.

We think it important to note that traditionalism, as measured through student responses to the Ways of Living instrument and through other means, is NOT a relevant variable for determining the incidence of math avoidance within either segment of the research population. Within both student populations, high scorers on the mathematics problem-solving test could include both persons evidencing highly traditional as well as highly "acculturated" attitudes and value orientations. As was discussed in detail in Chapter Seven, students evidencing traditional orientations, especially the stress on self-dependence, might also be associated with low test scores; while students with a less sharply evidenced traditional attitude were less frequently associated with that grouping. So it cannot be said that, within the TES sample, traditionality promotes poor math performance; traditionality is found as part of the configuration of characteristics which accompany poor math performance, but it is also found with part of the configuration accompanying high math performance as well. Aparently traditionality functions as a barrier to students math learning within this population only to the extent that it co-occurs with other, more directly inhibiting variables.

We need to note, to make the summary of findings explicitly accurate, that the conditions just described were evidenced more directly for male Ute students and for female Oneida students. We also need to note that these are precisely the cases where we might have anticipated traditionality, in and of itself, does not function as a barrier to student math learning and math achievement, is underscored more forcefully by that observation.

The comparison of the Ute and Oneida student data on traditionality alludes to the second area of surprising research findings. Numerous sources have discussed the fact that women tend to express math avoidance and math achievement problems with greater, or more pronounced frequencies than do men. We were particularly interested to see what our data would reveal on this issue, given first that we were exploring math avoidance in a Tribal, not state-centered, context; and second, that Oneida traditional culture operated in terms of a strongly evidenced matrilineal, female-focused social institutions.

All Students Factor 2, it will be remembered, showed a low Math score/ attitudinal configuration most sharply evidenced by female students within the population. And in that sense, project data parallel more general observations. But All Student Factor 2 does not take the Tribal variable into account. And when it does, sex remains an adequate predictor of association with low math score only within Oneida student population.

The observations do not refute the more general association linking women and higher tendiencies toward math-related problems. But do remind us that the incidence of this association may vary from one cultural context

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to another. A reported occurrence of difficulties with math learning faced by women in a given society should be thoroughly examined in terms of that social context, and not used uncritically as a basis for more general assertions about biology behavioral potential.

Are there any practical recommendations?

The Math Avoidance Project has several recommendations to make, both for the design of research into Math Avoidance and for the design of programs which are attempting to remediate Indian math avoidance problems.

1. The need for a flexible methodology. The Math Avoidance Project was deliberately designed to draw on any number of strategies for research and analysis. By the time the write-up was completed, project activities had included: linguistic description, linguistic comparisons, general cross-cultural analysis, in-field observation, unstructured interviewing, use of structured elicitation instruments, along with several different forms of computer assisted data management. The data base generated by the project contains quantitative and qualitative data, so quantitative and qualitative research techniques had to be employed to interpret it. A high level of integration between quantitative and qualitative observations provided much of the substance underlying this report.

The decision to employ both sets of data-gathering techniques was made in the light of two facts: First, we wanted to assemble a rich data base to minimize the chance that we would consider only a limited number of the factors favoring math avoidance at the research sites. We selected our field-instruments and designed the in-field activities accordingly. Second, we also knew we had only four weeks for work at each site. And within that timeframe, fieldworkers had to establish credibility, arrange for interviews, conduct in-class observations, administer instruments, and complete the other tasks identified in the field agendas of Chapter Four. So we needed to use data-gathering strategy which was both powerful in scope and manageable in operation. So we decided to let the data-gathering process roam as widely as time would permit, relying on the analysis to generate the necessary linkages between responses and observations within the corpus.

In truth, the amount of information obtained within the field periods overwhelmed us. (This experience has laid to rest in our minds the idea that "scientific research" cannot be conducted with American Indian Tribal communities. See more comments on this, below.) But it also meant that much of the period of time set aside for data analysis had to be directed toward the more preliminary task of data management. At times, this gave project staff the feeling that no patternings within the data could be identified. The delay in preparation of this report, while motivated because of differing considerations, certainly helped add perspective and detachment to the analysis at a time when perspective and detachment were sorely needed.

We would recommend that other fieldworkers seeking to increase our understanding of math avoidance issues, especially as they relate to an American Indian context, adopt a flexible and wide-ranging data-gathering plan. We might not recommend that the focus of the study be as open-ended as was ours. A full sense of context can be maintained even while specific facets of the context are being explored. We would not, for reasons detailed in this chapter, recommend that researchers focus exclusively on single math avoidance "causes", nor would we recommend that researchers base their analyses on data gathered strictly through questionnaires, through observations, or home interviewing. This report has shown the importance of gathering, analyzing and coordinating data from a variety of sources and through a variety of formats. We would recommend that that kind of methodological holism -- a greatly expanded form of Cicourel's "indefinite triangulation" -- be the minimum standard for any research project seeking accurately to explore math avoidance conditions for any population.

2. The importance of the Tribal connection. This point need not be belabored. The kind of holistic perspective alluded to in the preceding paragraph cannot be constructed within an Indian community, unless the Tribal government or other community authority is aware of and is openly supportive of that effort. We merely note that the present project was fortunate to have Tribal endorsement at both research sites; and we leave to others to decide to what extent the access and cooperation extended to us because of those endorsements impacted on the quality of the research findings.

3. The need for increased staff knowledge about Tribal culture and increased parental understanding of the "truth" about schooling. Both ideas go together; the distance between home and school evidenced at both sites needs to be addressed from both ends. Ideally, Tribal government can play a critical role in mediating the information "flow" to both parties. And they should. It is unrealistic to expect that school staff or parents will be able to develop common educational goals and then work collectively to implement them, if the foundation of understanding out of which those goals can be developed

has not first been created. Chapters Five and Six speak directly to the urgency of this issue.

4. <u>The Question of classroom management</u>. Interests in remediating Indian student math problems runs high within most reservation communities and on-reservation schools. And there have been numerous strategies developed and marketed in recent years in response to those needs and those interests.

The findings of this project make it clear that addition of a native language mathematics component to the school curriculum, introduction of computer facilities or hand-held calculators into the classroom, purchase of materials to make abstract concepts more "tangible", and the like may be useful additions to the students' educational experiences at both sites. However these innovations, as attractive as they may initially seem, will not necessarily address what emerges as fundamental issues in math instruction as it occurs within these classrooms. They will do little, for example, to help bring Ute students' orientation toward self-dependence into closer harmony with the teacher's style of classroom management and with the friction which emerges when self-dependence and management style coincide.

The fact is, of course, such innovations could do much to help integrate the two perspectives. Computers could provide ample opportunity for self-dependence to be asserted, cultivated, and rewarded -- if they had been purchased, and now are being used as part of activities which are designed to address that goal.

We are not recommending that the whole of the math curriculum at TES or OTS be revamped to acknowledge the Indian background and Indian interest of the students. School-math contains western-oriented cultural concepts and has to be mastered in terms of its western conceptual orientation. There is a way to draw on the skills, interests and attitudes which the student already possesses, and then to use those skills, interests and attitudes as foundation for developing student mastery over the more western oriented concepts expected by the school program. This can happen only after the school becomes fully aware of the skills, interests and attitudes which the Indian students are bringing into the classroom. And to the extent that further studies of Indian Math Avoidance can help us better understand those skills, interests and attitudes, further studies of Indian math avoidance will clearly be in the best interests of the Tribes.

APPENDIX I : Consent Forms

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Points of agreement between the Math Avoidance Project and the Vernal School District

1. The on-site research will be carried out during the period January 3 - January 30, 1980, at Todd Elementary School, Fort Duchesne, Utah.

2. J.D. Smith, principal of Todd Elementary School, will serve as liason between the school board and the project staff. William L. Leap will be the contact person within the project staff.

3. Project staff will be given permission to sit in on and observe third and fourth grade classes during the designated on-site period and discuss observations with teachers and students. Tape recordings of mathematics lessons, and of discussions of math-related issues with individual students, may also be made during that time. Parental informed consent will be obtained prior to the time of the tape-recording.

4. The School Board, or its delegate, will be given opportunity to review all interim reports prepared for submission to the NIE and to suggest additions and modifications to the arguments. Project staff agrees to incorporate those suggestions into the report, or to indicate the areas of concern to NIE in a separate, appended document.

5. Project staff will make a formal presentation of project findings to the faculty and staff of Todd Elementary School before the final report is submitted to the NIE faculty and staff. Todd Elementary faculty and staff will have opportunity to ask questions and comment on the report, its conclusions, and its recommendations; project staff agrees to incorporate indicated concerns into the final report or to indicate those concerns to the NIE in a separate, appended document.

For the_______ School District	date	William Leap, Director Math Avoidance Project	date

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"Math Avoidance Project"

Parental Informed Consent Statement

One of the problems facing Indian children when they go through school is that they often find mathematics a difficult subject to learn. No one is sure why this problem arises, though its result — school leaving, avoidance of "hard science" courses in high school or of career training in technical fields, are familiar to parents, teachers and tribal authorities alike.

