ENVIRONMENTAL INTERPRETERS IN SOUTHERN MICHIGAN: A Q-STUDY OF INTERPRETER TYPES

Dissertation for the Degree of Ph. D.
MICHIGAN STATE UNIVERSITY
ROBERT DOUGLAS HINKLE
1976

This is to certify that the

thesis entitled

ENVIRONMENTAL INTERPRETERS
IN SOUTHERN MICHIGAN:
A Q-STUDY OF INTERPRETER TYPES

presented by

ROBERT DOUGLAS HINKLE

has been accepted towards fulfillment
of the requirements for

Ph.D. degree in Fisheries and Wildlife

Major professor

Date November 12, 1976

O-7639

ABSTRACT

ENVIRONMENTAL INTERPRETERS IN SOUTHERN MICHIGAN:
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By

Robert Douglas Hinkle

The traditional role of a nature center in southern Michigan seems to be undergoing subtle but important changes in direction. Past concepts of a nature center as a place where people might go to learn about plants and animals and how they live have been greatly altered. Demands for information relating to environmental problems of pollution, energy, and population have changed many of the traditional roles of nature centers.

The interpretive naturalist is the guiding force behind programs at a nature center. The kinds of programs which a naturalist offers reflect his interests, attitudes, and beliefs. In times past, the ranks of most naturalists were filled by persons trained in botany, biology, fisheries and wildlife, forestry, or zoology. Naturalists trained in field biology usually offered programs dealing with nature in its strictest sense. Today, traditional nature related topics and current environmental problems may be dealt with all in the same day. The attitude orientation of the individual naturalist determines what kinds of emphases will be placed on each of the programs offered.

This study identified and described types of interpretive naturalists in southern Michigan. Utilizing an investigative method termed a

Q-sort, it analyzed interpreters' responses to a series of statements relating to attitudes, beliefs, and priorities dealing with nature center operation and interpretation. Factor analysis of the responses obtained from interpreters resulted in the identification and description of four definitive types of interpreters.

Analysis of patterns in their responses showed that Type I interpreters, the Naturists, were naturalists who strongly believed in a holistic approach to understanding the outdoors. Their attitudes stressed attitude development and showed an aversion to a factual presentation of interpretive material. Type II interpreters were termed Pragmatists. Pragmatists indicated that they believed interpretation should be a balance of facts, attitudes, and philosophies. Pragmatists showed attitude orientations which indicated that they believed that facts were the root of a good interpretive program. Type III naturalists were termed Educators. They strongly preferred statements which dealt with or emphasized concepts and methods of education. Type IV interpreters were regarded as Professionalists. They displayed strong orientation toward statements dealing with services which nature centers offered and duties of naturalists to provide those services.

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A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Fisheries and Wildlife

1976

ACKNOWLEDGMENTS

The writer wishes to acknowledge the contributions of the following individuals without whose assistance this dissertation could not have come to pass:

Dr. Gilbert W. Mouser, graduate committee chairman, mentor, and friend, whose advice, guidance, and good humor over the past five years were a source of constant encouragement.

Drs. Paul H. Risk, Eugene W. Roelofs, and Milton Steinmueller; members of the graduate committee which directed the research and provided valuable and timely critiques.

Dr. Niles R. Kevern, Chairman, Department of Fisheries and Wildlife, for his generously providing a term without on-campus teaching responsibilities during which preliminary research was formulated and begun.

Graduate students Laurie Aaron, Clara Bratton, John Craig, Rita Knoop and Nancy Smith for their constant encouragement and critical comments which greatly assisted the final form of this dissertation.

Dr. Joe Tennereli, University of Iowa, who generously provided the QUANAL computer analysis program and Drs. Paul Risk and Ronald Stanton who debugged the program and converted it to a form usable by the MSU computer lab.

Typists Pat Friday, Ann Hinkle, and Carolyn Wing for their care in preparing preliminary and final drafts of this dissertation.

Graduate and undergraduate students participating in the Nature Center Operation course taught Winter term 1976, for their assistance in generation of statements and for the preparation of the opinion sort.

The students under my direction, and the students of the several FW 402, FW 404, FW 486, and FW 802 classes both on and off campus who have patiently persisted through the reduced advising time created by the dissertation.

And finally, especially, the interpretive naturalists of the nature centers of southern Michigan who gave generously of their time in the collection of data used in the research.

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CHAPTER I

INTRODUCTION

The Importance of Environmental Interpretation in Southern Michigan

For many people, the first guided contact they may have with their natural surroundings might occur during a visit to a local nature center. There, under the guidance of a trained professional naturalist, they might be brought to see, perhaps for the first time, some of the intricate beauty and complexity of the natural world. Few other places offer this type of opportunity. Busy adults, many with families and financial burdens, often cannot avail themselves of university courses in nature-related subjects. Even the expense--or unavailability--of satisfactory reference books for them may be prohibitive. School children, particularly at the elementary level, seldom venture into field or forest with their teachers. If for no other reason, many teachers are lacking in knowledge of the outdoors and methods of group control in natural settings and hesitate to take their classes on such field trips. Furthermore, most school systems have not yet found suitable funding for specialized "school naturalists" to assist in the presentation of such programs. At the elementary school level in particular, school administrators must look beyond normal instructional channels for assistance in their outdoor programs or the school goes without.

It seems, therefore, that for many adults and children a great deal of their formal environmental education might be received from an

interpretive naturalist at a nature center. As population trends continue to shift ever away from rural settings and people seem to know less and less about the land, the need for quality environmental interpretation grows more acute. A citizenry lacking in either sensitivity for or knowledge about the land will be ill-prepared to either enjoy it in its natural setting or make intelligent decisions about it in the voting booth. For many of these types of people, environmental interpretation may offer the sole means by which they obtain dependable information about the outdoors.