We have been funded by the National Institute of Education to try and shed some light upon this problem. We hope, through our research this year, to be able to identify some of the factors which give rise to the "math avoidance" problem in the Indian elementary school classroom. We are working in full cooperation with the Education Division of the Ute tribe and have also received endorsement of the tribe's Business Committee. But to make this project truly successful, we need your cooperation as well.

During part of the research period this year, we need to have a member of the research team sit in on and observe third and fourth grade classroom activities at Todd Elementary School. We have tentatively scheduled four weeks for these observations. And, during that time, we need to tape-record several of the mathematics lessons in those classrooms so we can have an accurate record of the formal steps through which the students learn mathematical skills. We will want to talk with Ute students who are in those classes, to gain their perspective on math-learning and the strengths and weaknesses they have in these areas. We will be talking with the teachers and other school personnel, and we will also want to get your views on these subjects, as well.

The project recognizes that portions of this research activity could, if improperly handled, create embarassment or otherwise reflect improperly on you, members of your family, other students, school personnel, and the Ute tribe as a whole. Several safeguards are being taken to prevent this from happening. All tapes, field notes and analyses will be kept strictly confidential. Discussion will not identify students, parents or teachers by name or through any other individualized reference. The information gathered in this study will be analyzed solely for educational research purposes, and will not be used to assess the professional or personal competence of any person interviewed during the course of this research. At the conclusion of this project, all tape recorded materials will be turned over to the Division of Education for safekeeping. Access to the tapes will in future years be restricted solely to educational research purposes. Use of the tapes for evaluation of the competencies of the teachers, parents, or student, or for any other such purpose, will again not be permitted.

The Division of Education will review and approve all reports on the progress of the research before they are submitted to the NIE. Tribal and school authorities will receive a thorough briefing about project conclusions and recommendations, and have a chance to ask questions about those conclusions and recommendations, before the final report on the research effort is prepared.

Participation in this study is strictly voluntary and you and your children may choose to withdraw from project activities at any time.

If you are willing to lend your support to this study, we ask you to sign your name on the line below, date your signature, and return the letter to project staff. Signing this statement indicates that you are familiar with the goals and purposes of this project and that you consent to cooperate with the project staff and the Division of Education in addressing them.

Should you have any questions, whether now or at some later time, please contact Forrest Cuch, director of the Division of Education. He has been designated by the Business Committee to serve as tribal liason for this project.

Sincerely,

William Leap, Director
Math Avoidance Project
American University
Washington, D.C.

I hereby give my informed consent participation, and that of my children, in the Math Avoidance project.

SIGNATURE DATE

"Math avoidance" Project

Teachers' Informed Consent Statement

One of the problems facing Indian children when they go through school is that they often find mathematics a difficult subject to learn. No one is sure why this problem arises, though the results of the problem — school leaving, avoidance of "hard science" courses or of career training in the later years, and the like, are familiar to parents, teachers, and tribal authorities alike.

We have been funded by the National Institute of Education to try and shed some light on this problem. We hope, through our research, to be able to identify some of the factors which lead to the "math avoidance" problem in the Indian elementary school classroom. We are working in full cooperation with the Ute tribe's Education Division and have also received the endorsement of the tribe's Business Committee. But to make the project truly successful, we need your cooperation as well.

During part of the research period this year, we need to have a member of the research team sit in on and observe third and fourth grade classroom activities at Todd Elementary School. We have tentatively scheduled four weeks of such observations. And, during that time, we need to tape-record several of the mathematics lessons so we can have an accurate record of the formal steps through which the students learn math skills. We will want to talk with Ute students in those classes, to gain their perspective on math-learning process and their comments on the problems they may be having in these areas. We will plan to talk with parents and community members on these points. And we will want to get your views on these topics as well, particularly to make certain that your concerns about the "math avoidance problem" and the strategies you use to remediate this problem are integrated into our research findings and recommendations.

The project recognizes that portions of this research activity could, if improperly handled, create personal embarrassment or otherwise reflect inappropriately on you and your position within the public schooling program. Several safeguards are being taken to prevent this from happening. All tapes, field notes, and analyses will be kept strictly confidential. Discussions will be turned over to the Division of Education for safekeeping. Access to the tapes in future years will be restricted solely to educational research purposes. Use of the tapes for any evaluation of professional skill or personal competence at any future time will likewise be prohibited.

Participation in this study is strictly voluntary. We recognize that you are under no obligation to allow data gathering to go on within your classroom; nor are you obligated to agree to be interviewed by project staff.

If you are willing to lend your support to this study, we ask you to sign your name on the line below, date your signature, and return the letter to project staff. Signing this statement indicates that you are familiar with the goals and purposes of the project and that you consent to cooperate with project staff in addressing them.

Should you have any questions, either now or at some later stage in the project, please contact Forrest Cuch, director of the Ute Tribe's Division of Education. He has been designated by the Business Committee to serve as tribal liason for this project.

Sincerely,

William L. Leap
The American University
Washington, D.C.

I hereby give my informed consent to participation in the Math Aviodance Project.

SIGNATURE DATE

Points of agreement between the Math Avoidance Project and the Oneida Tribal School.

1. The on-site research will be carried out during the period May 14 - June 12, 1980, at Oneida Tribal School, Oneida, Wisconsin.

2. Jerry Hill will serve as liason between the school board and the project staff. William L. Leap will be the contact person within the project staff.

3. Project staff will be given permission to sit in on and observe third and fourth grade classes during the designated on-site period and discuss observations with teachers and students. Tape recordings of mathematics lessons, and of discussions of math-related issues with individual students, may also be made during that time. Parental informed consent will be obtained prior to the time of the tape-recording.

4. The School Board, or its delegate, will be given opportunity to review all interim reports prepared for submission to the NIE and to suggest additions and modifications to the arguments. Project staff agrees to incorporate those suggestions into the report, or to indicate the areas of concern to NIE in a separate, appended document.

5. Project staff will make a formal presentation of project findings to the faculty and staff of Oneida Tribal School before the final report is submitted to the NIE faculty and staff. Faculty and staff will have opportunity to ask questions and comment on the report, its conclusions, and its recommendations; project staff agrees to incorporate indicated concerns into the final report or to indicate those concerns to the NIE in a separate, appended document.

SCHOOL REPRESENTATIVE	DATE	WILLIAM L. LEAP Math Avoidance Project	DATE

"Math avoidance" Project

Teachers' Informed Consent Statement

One of the problems facing Indian children when they go through school is that they often find mathematics a difficult subject to learn. No one is sure why this problem arises, though the results of the problem -- school leaving, avoidance of "hard science" courses or of career training in the later years, and the like, are familiar to parents, teachers, and tribal authorities alike.

We have been funded by the National Institute of Education to try and shed some light on this problem. We hope, through our research, to be able to identify some of the factors which lead to the "math avoidance" problem in the Indian elementary school classroom. We are working in full cooperation with the Oneida Tribal School and have also received the endorsement of the tribe's Business Committee. But to make the project truly successful, we need your cooperation as well.

During part of the research period this year, we need to have a member of the research team sit in on and observe third and fourth grade classroom activities at Oneida Tribal School. We have tentatively scheduled four weeks of such observations. And, during that time, we need to tape-record several of the mathematics lessons so we can have an accurate record of the formal steps through which the students learn math skills. We will want to talk with Oneida students in those classes, to gain their perspective on math-learning process and their comments on the problems they may be having in these areas. We will plan to talk with parents and community members on these points. And we will want to get your views on these topics as well, particularly to make certain that your concerns about the "math avoidance problem" and the strategies you use to remediate this problem are integrated into our research findings and recommendations.

The project recognizes that portions of this research activity could, if improperly handled, create personal embarrassment or otherwise reflect inappropriately on you and your position within the public schooling program. Several safeguards are being taken to prevent this from happening. All tapes, field notes, and analyses will be kept strictly confidential. Discussions will be turned over to the Division of Education for safekeeping. Access to the tapes in future years will be restricted solely to educational research purposes. Use of the tapes for any evaluation of professional skill or personal competence at any future time will likewise be prohibited.

Participation in this study is strictly voluntary. We recognize that you are under no obligation to allow data gathering to go on within your classroom; nor are you obligated to agree to be interviewed by project staff.

If you are willing to lend your support to this study, we ask you to sign you name on the line below, date your signature, and return the

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letter to project staff. Signing this statement indicates that you are familiar with the goals and purposes of the project and that you consent to cooperate with project staff in addressing them.

Should you have any questions, either now or at some later stage in the project, please contact Jerry Hill who has agreed to serve as tribal liason for this project.

Sincerely,

William L. Leap
The American University
Washington, D.C.

I hereby give my informed consent to participation in the Math Avoidance Project.

SIGNATURE DATE

"Math Avoidance Project"

Parental Informed Consent Statement

One of the problems facing Indian children when they go through school is that they often find mathematics a difficult subject to learn. No one is sure why this problem arises, though its result -- school leaving, avoidance of "hard science" courses in high school or of career training in technical fields, are familiar to parents, teachers and tribal authorities alike.