Statement of the Problem

The interpretive naturalist seems to play an important part in the overall program of environmental education in southern Michigan. Naturalists offer many different programs at their interpretive centers which seem capable of providing the public with greater insight and understanding about the natural world. Comparisons of specific programs listed in interpretive brochures show many programs which sound at least superficially very similar. It seems unlikely, however, that naturalists so diverse--in age, academic background, educational achievement, and years of experience--would really offer nearly identical programs with nearly identical content. Naturalists with varied backgrounds might well produce different kinds of programs, have different priorities as to what should be included in a general educational program and have different ideas as to how it is to be presented. Yet we seem to have no concrete information that real differences exist.

This study is an attempt to identify and describe types of interpretive naturalists in southern Michigan as they might be involved in the aspect of educating people in and about the bio-ecology of their

environment. An examination of their attitudes and beliefs relating to interpretation should provide a great deal of information of value to both environmental education and environmental interpretation. If significant philosophical and educational differences exist among naturalists, then the types of programs which they offer could well differ significantly. A stereotyped image of the naturalist presenting a program dealing with "autumn bird migration" or "wildflowers of the spring forest" may have limited value. New programs at nature centers may more appropriately deal with "energy conservation" or "environmental attitude development" and are thus a far cry from the traditional offerings of previous years.

Also of interest to this study is information which might show apparent changes in the attitudes or academic orientation of naturalists as they practice their profession. For example, an interpreter trained as a research biologist might initially place strong emphasis on statements relating to factual material and show a strong biological orientation. No information currently exists to show how this naturalist would react to similar statements after having worked in the field for a number of years. Exposure to large numbers of persons with diverse backgrounds, perhaps especially to young children, might alter his attitudes toward methods of presentation of biological information. Perhaps practical experience he will gain from working with people will serve to alter his perceptions of the interpretive technique entirely. This study, then, will be an attempt to determine factors influencing attitudes as they might affect interpretive procedures.

General Plan of the Investigation

Following a technique developed by William Stephenson (1935), a clinical psychologist, a survey technique termed a "Q-study" will be employed to identify types of interpretive naturalists in southern Michigan. A series of statements expressing a range of opinions about attitudes, beliefs, priorities, and issues of interpretation were gathered from representative naturalists. The Q-study instrument is constructed from a representative sample of these statements. Interpreters interviewed are asked to respond to the statements according to a fixed forced-normal distribution array expressing the relative strengths of their beliefs. Factor analysis of their responses yields an array of types, or groupings, of similar respondents. On the basis of the patterns of responses, information about the priorities of the attitudes, beliefs, and issues of interpretation relevant to the naturalists studied may be extracted. Types of naturalists may be described from patterns of responses by similar groups.

Implications of the Study to Interpretation

In order to understand and effectively evaluate what kinds of information and programs are being presented to visitors at interpretive centers, we must first understand something about the types of interpreters behind those programs. With a better knowledge of those attitudes and priorities, we might be able to more clearly see what kinds of programs are actually being presented at nature centers, and what emphases lie within these programs. In addition, previously unrecognized patterns of interpretation across southern Michigan might be revealed. Such information could be of great benefit in evaluating

interpretive programs or assist in balancing the interpretive staff at a given nature center or within a park district.

Data on types of interpreters could also be very useful to institutions of higher education which offer programs to train potential interpreters. Such information might assist in deciding whether a student was well-suited to the interpretive profession. It might help to assist in the developing interpretive curricula which would embody the best characteristics of all interpreters discovered in the study, and help provide a better educated, better prepared interpreter.

Definitions of Terms Used in the Study

For the purposes of this study, an interpretive naturalist may be defined as a specially educated individual who interprets technical information related to the natural environment to a non-technical audience in such a manner as to make it understandable and, whenever possible, relevant to their lives. The terms "naturalist", "interpretive naturalist", and "interpreter" are used interchangably throughout the body of the dissertation. The writer acknowledges the fact that other kinds of naturalists, such as research naturalists, exist. Excellent interpreters specializing in archeological, historical, geological, and other forms of interpretation also exist, but these are not dealt with in this study.

Within the context of this study, the terms "nature center", "interpretive center", and "interpretive facility" are used interchangably. The writer recognizes that a wide range of other types of interpretive centers exist which do not deal with natural history, but he wishes to spare the reader too many oft-repeated phrases.

The editorial "he" is used throughout the description of this study. Many excellent female interpreters participated in this

investigation, and are not implied to be excluded by descriptions of interpreters using "he".

CHAPTER II

STUDIES RELATING TO THE PROBLEM

Examination of the literature has shown that very little research has been done in the area of identifying types of interpreters. Mahaffey (1972) performed a study in which he examined programs offered at a number of universities training interpretive naturalists and made a series of recommendations about interpretive curricula. At a national meeting of the Association of Interpretive Naturalists held in 1972, Mahaffey presented the results of a companion study entitled "Profiles of An Interpreter." Here, he explored biographical and statistical information about interpreters, but no research was undertaken as to interpreter types. Personal correspondence with Dr. Mahaffey disclosed no knowledge of further studies relating to types of interpreter types.

A bulletin published by the Association of Interpretive Naturalists entitled "Preparation of the Interpretive Naturalist--A Statement by the Association of Interpretive Naturalists" offers many suggestions for coursework which they feel should be a part of interpretive curricula, but give no insight as to what kinds of interpreters there might be.