We have been funded by the National Institute of Education to try and shed some light upon this problem. We hope, through our research this year, to be able to identify some of the factors which give rise to the "math avoidance" problem in the Indian elementary school classroom. We are working in full cooperation with the Oneida Tribal School. But to make this project truly successful, we need your cooperation as well.

During part of the research period this year, we need to have a member of the research team sit in on and observe third and fourth grade classroom activities at the School. We have tentatively scheduled four weeks for these observations. And, during that time, we need to tape-record several of the mathematics lessons in those classrooms so we can have an accurate record of the formal steps through which the students learn mathematical skills. We will want to talk with Oneida students who are in those classes, to gain their perspective on math-learning and the strengths and weaknesses they have in these areas. We will be talking with the teachers and other school personnel, and we will also want to get your views on these subjects, as well.

The project recognizes that portions of this research activity could, if improperly handled, create embarassment or otherwise reflect improperly on you, members of your family, other students, school personnel, and the Oneida tribe as a whole. Several safeguards are being taken to prevent this from happening. All tapes, field notes and analyses will be kept strictly confidential. Discussion will not identify students, parents or teachers by name or through any other individualized reference. The information gathered in this study will be analyzed solely for education research purposes, and will not be used to assess the professional or personal competence of any person interviewed during the course of this research. At the conclusion of this project, all tape-recorded materials will be turned over to the Division of Education for safekeeping. Access to the tapes will in future years be restricted solely to educational research purposes. Use of the tapes for evaluation of the competencies of the teachers, parents, or student, or for any other such purpose, will again not be permitted.

The Division of Education will review and approve all reports on the progress of the research before they are submitted to the NIE. Tribal and school authorities will receive a thorough briefing about project conclusions and recommendations, and have a chance to ask questions about those conclusions and recommendations, before the final report on the research effort is prepared.

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Should you have any questions, whether now or at some later time, please contact Jerry Hill who has agreed to serve as tribal liason for this project.

Sincerely,

William L. Leap
Math Avoidance Project
The American University
Washington, D.C.

I hereby give my informed consent participation, and that of my children, in the Math Avoidance Project.

SIGNATURE DATE

APPENDIX II : Field Instruments

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TEACHER INVENTORY

In the following questionnaire a number of statements about teaching are presented. Our purpose is to gather information about the attitudes of educators concerning these statements. Many of the statements are of such a nature that there are no correct or incorrect answers. We are interested only in your frank opinion of them.

Your responses will remain confidential, and no individual will be named in the report of this study. Your cooperation is greatly appreciated.

I. Check the <u>one</u> statement in each column which is nearest your own and your school's policy with respect to Indian education. Check <u>only one</u> statement in each column.

	OWN OPINION	SCHOOL'S
1. Orient the Indian student to slowly lose identification with his tribal heritage to assume adaptation to the dominant society.	___	___
2. Orient the Indian students to respect their Indian culture, yet to change predominantly toward the dominant society.	___	___
3. Orient the Indian students to combine their Indian culture and the ways of the dominant society.	___	___
4. Orient the Indian students to accept some aspects of the dominant society but to remain predominantly identified with their Indian culture.	___	___

TEACHER INVENTORY

1. When and why did you first become interested in education?

2. How do you define Indian education?

3. What are the goals of Indian education for your school?

To what extent are they being achieved?

4. What are the major problems in educating Indian children in your school?

5. Are these problems different from the problems of non-Indian students in your school?

6. How can the problems in educating Indian children in your school be solved?

7. Do economic, social, and political conditions in your community affect the education of Indian children? ____Yes ____No ____Don't know (If yes) In what way?

8. Who are the people in your district who make decisions about educational programs for your school?

9. Are there other people who could be included in making these decisons? ____Yes ____No

Who are these people?

10. What organizations in your community are working for the improvement of the education of Indian children?

11. Specifically, what are these organizations doing?

12. Do fa ulty members participate in the following activities:

a) Assisting in the interviewing and selecting of the teaching staff? ____Yes ____No

b) Determination of the content of the curriculum? ____Yes ____

c) The determination of such school policies as attendance, enrollment, school calendar? ____Yes ____No

d) Attendance at school-community meetings sponsored by school and community organizations? ____Yes ____No

e) Mention any other activities of the faculty in relation to the school and community.

13. Should Indian language be included in the school curriculum?
____Yes ____No ____Don't know (If yes) In what grade and how

14. Do you think having more Indian teachers on the faculty would improve the educational achievements of Indian students?
____Yes ____No Please explain:

15. Does the present education of Indian children in your school equip them to be successful students now and in the future?
____Yes ____No (If no) What changes are necessary to allow Indian students to be successful students?

PARENT OR GUARDIAN INVENTORY

Name of your community school____________________

Relationship to student(s)____________________

Tribal Membership____________________

Occupation____________________

I. Attitudes toward the school

1. What do you like about the school your child attends?

2. What don't you like about the school your child attends?

II. Curriculum

1. What should your child learn in school that he/she is not now learning?

2. What kinds of things about ~~your~~ the tribe do you think your child should learn in school?

3. Does your school presently offer a bi-lingual program?

4. Do you see a need for a bi-lingual program at your school?

5. Do the classes offered at your school prepare students for their future education and/or work?

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II. Curriculum (continued)

6. What things can teachers do to help your child become a better student?

7. In your view, do the school activities other than classes meet the needs of your child?

8. Are there any other school activities which you think should be provided for your child?

9. As a parent, how does the school involve you in your child's education?

10. How does your school inform you about the classes and activities your child is involved in?

11. Are parents able to participate in making decisions about school programs which affect their children?

II. Curriculum (Continued)

12. How are parents included in decision making?

13. What programs does the school provide for adults?

14. What programs would you like the school to provide for adults of the community?

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PARENT INVENTORY

INSTRUCTIONS:

1. Do not sign your name.
2. Please indicate the extent to which you agree with the following sentences by checking (X) one of the following choices:

    (Y) yes, (MY) Maybe yes, (MN) Maybe no, (N) no.

PLEASE CHECK ONE

Example:	Y	MY	MN	N
You really agree that: I want my child to get a good education.	X			
1. I feel comfortable when I go to the school.				
2. I think I know what type of education my child needs.				
3. I enjoy talking to school teachers.				
4. Teachers are interested in what I think.				
5. I really don't like to go to the school building.				
6. I can make the school better for my child.				
7. When my child gets into trouble at school he is generally wrong.				
8. I think school teachers are doing a good job.				
9. I'd get more involved in school if I knew how to help.				
10. Parents working together can help our children get a good education.				
1. The school is not doing what it should for my child.				
2. I can help my child stay in school.				
3. My child tells me what he learns in school.				
4. My child listens to me.				
5. My child has to go to school, even if he doesn't want to.				
6. Whenever my child has problems in school, I'm the last to know.				
7. I don't know what to tell my child about why he should go to school.				
8. I would like to learn how I can help my child do well in school.				

9. I've been to ________________ school meetings last year.

0. Last year I visited the school principal or my child's teacher(s) ____________ times.

. If I had to blame someone for my child not doing well in school, I would blame: my child; the principal; the school; myself; other__________________________.

Addendum to parental questionnaire:

Let me ask you some questions about your involvement and interaction with the school:

1. Is there a Parent-teacher association or group like that at the school ?
2. Do you attend the meetings ? Why or why not ?
3. Have you ever had a conference with your child's teacher ? For what reasons ? Were math-related issues ever discussed at those meetings ?
4. Does your child ever make comments about school, his day at school, or about the effectiveness of the learning experience there ? What is your reaction when he makes these comment: does he know what he is saying ? Is he just complaining, or what ?
5. Overall, do you feel comfortable witb the school and the work it is doing ? Why or why not ?

Lett me ask a few questions about homework :

6. Does the teacher assign homework for the students to complete ? Is math homework ever assigned ? How much and how often ? (If no, go to 10
7. Do you help your child with his homework ? His math homework ?
8. If you cannot hlp your child, who will ? Other adults in the home ? A neighbor ?
9. Do your children ever help each other with their homework assignments ?

And here are some additional questions:

10. How much education do you want your children to have ? Is high school enough ? What about college ?
11. After your child com pletes junior high school, do you want him to continue schooling : ___ at a public school in Roosvelt ? ___ at public school in Vernal; ___ at BIA boarding school ? ___ at Wasatch Academy or some private school ? ___ some other option ? Explain.
12. Does your child attend school regularly ? Do you think he should go every day ? What reasons might he give for not going ? How many of those would you accept ?
13. What do you think is the best way for a child to learn : ___ to be told, in detail, once ; ___ to be told several times; ___ to watch someone else ; ___ to read about it in a book ?
14. Do you ever tell stories to your children ? Are these ever stories you remember hearing when you were a child ?