A recent text edited by Grant W. Sharpe (1976) entitled Interpreting the Environment offers what is perhaps the first definitive look at the field of interpretation, but curiously tells little about what

an interpreter is. A chapter authored by Paul H. Risk entitled "Educating for Interpreter Excellence" lists and describes a number of personal attributes which are felt to be desirable for an interpreter to possess. This chapter comes as close as any written evaluation encountered by the writer to describing what qualities help comprise a "good" interpreter. Attributes such as sparkle, enthusiasm, humor, articulateness, self-confidence, warmth, poise, and credibility are all felt to be desirable in the interpretive naturalist, according to Risk. The discussion of these attributes is an important beginning in the process of understanding certain attributes and qualities of interest to a study of interpreter types.

The classic book of interpretation, Interpreting Our Heritage by Freeman Tilden (1957), explores the field of interpretation and describes in detail what Tilden considers to be the basic principles of the interpretive technique. It stresses many methods of good interpretation and elaborates upon specific meaningful understanding of parts of their natural world. It fails, however, to examine who the interpreter is and instead stresses how the interpreter should interpret.

A doctoral dissertation assembled by Richard Shew (1970) entitled "Visitor Types in the National Parks: A Q-Study of Wants and Needs in Outdoor Recreation" appears to be a pioneer study in identifying types of people in a recreationally related field. In it, Shew identified and described a number of significantly different classes or types of park visitors based on their wants and needs relating to facilities and services, and their wants and needs affecting attitudes and behaviors while in National Parks. Shew utilized a research tool termed a "Q-sort" to analyze patterns of responses among the individuals under study.

The Q-technique methodology employed by Shew enabled him to identify a number of distinct types of visitors. With this kind of information available to him, Shew predicted that park personnel would be able to accurately predict what kind of services their parks should offer based on the kinds of persons visiting them.

A survey technique such as this which seemed to bring reliable information about types of people--not just about the individuals themselves--seemed to the writer to be an ideal method to gain information about types of interpretive naturalists in southern Michigan. Shew's Q-study, then, served as a prototype for this investigation.

No other literature surveyed in the course of this study offered further information about types of interpreters. Information of this specific type seemed lacking from any available interpretive materials. Correspondence with the Association of Interpretive Naturalists and long-time interpreters in the state offered no further information about types of interpreters.

Limitations of Previous Studies

All previous investigations or descriptions of interpretation encountered in the course of this study dealt with preparation of interpretive naturalists or with interpretation techniques. None actually examined the interpreter himself, much less types of interpreters which might exist.

Traditional survey methods typically examine responses of a single individual to a battery of questions. Information necessary to this investigation required that a different kind of survey method be used.

The Q-analysis, which looks at patterns of responses rather than just the responses themselves, proved ideal for this study.

CHAPTER III

METHODS OF INVESTIGATION

Q-methods and Research Design: An Overview

To analyze types of interpretive naturalists in southern Michigan, it was necessary to use a relatively new method of research design. More traditional survey methods have generally involved examining a number of distinct concepts and a specific individual's responses to the concepts under investigation. These methods are most useful when one wishes to quantitatively measure opinion, attitude, or activity. They are often used to measure preconceived hypotheses (Stephenson 1953). Interpretation of data gathered by this method leads to the discovery of specific differences between the individual in question and all other individuals in the study. Sample size in this type of study needs to be as large as possible to insure reliability in the conclusions reached (Backstrom and Hursh 1963). This type of study is termed R-methodology. It is chiefly concerned with the relationships between tests (Stephenson 1953).

R-methodology, however, could not be applied to this study. To discover types of people, researchers need a survey design which generates new hypotheses based on behavior, attitudes, or preferences of different people. Here, the writer is attempting to discover something new: he is not concerned with measuring opinion in relation to individual items or proving specific preconceived hypotheses (Shew 1970). To discover information about types of interpreters, data needed to be gathered which

showed distinct patterns of responses to statements, and not just an analysis of specific responses to a number of items on a survey instrument. Only by analyzing patterns of responses could closely related individuals be categorized and then examined.

The doctoral dissertation by Richard L. Shew (1970) examined visitor types in National Parks through the use of a survey technique called a Q-sort. In it, types of park visitors were identified on the basis of their wants and needs affecting attitudes and behaviors. Although no other recreational or interpretive-related research studies encountered by the writer involved Q-analysis, Shew's method of research seemed to be an ideal model for this study.

Q-methodology is a general name used by its developer, William Stephenson, to characterize a set of philosophical, psychological, statistical, and psychomotor ideas oriented to research on the individual (Kerlinger 1973). Its chief advantage lies in its ability to correlate persons instead of tests (Stephenson 1935). The letter "Q" distinguishes this type of study from the more traditional "R" design used in survey research (Kerlinger 1973). R-design is used when correlation is desired between individual items on a given survey or questionnaire. Q-design is used when correlations are desired among the patterns of responses of different people to the same questionnaire. Unlike R-design, which gives a large number of people a small number of test items and analyzes the items, Q-design allows the researcher to give a relatively small number of people a large number of test items and analyzes the people taking the test (Stephenson 1935). This new method allows the writer to investigate a group of individuals and learn, on the basis of their responses, what characteristics and beliefs they share.

In Q-studies, the responses ordered by one person are correlated with the ordered responses of every other person in the group under study. People who are alike will show high correlations and form a series of discernable groups, or types. Each type may be described by analyzing the statements with which they most highly correlated. Types may be revealed not only by the statements themselves, but also by the themes of the statements which correlate highly. Although this method seems superficially indirect, it eliminates "test-wise" responses more fully, as the person surveyed does not realize that it is the pattern of his responses, and not the statements directly which are of greatest concern to the study. These patterns revealed by correlations are examined and types described from them.