15. What happens if you face a problem with your child's education which you cannot solve: whom do you turn to for advice?
16. Do you have contact with the tribe's Division of Education? For any particular reasons?
17. Have you ever felt that mathematics was a particular problem-area for Ute/Oneida children in general? For your own child?
18 Has a teacher or school official ever told you that your child is not doing well in mathematics? What did the person propose doing about this?
19. Do you keep any numerical records at home? Any crafts, hobbies, or other which directly use mathematical concepts and principles?
20. How important do you think math is, for young people? Do you find a need for math during the day? Have you ever felt that you needed to know more math to be able to do a job well? Do you foresee this as a problem for your children?

STUDENT INTERVIEW

I. Name of school

Age

Tribe

Sex: Male_____ Female_____

Residence: (With whom and where do you live?)

Grade in school

How long in this school?

How many schools have you attended before coming to this school?

- 1 -

STUDENT INTERVIEW

II. Influential persons

1. What do you usually do with your time after school?

2. Do you have friends at school?

   How are your friends helpful to you in school?

3. Do you have teachers in school who are your friends?

4. Are there any other persons in school or outside of school who influence your feelings about school?

   What *roles do they have? (Such as relatives, teacher-aides, cooks, bus dirvers)?

5. Are there any persons in school or out of school who discourage you from doing well in school?

III. Parents

1. Do your parents ever visit the school?
   How often?

2. For what reasons do your parents visit the school?

3. What do your parents say about the staff at school?

4. What do your parents say about the school curriculum?

(*Who are they? What do they do? Explain with examples.)

STUDENT INTERVIEW

IV. Language and Culture

1. Do you speak any Indian language?

2. Does anyone else at school speak an Indian language? If so, who?

3. Would you like an Indian language taught in your school?

4. What kinds of things would you like to learn about your tribe?

5. Where can these best be learned?

V. Curriculum

1. What would you do with your time if you were not in school?

2. Do you have a choice in the classes you take?

3. What classes do you like?

4. Why do you like them?

5. What classes are not helpful to you?

6. If you see any relationship between your present education in school and your future plans, what is it?

7. Other than classes, are there school activities in which you participate?

8. What do you need to know other than what you learn in school?

9. What things can teachers do to help you become a better student?

10. Are you able to participate in making decisions about school programs which affect students?

11. How are students included in decision making? 309 TGC 1b

Last name	First name	Grade	Date of Test	Date of Birth

NUMBER SURVEY

DIRECTIONS: Write the answers to these questions in the blanks. Answers

1. Count these crosses with your finger and write the number here .... ______

   X X X X X X X X X

2. If you take away one of these crosses, how many crosses will be left? ______
3. If you take away two more of these crosses, how many will be left? ______
4. If you cut an apple in half, how many pieces will you have? ______
5. Billy had 4 pennies and his father gave him 2 more. How many pennies did he have altogether? ______
6. Tom had 8 marbles and he bought 6 more. How many marbles did he have altogether? ______
7. A boy had 12 newspapers and he sold 5 of them. How many did he have left? ______
8. At 7¢ each, what will 3 oranges cost? ______
9. A milkman had 25 bottles of milk and sold 11 of them. How many bottles did he have left? ______
10. Four boys had 72 pennies which they divided equally among themselves. How many pennies did each boy get? ______
11. If a boy was paid $4 a day for working in a store, how many days would he have to work to earn $36? ______
12. If oranges cost 30¢ a dozen and you buy 3 dozen of them, how much change should you get back from $1.00? ______
13. 36 is two-thirds of what number? ______
14. If 3 pencils cost 5¢, what will it cost you to buy 24 pencils? ______
15. If a taxi charges 20¢ for the first quarter mile and 5¢ for each quarter mile thereafter, what will be the fare for a two-mile trip? ______
16. Jones and Smith start to play cards with $27 each. They agree that at the end of each game the winner will get one-third of the money which the loser has in his possession. Jones wins three games in a row. How much money does Smith have left at the beginning of the fourth game? ______

DIRECTIONS: Write the answers to all of these problems that you can solve.

(Add) 2 3	(Add) 4 3 6	(Subtract) 6 - 3	(Subtract) 14 - 8	(Add) 234 461 925
(Subtract) 322 - 154	(Multiply) 8 X 3	(Multiply) 204 X 7	(Divide) 3) 12	(Divide) 4) 492
(Divide) 7) 65	(Multiply) 23 X 9	(Subtract) 4203 - 3705	(Multiply) 37 - 86	(Divide) 26) 1326
(Add) 10 2½	(Add) 1/6 1/2	(Subtract) 3½ - 2	(Subtract) 7 - 5 1/3	(Add) 1/3 1/4 5/6
(Add) 192 5/6 21 1/3	(Multiply) 27 X 2 1/3	(Multiply) 2/3 X 3/4 =	(Divide) 3/4 1/2 =	(Multiply) 39 X .04
(Add) .26 .2 4.936	(Divide) 8) 2.48	(Divide) .002) 90.12	(Multiply) 32.1 X 1.97	Write 3/4 as a decimal fraction.

Name ____________________

WAYS OF LIVING *

It is important:

____ not to run away from difficult things you're asked to do

____ to get along well with people

____ to show you are no better than other people

____ to be free so that no one can tell you what to do

____ to make money so you can buy lots of things

____ to give other people what they need

____ to be efficient and practical in everything you do

____ to take from nature whatever you want, whenever you want it

____ to work hard and be industrious so people will respect you

____ to be able to tell other people what to do

____ to act smarter than other people

____ to work hard and achieve so that everyone can live better

____ to know and understand the ways of nature

____ to make up your own mind about things

____ to judge other people for what they are worth

____ to be quiet while others are talking

____ to be respected for what you know

____ to be respected for what you have

____ to know when to take advice

____ to never let your family or friends down

* Used at Todd Elementary School and Oneida Tribal School

Name ______________________

WAYS OF LIVING - II*

It is important to:

- ____ share what you have with others
- ____ never tell anyone else how to live their life
- ____ never waste a thing
- ____ save for today because you never know what might happen tomorrow
- ____ never take advantage of other people
- ____ clean up after other peoples' messes
- ____ always remember to return favors people do for you
- ____ look out for yourself above everything else
- ____ help others when they need it
- ____ insist on getting what is coming to you
- ____ pay attention to the smallest details, no matter how insignificant they seem
- ____ never worry about getting things exactly right
- ____ let the future take care of itself
- ____ avoid getting into fights over unimportant things
- ____ never deny yourself whatever you want

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* Used at Oneida Tribal School only

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STUDENT INVENTORY

GRADE________ AGE________ SEX________ SCHOOL________

Please mark each sentence in the following way:

If the sentence describes how you usually feel, put a check ( ) in the column, "Like Me".

If the sentence does not describe how you usually feel, put a check ( ) in the column, "Not Like Me". REMEMBER, there are no right or wrong answers.

	THIS IS: LIKE ME	NOT LIKE ME
1. I think I'm as good as everybody else.	____	____
2. I usually do the wrong things.	____	____
3. Things often bother me.	____	____
4. I am much like other people.	____	____
5. I find it hard to talk in front of the class.	____	____
6. I do all right in school.	____	____
7. No one pays much attention to me at home.	____	____
8. I often feel left out of things that are going on around here.	____	____
9. There are many times that I'd like to leave school.	____	____
10. I am usually able to get the things I need by myself.	____	____
11. No one pays much attention to me at school.	____	____
12. Kids usually pick on me.	____	____
13. There are many times I'd like to leave home.	____	____
14. I can make up my mind without too much trouble.	____	____
15. I think most people understand the way I feel about things.	____	____
16. Others have to help me in the things I need.	____	____
17. I usually do what my parents want me to do.	____	____
18. I have trouble making up my mind.	____	____
19. My parents expect too much of me.	____	____
I usually do the right thing.	____	____

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MY FAMILY

	VERY—	IRLY—	WHAT—	OME-WHAT	OME— IRLY—	VERY	
good	O	O	o	o	O	O	bad
worthless	O	O	o	o	O	O	valuable
weak	O	O	o	o	O	O	strong
happy	O	O	o	o	O	O	unhappy
lazy	O	O	o	o	O	O	active
smart	O	O	o	o	O	O	dumb
friendly	O	O	o	o	O	O	unfriendly

MY FUTURE

	VERY—	RLY—	HAT—	OME-WHAT	OME—	IRLY—	VERY
good	O	O	o	o	O	O	bad
worthless	O	O	o	o	O	O	valuable
weak	O	O	o	o	O	O	strong
happy	O	O	o	o	O	O	unhappy
lazy	O	O	o	o	O	O	active
smart	O	O	o	o	O	O	dumb
friendly	O	O	o	o	O	O	unfriendly

INDIANS

good	O	O	o	o	O	O	bad
worthless	O	O	o	o	O	O	valuable
weak	O	O	o	o	O	O	strong
happy	O	O	o	o	O	O	unhappy
lazy	O	O	o	o	O	O	active
smart	O	O	o	o	O	O	dumb
friendly	O	O	o	o	O	O	unfriendly

MY SCHOOL CLASSES

good	O	O	o	o	O	O	bad
worthless	O	O	o	o	O	O	valuable
weak	O	O	o	o	O	O	strong
happy	O	O	o	o	O	O	unhappy
lazy	O	O	o	o	O	O	active
smart	O	O	o	o	O	O	dumb
friendly	O	O	o	o	O	O	unfriendly

MY TEACHERS

good	O	O	o	o	O	O	bad
worthless	O	O	o	o	O	O	valuable
weak	O	O	o	o	O	O	strong
happy	O	O	o	o	O	O	unhappy
lazy	O	O	o	o	O	O	active
smart	O	O	o	o	O	O	dumb
riendly	O	O	o	o	O	O	unfriendly

MY TRIBE'S WAY OF LIFE

good	O	O	o	o	O	O	bad
worthless	O	O	o	o	O	O	valuable
weak	O	O	o	o	O	O	strong
happy	O	O	o	o	O	O	unhappy
lazy	O	O	o	o	O	O	active
smart	O	O	o	o	O	O	dumb
friendly	O	O	o	o	O	O	unfriendly

MY HOME

good	O	O	o	o	O	O	bad
worthless	O	O	o	o	O	O	valuable
weak	O	O	o	o	O	O	strong
happy	O	O	o	o	O	O	unhappy
lazy	O	O	o	o	O	O	active
smart	O	O	o	o	O	O	dumb
friendly	O	O	o	o	O	O	unfriendly

MYSELF

good	O	O	o	o	O	O	bad
worthless	O	O	o	o	O	O	valuable
weak	O	O	o	o	O	O	strong
happy	O	O	o	o	O	O	unhappy
lazy	O	O	o	o	O	O	active
smart	O	O	o	o	O	O	dumb
friendly	O	O	o	o	O	O	unfriendly

MY FRIENDS

good	O	O	o	o	O	O	bad
worthless	O	O	o	o	O	O	valuable
weak	O	O	o	o	O	O	strong
happy	O	O	o	o	O	O	unhappy
lazy	O	O	o	o	O	O	active
smart	O	O	o	o	O	O	dumb
friendly	O	O	o	o	O	O	unfriendly

Semantic Differential Categories

____

NAME

Semantic Differential Scoresheet

GOOD	/_______/_______/_______/_______/_______/_______/_______/	BAD
WORTHLESS	/_______/_______/_______/_______/_______/_______/_______/	VALUABLE
WEAK	/_______/_______/_______/_______/_______/_______/_______/	STRONG
HAPPY	/_______/_______/_______/_______/_______/_______/_______/	SAD
LAZY	/_______/_______/_______/_______/_______/_______/_______/	ACTIVE
SMART	/_______/_______/_______/_______/_______/_______/_______/	DUMB
FRIENDLY	/_______/_______/_______/_______/_______/_______/_______/	UNFRIENDLY

APPENDIX III: Tabulations of Students' Responses to the Field Instruments

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MPORT						
OT IM	IMPORT	NOT IM	NOT IM			
OT IM	NOT IM	IMPORT	NOT IM	IMPORT	IMPORT	
MPORT	IMPORT	NOT IM	NOT IM	IMPORT	IMPORT	IMPORT
OT IM	IMPORT	NOT IM	NOT IM	IMPORT	NOT IM	IMPORT
OT IM	IMPORT	NOT IM	NOT IM	IMPORT	IMPORT	IMPORT
OT IM	NOT IM	NOT IM	IMPORT	IMPORT	IMPORT	NOT IM
OT IM	IMPORT	NOT IM	IMPORT	IMPORT	IMPORT	NOT IM
OT IM	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT
MPORT	IMPORT	NOT IM	NOT IM	IMPORT	IMPORT	NOT IM
MPORT	NOT IM	NOT IM	IMPORT	IMPORT	IMPORT	IMPORT
.36	.73	.18	.36	.82	.91	.73

NOT RUN AWAY	GET ALONG WELL	NO BETTER OTHERS	BE FREE	MAKE MONEY	GIVE OTHERS	EFFIC PRACT
IMPORT	IMPORT	NOT IM	NOT IM	IMPORT	IMPORT	IMPORT
IMPORT	IMPORT	NOT IM	IMPORT	NOT IM	IMPORT	IMPORT
NOT IM	IMPORT	NOT IM	NOT IM	IMPORT	IMPORT	NOT IM
IMPORT	IMPORT	NOT IM	NOT IM	NOT IM	IMPORT	IMPORT
IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT	IMPORT
IMPORT	IMPORT	NOT IM	IMPORT	IMPORT	NOT IM	NOT IM
IMPORT	NOT IM	NOT IM	IMPORT	NOT IM	IMPORT	IMPORT
IMPORT	IMPORT	NOT IM	NOT IM	NOT IM	IMPORT	IMPORT
IMPORT	NOT IM	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT
IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	NOT IM	IMPORT
IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT	IMPORT
IMPORT	NOT IM	NOT IM	NOT IM	NOT IM	IMPORT	IMPORT
IMPORT	IMPORT	NOT IM	NOT IM	IMPORT	IMPORT	IMPORT
NOT IM	IMPORT	NOT IM	IMPORT	IMPORT	IMPORT	IMPORT
IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	IMPORT
.87	.80	.33	.40	.60	.87	.87

[illegible]	[illegible]	IMPORT	IMPORT	NOT IM	[illegible]	IMPORT
IM	IMPORT	NOT IM	IMPORT	NOT IM	IMPORT	IMPORT
IM	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT
IM	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT
IM	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT
IM	IMPORT	IMPORT	NOT IM	NOT IM	IMPORT	IMPORT
IM	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	NOT IM
IM	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	NOT IM
IM	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT
IM	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT
IM	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	NOT IM
0	1.00	.91	.91	0.0	1.00	.73

[illegible]	WORK HARD LIVE	KNOW WAYS NATURE	MAKEUP OWN MIND	JUDGE PEOPLE WORTH	QUITE OTHERS TALK	RESPCT WHAT KNOW	[illegible]
IM	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT	I
IM	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT	I
IM	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT	I
IM	IMPORT	IMPORT	NOT IM	NOT IM	IMPORT	IMPORT	N
IM	IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	I
IM	NOT IM	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT	I
IM	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	NOT IM	I
IM	IMPORT	NOT IM	IMPORT	NOT IM	IMPORT	IMPORT	I
IM	IMPORT	IMPORT	NOT IM	NOT IM	IMPORT	IMPORT	N
IM	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT	I
IM	IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	I
IM	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT	N
IM	IMPORT	IMPORT	NOT IM	NOT IM	IMPORT	NOT IM	I
IM	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT	N
IM	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT	N
	.93	.93	.80	.13	1.00	.87	

ONEIDA WAYS OF LIVING

TRIBE	STUDENT	SHARE	NEVER TELL LIVE	NEVER WASTE	SAVE TODAY	NEVER TAKE ADVNTG	CLEAN OTHER-MESSES	RETURN FAVORS	SELF ABOVE	HELP OTHERS	INSIST ON GETTIN	SMALL DETAIL	NEVER WORRY	FUTURE CARE ITSELF	AVOID FIGHTS UNIMPO	NEVER DENY SELF
ONEIDA		IMPORT	IMPORT	IMPORT	IMPORT	NOT IM	NOT IM	IMPORT	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	NOT IM	IMPORT	IMPORT
		IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT
		IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	NOT IM
		IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	NOT IM	IMPORT	IMPORT	IMPORT	NOT IM	NOT IM	NOT IM	IMPORT	NOT IM	IMPORT
		IMPORT	NOT IM	NOT IM	IMPORT	NOT IM	IMPORT	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT	NOT IM	NOT IM	NOT IM
		IMPORT	NOT IM	NOT IM	IMPORT	NOT IM	IMPORT	NOT IM	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT	IMPORT	IMPORT	NOT IM
		NOT IM	IMPORT	NOT IM	NOT IM	NOT IM	NOT IM	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	NOT IM	IMPORT	NOT IM	NOT IM
		IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT	IMPORT	NOT IM	NOT IM	NOT IM	NOT IM	NOT IM	IMPORT
		IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT	IMPORT	IMPORT	NOT IM
		IMPORT	NOT IM	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	NOT IM	NOT IM	IMPORT	NOT IM	IMPORT
		IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT	IMPORT	IMPORT	IMPORT	NOT IM	IMPORT	IMPORT	NOT IM
MEAN		.91	.73	.73	.82	.55	.45	.91	.91	1.00	.45	.64	.55	.73	.45	.45

STUDENT INVENTORY

TRIBE	STUDENT	GOOD AS EVERYBODY ELSE	USUALLY DO THE WRONG THINGS	THINGS OFTEN BOTHER ME	HARD TO TALK IN FRONT CLASS	HARD TO TALK IN THE CLASS	I DO ALL RIGHT IN SCHOOL	NO ONE PAYS ATTENTION ME AT HOME
ONEIDA								
		LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME
		LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME
		NOT LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME
		LIKE ME	LIKE ME	LIKE ME	LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME
		NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME
		NOT LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME
		NOT LIKE ME	LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME
		LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME
		LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME
		NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME
		NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME
MEAN		.45	.64	.73	.36	.55	.73	.27