How a Q-sort Operates

A Q-sort instrument is designed by first collecting a number of self-reference statements from persons representative of the group under study (Stephenson 1967). These statements represent a range of opinions with reference to matters of concern to the group in question to a specific situation. The situations in this study were attitudes, priorities, and issues relating to methods of interpretation and nature center operation. "The building of proper attitudes and an ecological conservation philosophy is the greatest value of nature centers" represents a statement of opinion held by certain naturalists. Other interpreters surveyed may agree or disagree. A collection of these opinion statements represents a Q-sort instrument. A Q-sort deck composed of a number of cards each having a statement relating to interpretation or nature center operation was given to interpreters participating in this study.

Naturalists surveyed were asked to carefully read each statement and react to it on the basis of their own beliefs. They arranged the statement cards in a forced normal or quasi-normal distribution along a continuium from "strongly agree" through "neutral" to "strongly disagree" (Appendix C). The forced distribution is useful for statistical analysis and also encourages the interpreter to make definite strong choices of opinion with regard to the statement found on each card. Statement distributions of all naturalists participating in the study were then intercorrelated by means of the QUANAL computer analysis program (Appendix D).

Types can be extracted from intercorrelations in a number of ways. McQuinty (1957) suggests simply grouping people together which strongly intercorrelate. Persons having common opinions or feelings would relate closely to other similar persons and form a distinct group, or type. This method is difficult to use in more complex analyses of types where increasing numbers of variables exist. Stephenson (1953) employs factor analysis, a complex mathematical method of determining intercorrelations and determining the number and nature of variables underlying a larger number of measures. It tells what variables belong together. Factor analysis using orthogonal rotation of data clusters often found in factor analyses of this type can give significance to seemingly unrelated factor variables (Kerlinger 1973). Extraction and description of interpreter types in this study were based on factor-analyzed data.

Q-technique: The Structured One-way Sort

The Q-investigation utilized in this study was developed as a structured one-way Q-sort. In a structured Q-sort, the variables of a theory of hypothesis are built into a set of statement items along

Fisherian experimental and analysis of variance design principles (Kerlinger 1973). To structure a Q-sort is to virtually build a theory into it. Instead of constructing instruments to measure the characteristics of individuals, they are constructed to embody theories. The basic rationale of Q remains. We have individuals sort the cards not so much to test the individuals as to test "theories" that have been built into the cards (Kerlinger 1973).

Based upon personal observations of naturalists in southern Michigan and extensive contacts with interpreters at professional meetings and in the field, the writer, in consultation with a number of naturalists, developed the general assumption of the study that interpretive naturalists in southern Michigan might generally fall into one of five universal categories. These categories seemed to best express types, which obviously are colored by their professional specialization and emphases of most interpreters encountered by the writer. These categories were:

1. Biologist-naturalists; scientists, research-oriented naturalists. These types of interpreters would place a great deal of emphasis in their programs upon the hard sciences and probably show orientations toward taxonomic presentations and natural history.

2. Educator-naturalists. Factual interest with holistic approaches. These types of naturalists would show a great interest in communicating natural history and probably show a great personal interest in their visitors.

3. Naturist-naturalists. This type of naturalist might choose to emphasize a more general approach to the outdoors. Facts would be de-emphasized in favor or skills or activities involving multi-sensory learning.

4. Philosopher-naturalists. This type of interpreter would probably be concerned with a holistic approach to the outdoors and life in general.

5. Preservationist-naturalists. Interpreters who might be greatly concerned with saving the environment for themselves and others. They might be politically oriented and display restrictive tendencies at their nature centers.

Statements extracted from interviews with naturalists and also taken from student volunteers were generated to fit one or more of these five types. In certain instances, a statement might easily fit more than one type. This was expected, as the naturalists studied were expected to have as much in common as they had differences from one another.

The computer program used in the extraction and description of types of interpreters was written by N. VanTubergen, Institute for Communication Studies, School of Journalism, at the University of Iowa. It was generously provided to this study by Dr. Joseph Tenerelli of the University of Iowa. The program, called QUANAL (Q-ANALYSIS), allows for the determination of types of persons existing in a set of Q-data. It is also able to determine if, in a structured one-way sort, any other hidden types exist. In its final form, it allows the researcher to determine how many, or indeed if any, of the predicted types of interpreters were actually present in the results. A detailed presentation of the QUANAL statistical method of analysis is outlined in Appendix D.

Development of the Opinion-sort

To begin to analyze the attitudes, beliefs, priorities, and issues relating to the interpretive naturalist in southern Michigan it first became necessary to have some reliable method for obtaining statements which would accurately represent them. Three methods for gathering these statements were employed in this study: 1) focused interviews with naturalists, 2) reviews of interpretive literature, and 3) questionnaires

given to students of interpretation. Each of these methods provided statements useful to the writer.

The most common method used for obtaining statements relevant to any particular group is to obtain a series of self-referant statements from members of the group (Stephenson 1967). All such self-referent statements provide a most direct reference to the person in question and his reflections upon himself as a more or less conscious matter (Stephenson 1953). All statements gathered in this manner are likely to be unique and certainly highly particular to a person (Stephenson 1953). Research has shown that statements from as few as twenty carefully chosen individuals might adequately represent the opinion of an entire group and could scarcely be improved upon by enlarging the sample size to any degree (Stephenson 1953). These individuals must, of course, be highly representative of the group under study and be capable of reflecting a variety of opinions for the study to be statistically accurate.

The following techniques were used to obtain statements relevant to interpreters and interpretation.