TRIBE	STUDENT	GOOD AS EVERYBODY ELSE	USUALLY DO THE WRONG THINGS	THINGS OFTEN BOTHER ME	HARD TO TALK IN FRONT CLASS	HARD TO TALK IN THE CLASS	I DO ALL RIGHT IN SCHOOL	NO ONE PAYS ATTENTION ME AT HOME
UTE								
		NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME
		NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME	LIKE ME
		NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME
		NOT LIKE ME	LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME
		LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME	LIKE ME	LIKE ME
		NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME
		NOT LIKE ME	LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME
		NOT LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME
		LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME	LIKE ME
		LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME
		NOT LIKE ME	LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME
		NOT LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME
		LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME
		NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME
		NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME
MEAN		.27	.60	.80	.53	.33	.93	.60

322

STUDENT INVENTORY

TRIBE	STUDENT	LEFT OUT OF THINGS AROUND HERE	MANY TIME TO LEAVE SCHOOL	ABLE TO GET THINGS NEED BY MYSELF	NO ONE PAYS ATTENTION ME AT SCHOO	KIDS USUALLY PICK ON ME	MANY TIMES TO LEAVE HOME	MAKE MIND WITHOUT TROUBLE
ONEIDA		NOT LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME
		NOT LIKE ME	LIKE ME	LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME
		NOT LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME
		LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME
		LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME
		LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME
		NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME
		LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME
		LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME
		LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME
		LIKE ME	LIKE ME	LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME
MEAN		.64	.55	.73	.36	.18	.27	.82

TRIBE	STUDENT	LEFT OUT OF THINGS AROUND HERE	MANY TIME TO LEAVE SCHOOL	ABLE TO GET THINGS NEED BY MYSELF	NO ONE PAYS ATTENTION ME AT SCHOO	KIDS USUALLY PICK ON ME	MANY TIMES TO LEAVE HOME	MAKE MIND WITHOUT TROUBLE
UTE		NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME
		NOT LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME
		NOT LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME
		LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME
		NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME
		NOT LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME
		NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME
		LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME
		NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME
		LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME
		NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME
		NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME
		LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME
		NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME
		LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME
MEAN		.33	.47	.47	.27	.27	.47	.60

STUDENT INVENTORY

TRIBE	STUDENT	MOST PEOPLE UNDERSTAND WAY I FEEL	OTHERS HELP ME THINGS NEED	DO WHAT MY PARENTS WANT ME TO	TROUBLE MAKING UP MY MIND	PARENTS EXPECT TOO MUCH OF ME	USUALLY DO THE RIGHT THING
ONEIDA							
		LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME
		NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME
		NOT LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME
		LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME
		NOT LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME
		LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME
		LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME
		NOT LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME
		LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME
		LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME
		NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME
MEAN		.55	.27	.91	.45	0.0	.32

TRIBE	STUDENT	MOST PEOPLE UNDERSTAND WAY I FEEL	OTHERS HELP ME THINGS NEED	DO WHAT MY PARENTS WANT ME TO	TROUBLE MAKING UP MY MIND	PARENTS EXPECT TOO MUCH OF ME	USUALLY DO THE RIGHT THING
UTE							
		LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME
		LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME
		LIKE ME	LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME
		LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME
		LIKE ME	LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME
		LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	NOT LIKE ME
		LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME
		NOT LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME
		LIKE ME	LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME
		LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME
		NOT LIKE ME	LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME
		NOT LIKE ME	NOT LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	LIKE ME
		LIKE ME	LIKE ME	LIKE ME	LIKE ME	LIKE ME	LIKE ME
		NOT LIKE ME	LIKE ME	LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME
		LIKE ME	NOT LIKE ME	LIKE ME	NOT LIKE ME	NOT LIKE ME	LIKE ME
MEAN		.73	.53	1.00	.67	.20	.73

MATH CLASS QUESTIONNAIRE

TRIBE	STUDENT	LIKE BE IN CLASS	MUCH FUN IN CLASS	FRIENDS LIKE. TEACHER	TEACHER HELP YOU ENOUGH	FEEL LIKE AWAY FROM THIS CLAS	PROUD TO BE IN CLASS	ALWAYS DO YOUR BEST CLASS	TALK IN CLASS DISCUSSIO	STUDENTS FRIENDLY TO YOU
ONEIDA		SOMETIMES	ALWAYS	NEVER	ALWAYS	ALWAYS	SOMETIMES	MOSTLY	ALWAYS	ALWAYS
		SOMETIMES	SOMETIMES	NEVER	SOMETIMES	MOSTLY	MOSTLY	ALWAYS	NEVER	SOMETIMES
		SOMETIMES	MOSTLY	SOMETIMES	SOMETIMES	MOSTLY	SOMETIMES	MOSTLY	MOSTLY	MOSTLY
		SOMETIMES	SOMETIMES	NEVER	MOSTLY	ALWAYS	ALWAYS	ALWAYS	SOMETIMES	SOMETIMES
		ALWAYS	SOMETIMES	ALWAYS	MOSTLY	ALWAYS	MOSTLY	ALWAYS	SOMETIMES	ALWAYS
		MOSTLY	SOMETIMES	ALWAYS	SOMETIMES	MOSTLY	MOSTLY	SOMETIMES	ALWAYS	MOSTLY
		SOMETIMES	MOSTLY	ALWAYS	MOSTLY	ALWAYS	MOSTLY	ALWAYS	NEVER	MOSTLY
		SOMETIMES	SOMETIMES	SOMETIMES	MOSTLY	ALWAYS	SOMETIMES	MOSTLY	SOMETIMES	MOSTLY
		MOSTLY	SOMETIMES	SOMETIMES	ALWAYS	ALWAYS	MOSTLY	MOSTLY	SOMETIMES	ALWAYS
		SOMETIMES	NEVER	ALWAYS	NEVER	SOMETIMES	SOMETIMES	MOSTLY	ALWAYS	NEVER
		SOMETIMES	NEVER	MOSTLY	ALWAYS	MOSTLY	SOMETIMES	SOMETIMES	SOMETIMES	SOMETIMES
MEAN		1.36	1.18	1.55	1.82	2.45	1.64	2.18	1.45	1.82

TRIBE	STUDENT	LIKE BE IN CLASS	MUCH FUN IN CLASS	FRIENDS LIKE TEACHER	TEACHER HELP YOU ENOUGH	FEEL LIKE AWAY FROM THIS CLAS	PROUD TO BE IN CLASS	ALWAYS DO YOUR BEST CLASS	TALK IN CLASS DISCUSSIO	STUDENTS FRIENDLY TO YOU
UTE		MOSTLY	ALWAYS	MOSTLY	ALWAYS	ALWAYS	ALWAYS	ALWAYS	ALWAYS	MOSTLY
		MOSTLY	SOMETIMES	ALWAYS	MOSTLY	SOMETIMES	MOSTLY	ALWAYS	NEVER	MOSTLY
		NEVER	NEVER	MOSTLY	MOSTLY	ALWAYS	NEVER	ALWAYS	SOMETIMES	SOMETIMES
		ALWAYS	MOSTLY	SOMETIMES	SOMETIMES	ALWAYS	ALWAYS	ALWAYS	MOSTLY	SOMETIMES
		ALWAYS	ALWAYS	MOSTLY	ALWAYS	ALWAYS	ALWAYS	ALWAYS	NEVER	NEVER
		SOMETIMES	SOMETIMES	MOSTLY	ALWAYS	ALWAYS	MOSTLY	SOMETIMES	SOMETIMES	SOMETIMES
		ALWAYS	ALWAYS	MOSTLY	ALWAYS	ALWAYS	ALWAYS	ALWAYS	MOSTLY	ALWAYS
		ALWAYS	SOMETIMES	ALWAYS	SOMETIMES	ALWAYS	ALWAYS	ALWAYS	MOSTLY	SOMETIMES
		ALWAYS	SOMETIMES	NEVER	ALWAYS	ALWAYS	ALWAYS	ALWAYS	SOMETIMES	SOMETIMES
		ALWAYS	ALWAYS	MOSTLY	MOSTLY	ALWAYS	MOSTLY	ALWAYS	ALWAYS	ALWAYS
		ALWAYS	ALWAYS	MOSTLY	ALWAYS	MOSTLY	ALWAYS	ALWAYS	ALWAYS	ALWAYS
		SOMETIMES	MOSTLY	NEVER	MOSTLY	ALWAYS	MOSTLY	ALWAYS	MOSTLY	ALWAYS
		ALWAYS	ALWAYS	NEVER	ALWAYS	ALWAYS	ALWAYS	ALWAYS	MOSTLY	ALWAYS
		ALWAYS	MOSTLY	NEVER	ALWAYS	ALWAYS	ALWAYS	ALWAYS	ALWAYS	ALWAYS
		ALWAYS	MOSTLY	NEVER	ALWAYS	ALWAYS	ALWAYS	ALWAYS	MOSTLY	ALWAYS
MEAN		2.40	2.00	1.40	2.47	2.80	2.[illegible]	2.87	1.80	2.00