The Focused Interview

During a seminar in Nature Center Operation taught Winter Term 1976 at Michigan State University, a group of graduate and undergraduate students visited six interpretive centers in southern Michigan. Each center visited was selected on the basis of its being representative of a number of types of nature centers, i.e., public, private, large, small, research-oriented, education-oriented, and so forth. During these visits tours were conducted, interpretive program materials were collected, and a semi-structured interview was given to the interpreter or interpreters present. The interviews started with questions about the

nature center in general. Its past history, economic support, programs, and goals and priorities were all explored. Gradually, the questions became more specific and began to explore the interpreter's attitudes toward interpretation in general, skills and techniques, priorities in nature center operation, and his own personal philosophies. This method of informal questioning attempted to set a comfortable framework in which the interpreter felt free to express himself.

Written records were made of the naturalist's responses whenever possible. These were supplimented by tape recordings wherever written notes were too conspicupus or impractical for other reasons. Each statement made by an interpreter at these nature centers which seemed to express a definite opinion on some facet of interpretation was edited by the writer into a sentence and transcribed onto index cards for inclusion into the opinion deck. This type of statement and method of collection comprised approximately 50% of the total number of statements used in the opinion sort.

Literature Survey

A survey of relevant interpretive literature was conducted using interpretive pamphlets, texts, journal articles, and manuscripts from professional organizations. Relevant statements dealing with attitudes, beliefs, issues, and priorities of interpretation were extracted where they presented a definite statement relevant to the study. Statements which seemed more relevant to other types of interpretive facilities such as botanical and zoological parks, historic sites, and corporate contact centers were not included. These statements from the relevant literature comprised an additional 25% of the opinion deck and were added to it.

Student Questionnaire

A statement response questionnaire was devised and presented to 17 members of the seminar in Nature Center Operation class immediately following the final visit to an interpretive facility. Students involved in this class were all upperclassmen or graduate students. Their majors were Fisheries and Wildlife, Parks and Recreation, Natural Resources and Environmental Education, Field Natural History, and Outdoor Education at Michigan State University. Several students had completed an interpretive training internship at one of two local nature centers. Most had completed one or more classes in environmental interpretation taught in the Park and Recreation Resources Department at Michigan State University.

The students were requested to choose from a list of "type" of naturalists that seemed to best fit their personal philosophy of interpretation (Appendix B). Then they were asked to write a statement on an index card expressing an opinion or philosophy regarding each of 27 issues of interpretation which were extracted from the focused interviews over the span of the term. Their statements were instructed to be typical of what they, as that type of interpreter, might say about that issue. For example, a "biologist-type" naturalist reacting to the issue of "program content" might typically state, "An objective of every field trip should be learning the names of a few common plants and animals in the area." Statements collected from students in this manner were many times nearly identical to those extracted from focused interviews with practicing interpreters. These statements from students also presented a number of new viewpoints on important issues involved in interpretative technique and nature center operation.

Statements collected in this manner comprised an additional 25% of the total used in the opinion deck.

Development of the Q-sort

Through the use of focused interviews, literature reviews, and student questionnaires, over 400 statement cards were collected for the opinion deck. Each statement dealt with an issue, priority, or attitude which its author felt important to the interpretive profession. In order to reduce this overwhelming deck into a workable number of representative statements, an opinion-sort was conducted. An opinion-sort is similar to a Q-sort, except that numbers of statements in each category is not specified (Shew 1970). Students in the Nature Center Operation course were asked to sort through four decks of 50 cards each and place each one in one of three piles--depending on whether they generally agreed, generally disagreed, or were neutral or indifferent to the statements. Each of these cards was code-numbered and the numbers recorded on a master chart. The final consensus expressed on the chart showed questions which most agreed with, others which most disagreed with, and still a larger number with which there were great differences of opinion. Stephenson (1967) suggests that a Q-sort instrument should be composed of many statements which are indifferent to the sorter as well as many for him to agree or disagree with. The results of the opinion sort, then, were combined into groups with, disagreed with, essentially neutral, or controversial. Each card group was examined for duplication and similar statements. Those with essentially similar meanings were rewritten to express the statement in a clearer fashion. Cards with poor or confusing grammar, or double or unclear meanings were deleted from the study. These "second-generation"

opinion decks were again subjected to an opinion-sort by students and local interpreters. Again, statements were sorted into three categories: generally agree, generally disagree, and uncertain. Cards were coded and code numbers recorded to show consensus and controversy. Any unclear or confusing cards were rewritten or eliminated from the study. The "third-generation" opinion statement deck composed of 90 cards was issued to fourteen student volunteers from the seminar class who were instructed to sort the cards into three categories: generally agree, generally disagree, and neutral or indifferent. Sorters were then asked to find from the agree or disagree piles statements with which they more strongly agreed or disagreed. These five categories were examined and found to be nearly normally distributed. The final Q-sort deck of 60 cards were randomly drawn from this "third-generation" opinion deck.

The Q-sort instrument given to members of Michigan's interpretive profession was a device designed to evaluate their responses regarding the array of issues, attitudes, and priorities facing the day to day operation of their interpretive facilities. The instrument involved having each naturalist sort the cards into nine separate piles depending on the relative strength of their agreement, disagreement, or neutrality with the statements. Since the technique of Q-sorting is designed to analyze <u>patterns</u> of responses rather than each individual's response to each item, this "obliqueness" of approach insures that a person unconsciously reveals elements which are important in the decisions he makes (Shew 1970). This is especially important in survey research of this type, as people undergoing interviews which ask very specific questions about their personal beliefs may often be reluctant or unable to reveal the true reasons for believing as they do (George 1967). The patterns

of responses show by factor analysis in the QUANAL program express these underlying thoughts, identify and validate interpretive types, and thus make it possible to analyze interpreter types.

Assumptions and Limitations of the Study

The opinion-sort cards and their final derivation, the Q-sort deck (Appendix E), are assumed to be as representative as possible of a nearly total range of expressions of opinion. These opinions are felt by the writer to be expressive of accurate representations of opinions actually strongly held by a number of interpretive naturalists known by the writer. It is obvious that an instrument comprised of 60 cards will not be as comprehensive as a deck of 90 or 120 cards, but trials of Q-sorts held with a greater number of statement to sort seemed to be unusually unwieldy and time consuming. Time utilized by interpreters in sorting the final deck varied between 35 minutes and one and one-quarter hours. The writer felt that had much more time been necessary for the actual Q-sort, the interpreters under study might have lost interest or become bored with the sorting process midway through the sort and they might have made less than accurate choices.

Statements used in the final Q-sort were felt by the writer to occasionally apply to more than one proposed type of interpreter. This was expected, as most of the proposed philosophies overlapped in certain areas. As outlined in the previous section on Q-sort construction, a number of questions were expected as consensus items by all groups (Appendix F). These were responded to nearly equally by all types of interpreters described in the study. They are expected and in fact are required to be built-in on a properly constructed Q-sort.

The QUANAL computer program used in the analysis of interpreter types in this study was capable of identifying as many as ten separate types which might exist in the factor analysis. It is highly unlikely that any types might exist which were not extracted by the factor analysis. The major source of possible error in type descriptions might occur if a writer did not choose a sample of statements which were actually representative of the group under study. This is why the methods of obtaining self-referant statements seems so critical. Assuming that this is done with due care, the Q-study should accurately reflect the group under study.

Operational Procedures: Administering the Q-sort

A total of 51 interpretive naturalists in southern Michigan were contacted and agreed to participate in the study. Sixteen separate interpretive facilities were involved (Appendix A). Although the very structure of a Q-sort investigation requires only an adequate representation of the group under study, the persons participating in the study comprised nearly all of the interpretive naturalists in southern Michigan.

Interpreters were told the basic purpose of the study and how the data were to be analyzed. The fact that the statements had come primarily from other naturalists seemed to add confidence in their perception of the validity of the research. The information that no single individual's responses were to be extracted for analysis also seemed to add confidence in the study and perhaps resulted in greater perceived freedom for the interpreter to give realistic responses to what he really believed was important to the interpretive profession.

Naturalists were asked to sort through the card deck and separate the statements they read into three initial piles. Each pile represented

statements with which they generally agreed, those with which they generally disagreed, and those with which they were uncertain or indifferent. After this preliminary sort was completed, they were instructed to set the disagree and neutral piles aside--remembering which was which--and sort through the generally agree pile. There they were to find the two statements with which they most agreed or which they felt best expressed their priorities or beliefs as interpretive naturalists. These two cards were set aside, and the sorter was asked to go back through the agree pile once again and find three statements which next best expressed their beliefs. These were then set aside into another pile. The sorter was then asked to sort back through the remaining cards and find the next six statements with which they agreed, set those aside, and then find the last eleven in a similar fashion. If, upon reaching the final pile, there were not eleven cards available, the sorter was instructed to read through the neutral pile and find enough statements with which he agreed more than he was neutral to make up the last eleven cards. This not only gave the sorter an opportunity to find additional cards, but gave the chance to review a set of statements previously supposed to be neutral and see if there were any about which he might now agree. If there happened to be more than eleven statement cards remaining in the agree stack, the sorter was instructed to find the eleven with which he most agreed and then was asked to place the remaining cards into the neutral pile.

After completing this differentiation of the agree pile, the sorter was then asked to find the two cards in the disagree pile with which he found strongest disagreement and set them aside. The disagree pile was sorted in the same manner as the agree pile into additional stacks of

three, six, and eleven cards. Sorters were told that they were free to change their minds about the placement of any card at any time during the sorting process. Sixteen cards remained in the neutral pile upon completion of the Q-sort.

This method of card sorting produced a forced-normal distribution of statements which were arranged in a continuum of 2--3--6--11--16--11 --6--3--2 cards (Appendix C).

Statistical Treatment of the Data

Analysis of the Q-sort data was accomplished by means of factor analysis. Factor analysis is a statistical method which analyzes the independent and interactive effects of two or more independent variables on a dependent variable (Kerlinger 1973).

The traditional conduct of experimental research has been to study the effect of one independent variable on one dependent variable. For example, educational scientists knew that the study of effects on different pedagogical methods and techniques on educational outcomes was, in part, a function of other variables, such as the intelligence of the students, the personality of the teachers, the social background of both the teachers and the pupils, and the general atmosphere of both the class and the school. But in the past researchers believed that the most effective research method was to vary one independent variable while controlling, as best as one could, other independent variables that might contribute to the variance of the dependent variable (Kerlinger 1973). Factor analysis allows the writer to observe and analyze factors which are simultaneously working on the two independent variables. They were able to talk about the effects of the differential effects of the two variables. Likewise, this study is based on the statistical premise that

a number of variables taken together and factor analyzed might be able to describe types of interpretive naturalists in southern Michigan.

Analysis of data in this study is based on a matrix which analyses correlations among variables; in this case, correlations of strengths of agreement among interpreters. Naturalists making similar sort decisions correlate strongly with each other. Factor analysis produces groupings in which strongly intercorrelated people are placed together in a factor array. Each factor array shows a rank-ordered tables of lists of statements for each group, or type of interpreter.

Each interpreter's distribution of statements is compared to all other interpreters' statements in the factor array. The numerical value of this comparison, called the "factor loading," is similar to a correlation coefficient (Shew 1970). The degree to which each naturalist belongs to the group, or type, is expressed by a set of numerical value ranging upward from 0.0. A factor loading greater than 0.50 is considered sufficient to relate a person to a factor (Stephenson 1967). In order for a factor to be accepted, there must be at least two persons related to it (Stephenson 1967). Only factors which were accepted with loadings greater than 0.50 were considered for description and interpretation.