TRIBE	STUDENT	MYSELF AND TRIBE	MYSELF AND FAMILY	MYSELF AND SCHOOL	SCHOOL AND TRIBE	FAMILY AND TEACHERS
UTE						
		0	0	0	0	0
		0	60	30	30	0
		73	85	67	60	52
		85	85	90	90	60
		67	60	67	42	60
		59	53	39	73	14
		90	99	95	30	99
		92	48	47	104	17
		56	28	14	50	22
		22	20	36	20	0
		0	30	67	67	30
		42	84	35	45	90
		147	134	120	85	120
		60	85	37	68	104
		88	88	71	30	0
MEAN		58.73	63.93	54.33	52.93	44.53

TRIBE	STUDENT	MYSELF AND TRIBE	MYSELF AND FAMILY	MYSELF AND SCHOOL	SCHOOL AND TRIBE	FAMILY AND TEACHERS
ONEIDA						
		69	39	79	114	70
		47	47	40	62	52
		10	24	14	10	47
		0	44	41	41	48
		45	28	33	33	20
		47	62	67	66	68
		88	48	90	122	77
		46	36	30	42	28
		0	63	60	60	78
		49	39	70	66	35
		52	0	67	60	56
MEAN		41.18	39.09	53.73	61.45	52.64

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APPENDIX IV : Background Data for the Factor Analysis

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Relevant Variables

The following is a list of variables as they appear on the research instruments and the code used to refer to the variables during the factor analysis.

It is important:	Code
not to run away from difficult things you're asked to do.	Way 1
to get along well with people.	Way 2
to show you are no better than other people	Way 3
to be free so that no one can tell you what to do.	Way 4
to make money so you can buy lots of things.	Way 5
to give other people what they need	Way 6
to be efficient and practical in everything you do.	Way 7
to take from nature whatever you want, whenever you want it.	Way 8
to work hard and be industrious so people will respect you.	Way 9
to be able to tell other people what to do.	Way 10
to act smarter than other people	Way 11
to work hard and achieve so that everyone can live better.	Way 12
to know and understand the ways of nature.	Way 13
to make up your own mind about things.	Way 14
to judge other people for what they are worth.	Way 15
to be quiet while others are talking.	Way 16
to be respected for what you know.	Way 17
to be respected for what you have.	Way 18
to know when to take advice.	Way 19
to never let your friends and family down.	Way 20

About math class:	
Do you like to be in this class?	Math 1
Do you have much fun in this class?	Math 2
Do most of your close friends like the teacher?	Math 3
Does the teacher help you enough?	Math 4
Do you learn a lot in this class?	Math 5
Do you ever feel like staying away from this class?	Math 6
Are you proud to be in this class?	Math 7
Do you always do your best in this class?	Math 8
Do you talk in class discussions in this class?	Math 9
Are most of the students in this class friendly to you?	Math 10

	Code
This is like me- not like me.	
I think I'm as good as everybody else.	Like 1
I usually do the wrong things.	Like 2
Things often bother me.	Like 3
I am much like other people.	Like 4
I find it hard to talk in front of the class.	Like 5
I do alright in school.	Like 6
No one pays much attention to me at home.	Like 7
I often feel left out of things that are going on around here.	Like 8
There are many times that I'd like to leave school.	Like 9
I am usually able to get the things I need by myself.	Like 10
No one pays much attention to me at school.	Like 11
Kids usually pick on me.	Like 12
There are many times I'd like to leave home.	Like 13
I can make up my mind without too much trouble.	Like 14
I think most people understand the way I feel about things.	Like 15
Others have to help me in the things I need.	Like 16
I usually do what my parents want me to do.	Like 17
I have trouble making up my mind.	Like 18
My parents expect too much of me.	Like 19
I usually do the right thing.	Like 20
Semantic differential between:	
myself and my tribe's way of life	Sem 1
myself and my family	Sem 2
myself and my school classes	Sem 3
my school classes and my tribe's way of life	Sem 4
my family and my school teachers	Sem 5
Tribe (Ute or Oneida)	Tribe
Sex (male or female)	Sex
Grade (third or fourth grade)	Grade
Age (younger or older)	Age
Score (higher or lower on the math test)	Score

Selected Factors and Associated Variables -- All Students

Factor one all students

Code	Variable (as it appears on the research instrument)	Loading
Way 9	It is important to work hard and be industrious so people will respect you.	.85377
Math 7	Are you proud to be in this class?	.82864
Math 6	Do you feel like staying away from this class?	-.78761
Math 1	Do you like to be in this class?	.73251
Tribe	Tribal affiliation (-Ute, + Oneida)	-.69968

Thinking that it is important to work hard and be industrious, and being respected for it is an attitude that occurs in the same environment as liking to be in math class, being proud to be in that class. The Ute children are more apt to respond to the above questions in this manner than the Oneida children.

Factor two all students

Code	Variable	Loading
Sem 3	Semantic space between myself and my school classes	.86813
Sem 2	Semantic space between myself and my family	.82535
Sem 5	Semantic space between my family and my teachers	.78159
Sem 1	Semantic space between myself and my tribe's way of life	.65611
Math 5	Do you learn alot in this class?	-.57323
Score	The results of the math test	-.52135

Children who perceive "distance" between themselves and their school; themselves and their families; themselves and their tribe's way of life and between their teachers and their families also say they do not learn alot in math class. These children scored low on the math test.

Factor three all students

Code	Variable	Loading
Age	Age of the child	-.94988
Grade	Third or fourth grade	-.88526
Math 8	Do you always do your best in this class?	.56691

It is the younger children, attending the lower grades who say they do their best in math class.

Factor four	all students	
Code	Variable	Loading
Way 4	It is important to be free so that no one can tell you what to do.	.73428
Way 18	It is important to be respected for what you have.	-.68611
Way 13	It is important to know and understand the ways of nature.	.64321
Like 3	Things often bother me.	.64283
Like 9	There are many times I would like to leave school.	.54759

The attitudes represented on this factor have to do with freedom from authority, and freedom from school. These children say it is important to be free from someone telling them what to do. They say that material things are not important, but that knowledge and understanding of natural things are important.

Factor five	all students	
Code	Variable	Loading
Math 9	Do you talk in class discussions?	-.76278
Like 12	Kids usually pick on me.	.73711
Way 8	It is important to take from nature what you want when you want it.	.67778
Math 10	Are most of the students in this class friendly to you?	-.66070
Like 5	I find it hard to talk in front of the class.	.64125

Because the sample is about equally divided on this factor, it should be interpreted two ways. 1) Students who do not talk in class, and find talking in class to be hard, also feel that the other students are not friendly. 2) Students who talk in class and find it not difficult to do so, say the other students are friendly.

Factor six	all students	
Code	Variable	Loading
Like 14	I can make up my mind without too much trouble.	.89442
Like 10	I am usually able to get the things I need by myself.	.82453
Like 11	No one pays much attention to me at school.	-.53210

Children who say they can make up thier own minds and attend to their own needs also say they get enough attention in school.

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Factor seven all students

Code	Variable	Loading
Math 3	Do most of your close friends like the teacher?	.86553
Like 1	I think I'm as good as everybody else.	-.61071
Like 7	No one pays attention to me at home.	.50965

Children who said their close friends like the teacher, said they thought they were not as good as everybody else and that they didn't get enough attention at home.

Factor eight all students

Code	Variable	Loading
Like 6	I do alright in school	.87358
Like 20	I usually do the right thing	.58814

Children who say they do alright in school also say they usually do the right thing.

Factor nine all students

Code	Variable	Loading
Way 19	It is important to know when to take advice.	.85472
Sem 4	Semantic space between school classes and the tribe's way of life	-.60896
Way 9	It is important to work hard and achieve so that everyone can live better.	.60323

Children who say it is important to know when to take advice and to work hard perceive a "closeness"between school classes and the tribe's way of life.

Factor ten all students

Code	Variable	Loading
Way 2	It is important to get along well with people.	.85757
Way 14	It is important to make up your own mind about things.	.79058

Children who say it is important to get along well with people also say it is important to make up your own mind.

Factor eleven	all students	Loading
Code	Variable	
Way 3	It is important to show you are no better than other people.	-.75979
Like 17	I usually do what my parents want me to do.	.71106
Score	The score on the math test	-.60148

Children who say it is not important to show you are no better than others, also say they do what their parents want, and these children scored low on the math test.

Factor twelve	all students	Loading
Code	Variable	
Way 6	It is important to give other people what they need.	.86352
Like 2	I usually do the wrong things.	.57479
Way 12	It is important to work hard and achieve so that everyone can live better.	.55699

Children who say it is important to give others what they need, and to work hard also say they usually do the wrong things.