Extraction and Interpretation of Factors

Extraction of types based on factor loadings cannot be accomplished by simply "reading off" factor loadings from reference axes. They are calculated using rather complex methods (Kerlinger 1973). Methods employed on this study involve solving simultaneous linear equations. Roots obtained from the solution--in this case the sum of the square of the factor loadings for all persons on a given factor--produces a value called the "eigenvalue" (Erickson 1969). In factor analysis, the

eigenvalue is used as a criterion to terminate factor analysis (Harmon 1968). Factors analyzed in the study with eigenvalues greater than 1.0 indicated that a significant number of people were related to them and could be assumed to be predictive of behavior or attitude (Erickson 1969). Factors with eigenvalues less than 1.0 were neither extracted nor considered for the purposes of this study.

The sum of the squares of the factor loadings for all types persons on all factors is called the "total variance" (Erickson 1969). Total variance is a measure of the range of responses elicited by a particular test instrument. Each factor contributes to the total variance (Shew 1970).

"Factor variance" is the eigenvalue or sum of the squares of the factor loadings for all persons on a given factor expressed as a percentage of the total variance. "Factor variance" is a measure of what is known about a factor and is therefore a measure of how useful a factor will be in predicting the responses of the person whom it represents. Because more is known about factors with a high percentage of the total variance, they are more easily interpreted (Shew 1970). Each factor extracted by the study represents a type, or correlated grouping of similar individuals.

Several QUANAL computations were undertaken with the final Q-sorts of 50 interpreters interviewed for the study. QUANAL was allowed to extract all factors with eigenvalues greater than the 1.0 level suggested by Erickson (1969). Eight types of interpreters were listed with eigenvalues greater than the 1.0 criteria. Many of the interpreters listed, however, were assigned factor scores in each type less than the minimal accepted 0.50 significance level suggested by Stephenson (1967) as being

related to a type. The number or types was experimentally reduced until a workable number of six types was reached. Analysis of the data presented by six types revealed three interpreters loading well below the 0.50 limit set for reliable interpretation of types. These three interpreters were removed and the program was rerun. When QUANAL was told to again extract six types, the types showed weak representations to each type and were most certainly a forced result. Subsequent computer analysis with four types gave type sizes and groupings which seemed to appear to be reliable and predictive of known types (Table 1). The six eigenvalues originally extracted accounted for a total of 63.5% of the total variance. The four types described in this study accounted for 58.2% of the total variance, with other types left undescribed accounting for less than 3.0% each (Table 2).

Analysis of Types of Interpreters

The analyses of types of interpretive naturalists in this study is based on an array of statements provided by the QUANAL analysis as being most characteristic of that type. The arrangement of statements for each type is listed by the "Z-score" of each statement. The Z-score is a measure of the number of standard deviations that particular statements lies from the mean of the distribution. The Z-score for each statement is calculated by a formula which considers the placement of the statement in each person's distribution and the relationship of that person to the factor (Shew 1970). The statement array for each type is an arrangement of statements from those with highest Z-scores to those with the lowest.

The analysis of types of interpretive naturalists in the study is based on an array of statements provided by the QUANAL analysis as being most characteristic of each type.

Table 1.--Correlations Between Types.

Types	I	II	III	IV
I	1.000	.503	.677	.653
II	.503	1.000	.499	.559
III	.503	.499	1.000	.575
IV	.653	.559	.575	1.000

Table 2.--Variance-Loading Comparisons.

Types	Percent of total variance	Number of persons significantly related to each factor*
I	25.9	27
II	9.1	8
III	13.5	7
IV	9.7	5

* with factor loadings greater than 0.50

The arrangement of statements in the factor array for each type is determined by the "standard score" or "Z-score" for each statement. The Z-score represents the number of standard deviations--either positive or negative--that a statement lies from the mean of the distribution (Shew 1970). A statement with a Z-score of "-2" would be positioned minus two standard deviations from the mean, towards the bottom of the factor array, among the statements of strong disagreement. The Z-score for each statement is calculated by a formula which considers the placement of the statement in each person's distribution and the relationship of that person to the factor (Shew 1970). Factor arrays extracted for each type of interpreter list all 60 statements used in the Q-sort. Each statement is placed within the array on the basis of its Z-score. Statements with high positive Z-scores are listed first, then statements with lesser Z-scores are listed in descending order through zero and on into those with negative Z-scores.

The type of factor analysis used in this study utilizes varimax (orthogonal) mathematical rotation of data to extract what appear to be unrelated factors. In such rotations, the statements produced in each factor array which show strongest agreement and strongest disagreement are highly discriminatory in characterizing types (Kerlinger 1973). Statements listed on both ends of the array represent extremes in Z-scores. Both extremes in Z-scores show areas possessing high correlations of strong opinion. All statements on either end of the array possessing Z-scores greater than +1.0 or less than -1.0 were used to help characterize and describe types of interpreters in this study. The interpretation of types of people is always somewhat subjective in Q-analysis. The reader is urged to make his own analysis of types using the statement array provided for each type described.

CHAPTER IV

ANALYSIS OF DATA

Introduction

In this chapter, the writer will attempt to describe four types of interpretive naturalists which were extracted from the data present in Q-sorts and analyzed by the QUANAL factor analysis. Each type will be described in the following sequence:

1. A list of statements with Z-scores greater than +1.0 and less than -1.0 which will reveal statements which were indicated as "most agree" and "most disagree" for each type. An asterisk before any statement indicates that statement possessed the highest or lowest Z-score among all types.