Factor thirteen	all students	Loading
Code	Variable	
Like 16	Others have to help me in the things I need.	.87492
Like 8	I often feel left out of things that are going on around here.	-.52697

Because the sample is about equally divided on this factor, it should be interpreted in two ways. 1) Children who say they need help say they do not feel left out of what is going on in school. 2) Children who say they do not need help say they do feel left out of what is going on in school.

Factor fourteen	all students	Loading
Code	Variable	
Way 1	It is important not to run away from difficult things you are asked to do.	.82682
Tribe	Tribal affiliation (- Ute, + Oneida)	-.58115

It is primarily Ute children who think it is important not to run away from difficult tasks.

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Factor fifteen   all students

Code	Variable	Loading
Way 5	It is important to make money so you can buy lots of things.	.81939
Like 4	I am much like other people.	.56116

Children who say making money is important also say they are like other people.

Factor sixteen   all students

Code	Variable	Loading
Like 16	I have trouble making up my mind	-.82646
Way 10	It is important to tell other people what to do.	-.62093

Children who say they do not have trouble making up their minds also say it is not important to tell others what to do.

Factor seventeen   all students

Code	Variable	Loading
Like 15	I think most people understand the way I feel about things.	.94864

This attitude does not correlate significantly with any other variable.

Selected Factors and Associated Variables — Ute Students

UTE Factor one

Code	Variable	Loading
Way 10	It is important to be able to tell others what to do.	-.98949
Way 13	It is important to know and understand the ways of nature.	.98949
Way 9	It is important to work hard and be industrious so people will respect you.	.96703
Like 17	I usually do what my parents want me to do.	.84597
Math 10	Most of the students are friendly to me.	.78463
Like 3	Things often bother me.	.71290
Math 3	Do most of your close friends like the teacher?	-.68257
Math 9	Do you talk in discussions in this class?	.53418
Like 12	Kids usually pick on me.	-.52658
Like 9	There are many times I would like to leave school.	.52578

The Ute children who say it is important to understand nature, and to work hard also say it is not important to be able to tell others what to do. They say they do what their parents want, but that things often bother them, and that kids usually pick on them. They say that most of the children in math class are friendly to them, and that they talk in class discussions but that their friends do not like the teacher. They also say they would like to leave school, at times.

UTE Factor two

Code	Variable	Loading
Score	The score on the math test	-.025
Sem 3	Myself and my school classes	.91626
Sem 2	Myself and my family	.88773
Sem 5	My family and my teachers	.83716
Math 5	Do you learn alot in this class?	-.80336
Sem 1	Myself and my tribe's way of life	.79374
Like 18	I have trouble making up my mind.	.71719
Like 2	I usually do the wrong things	.66322
Like 19	My parents expect too much of me	-.56438
Sem 4	My school classes and my tribe's way of life.	.55684
Way 20	It is important never to let your friends and family down.	.53636
Like 12	Kids usually pick on me.	.51328
Like 5	I find it hard to talk in front of the class.	.47400

The Ute children who perceive "distance" between themselves and their school classes, between themselves and their families, between themselves and their tribe's way of life and between their families and their teachers, their classes and their tribe's way of life, also say they do not learn much in math class. They say they have trouble making up their minds and that they usually do the wrong things. They say their parents do not expect too much of them, and that it is important not to let friends and family down. These children also said that other kids pick on them, and that it is difficult to talk in front of the class. The low score is not at a level of significance.

UTE	Factor four	
Code	Variable	Loading
Like 10	I am usually able to get the things I need by myself.	.90981
Like 14	I can make up my mind without too much trouble.	.90981
Score	The results of the math test.	-.80434
Like 9	There are times I would like to leave school.	.63950
Sex	Boys (+), girls (-)	.59118
Like 12	Kids usually pick on me.	.58065
Way 8	It is important to take from nature what you want when you want it.	.53829
Math 6	Do you ever feel like staying away from this class?	.53628

The Ute children who scored low on the math test said that they could make up their minds without trouble, and that they could get what they needed by themselves. They say that there are times they would like to leave school and that kids pick on them. They say they feel like staying away from math class. These are mostly males. They think it is important to take from nature what they want.

UTE	Factor five	
Code	Variable	Loading
Way 2	It is important to get along well with people.	.84577
Grade	Third or fourth grade	-.83358
Way 17	It is important to be respected for what you know.	.81298
Age		-.74975
Math 1	Do you like to be in this class?	.69562
Way 5	It is important to make money so you can buy lots of things.	.56348
Like 8	I often feel left out of things that are going on around here.	.51207

The Ute children who say they like to be in math class also say it is important to get along well with people, that it is important to be respected for what you know. They say it is important to make money. They also say they often feel left out of what is going on in school. These are primarily younger children.

UTE	Factor eight	Loading
Code	Variable	
Way 6	It is important to give other people what they need.	.92629
Way 12	It is important to work hard and achieve so that everyone can live better.	.77347
Math 7	Are you proud to be in this class?	.67850
Sem 4	Semantic space between school classes and tribe's way of life.	-.56376

The Ute children who say they are proud to be in math class also say that it is important to give others what they need, and to work hard. These children also perceive a "closeness" between school classes and the tribe's way of life.

UTE	Factor nine	Loading
Code	Variable	
Way 1	It is important not to run away from difficult things you are asked to do.	.88292
Like 6	I do alright in school.	.88292
Like 20	I usually do the right thing	.56131
Like 7	No one pays much attention to me at home.	.50802

The Ute children who said they do alright in school also said that it was important not to run away from difficult tasks, and that they usually do the right thing. They also said that no one pays much attention to them at home.

Selected Factors and Associated Variables -- Oneida Students

ONEIDA — Factor one

Code	Variable	Loading
Way 12	It is important to work hard and achieve so that everyone can live better.	- .96338
Way 8	It is important to take from nature what you want when you want it.	.96338
Like 19	My parents expect too much from me.	.94095
Way 15	It is important to judge others for what they are worth.	.93165
Like 9	There are many times that I'd like to leave school.	- .75616
Way 18	It is important to be respected for what you have.	.72656
Way 4	It is important to be free so no one can tell you what to do.	- .67620
Math 2	Do you have much fun in math class?	.66814
Like 7	No one pays much attention to me at home.	- .64195
Math 6	Do you ever feel like staying away from this class?	- .61618
Grade		- .56815
Score	Results of the math test	- .43836
Like 8	I often feel left out of things that are going on around here.	- .52555
Way 17	It is important to be respected for what you know.	.50699

The Oneida children who scored low on the math test sai that it is not important to work hard, to be free so no one can tell you what to do, but that it is important to take from nature what you want and to judge others for what they are worth. They say their parent expect too much from them, and that they do not want to leave school. They say it is important to be respected for what you have and for what you know. They say they have fun in math class and they do not feel like staying away from it. They say that they get attention at home and they do not feel left out of things going on at school.

ONEIDA — Factor two

Code	Variable	Loading
Sem 4	Semantic space between my school classes and my tribe's way of life	.95511
Sem3	Myself and my school classes	.87665
Math 10	Are most of the students in the class friendly to you?	- .85916
Math 4	Does the teacher help you enough?	- .80353
Sem 1	Myself and my tribe's way of life.	.80134
Math 5	Do you learn alot in this class?	- .77505
Like 11	No one pays much attention to me at school.	.68919
Score	Results of the math test.	- .60367
Sex	Boys (+), girls (-)	- .55316
Like 20	I usually do the right thing.	- .54414
Sem 5	My family and my teachers	.54395
Mth 6	Do you ever feel like staying away from this class?	.53131

ONEIDA Factor two (continued)

The Oneida children who perceive a "distance" between their school classes and their tribe's way of life, themselves and their school classes, themselves and their tribe's way of life and between their families and their teachers are generally girls who did poorly on the math test. They say the children in math class are not friendly and that the teacher does not help them enough. They say they do not learn alot in math class and that they feel like staying away from it. They say they usually do not do the right thing and they do not get attention at school.

ONEIDA Factor four

Code	Variable	Loading
Way 6	It is important to give other people what they need.	.86748
Math 1	Do you like to be in this class?	-.83411
Way 10	It is important to be able to tell other people what to do.	-.77136
Math 3	Do most of your close friends like the teacher?	-.69302
Like 1	I think I'm as good as everybody else.	.60493
Like 3	Things often bother me.	.59803
Like 13	There are times I would like to leave home.	.55730
Like 5	I find it hard to talk in front of the class.	.50541

The Oneida children who say they do not like to be in math class also say their close friends do not like the teacher, and that they find it hard to talk in class. They say it is important to give people what they need, but that it is not important to tell them what to do. They say that things often bother them and there are times they would like to leave home. They say they are as good as everyone else.

ONEIDA Factor ten

Code	Variable	Loading
Way 5	It is important to make money so you can buy lots of things.	.81346
Way 1	It is important not to run away from difficult things you are asked to do.	.71143
Like 17	I usually do what my parents want me to do.	.58311

The Oneida children who say that it is important to make money also say they do what their parents want. They say it is important not to run from difficult tasks.

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