2. General themes listed are extracted from the list of statements by the writer after analyzing what he considers to be trends or patterns in thought of agreement or disagreement. Following each theme is a list of statements with Z-scores greater than +1.0 and less than -1.0 which seemed to relate to that theme.

3. Description of type of interpreter will be listed in this section according to the themes developed by the statements provided for it.

The reader is encouraged to examine each list of statements and themes before reading the description of the type of interpreter. Trends of thought should appear in the statements and allow the reader to better understand how each type of interpreter is described.

Type I Interpreters--The Naturists

Part 1--List of Statements and Z-scores

Following is a list of statements from the factor array of Type I interpreters. This array presents all statements for Type I whose Z-scores were greater than +1.0 and less than -1.0, and are thus considered to be predictive of attitudes, beliefs, and priorities of interpretation for those interpreters.

Strongly Agree statements with Z-scores greater than +1.0:

Statement No.	Statement	Z-score
*59	Teaching awareness of the outdoors is far more important than teaching facts about it.	2.37
20	The building of proper attitudes and an ecological conservation philosophy is the greatest value of a nature center.	2.04
*42	Knowing the wholeness of nature is more important than being able to name each plant and animal which inhabits it.	1.88
21	The chief aim of interpretation is provocation, not instruction.	1.52
*44	Tactile experiences are every bit as important as verbal communication in interpretation.	1.45
*57	The content of a field trip is not as important as the feelings a person gets as he comes back from it.	1.37
58	Attitudes are more important to teach than taxonomy on the trail.	1.32
*60	Interpretation should aim to present a whole rather than a part. It must address itself to the whole man rather than to any particular part.	1.11

* Denotes highest Z-score from among all types of interpreters on that particular statement.

Statement No.	Statement	Z-score
35	Interpretation is more of an art than a science.	1.08
56	Interpretation is revelation based on information.	1.04
*01	Acclimatization--types of total immersion environmental experiences are one of the best interpretive techniques.	1.03
16	No display or mechanical interpretive device is as good as interpretation by direct contact with the visitor.	1.00

Strongly Disagree statements with Z-scores less than -1.0:

Statement No.	Statement	Z-score
#04	It is the interpreter's duty to impart as many facts as possible.	-2.56
50	Types of visitors should somehow be limited to those who are interested in nature and agree with the purposes of a nature center.	-2.14
52	Nursery and pre-school groups--in reality--gain very little from a field trip. That time might be better spent with a somewhat older, more capable group.	-1.59
#12	Nature center activities should deal with nature, not soap making, cloth dying, and other pioneer activities.	-1.34
43	A modern, stylized nature center is important in the public's image of a program being in keeping with the times.	-1.34
#29	Nature centers should be competitive to insure high standards of design and performance.	-1.32

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* Denotes highest Z-score from among all types of interpreters on that particular statement.

# Denotes lowest Z-score from among all types of interpreters on that particular statement.

Statement No.	Statement	Z-score
#25	Volunteer naturalists usually don't seem to have the expertise or depth necessary to make good holistic presentations of the natural community on field trips.	-1.20
15	Stuffed animals on display to touch cheapens the value of the life of the animal and further strengthens the "Bambi-complex" in visitors.	-1.13
#08	A person cannot hope to become environmentally aware without first having some factual information upon which to base that awareness.	-1.00

Part 2--General Themes of Type I Interpreters

The following general themes for Type I interpreters, The Naturists, have been extracted by the writer from statements listed in the preceding section. Each general theme is then listed with statements which support it.

General Themes

A. Holistic Approach to Interpretation

B. Multi-Sensory Learning

C. Sharing--"People Orientation"

A. Holistic Approach to Interpretation--Aversion to "factual" methods of interpretation.

# Denotes lowest Z-scores from among all types of interpreters on that particular statement.

Strongly Agree statements with Z-scores greater than +1.0 which support this theme:

Statement No.	Statement
*@59	Teaching awareness of the outdoors is far more important than teaching facts about it.
@42	Knowing the wholeness of nature is more important than being able to name each plant and animal which inhabits it.
@57	The content of a field trip is not as important as the feeling a person gets as he comes back from it.
58	Attitudes are more important to teach than taxonomy on the trail.
@60	Interpretation must aim to address itself to a whole rather than to a part. It must address itself to the whole man rather than to any particular phase.
@01	Acclimatization--types of total immersion environmental experiences are one of the best interpretive techniques.

Strongly Disagree statements with Z-scores less than -1.0 which support this theme:

Statement No.	Statement
12	Nature center activities should deal with nature, not soap-making, cloth-dying, and other pioneer activities.
#25	Volunteer naturalists usually don't seem to have the expertise or depth necessary to make good holistic presentations on field trips.
#08	A person cannot hope to become environmentally aware without first having some factual information upon which to base that awareness.

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* Denotes highest Z-score greater than +1.0 from among all types on this statement.

@ Denotes highest Z-score greater than +1.0 in this type.

# Denotes lowest Z-score less than -1.0 from among all types of interpreters.

B. Multi-sensory Learning--Emphasis on involving the whole person in the interpretive process.

Strong Agree statements with Z-scores greater than +1.0 which support this theme:

Statement No.	Statement
&@59	Teaching awareness of the outdoors is far more important than teaching facts about it.
21	The chief aim of interpretation is provocation, not instruction.
@44	Tactile experiences are every bit as important as verbal communications in interpretation.
@60	Interpretation should aim to present itself to a whole rather than a part. It must address itself to the whole man rather than to any particular phase.
@01	Acclimatization-types of total immersion environmental experiences are one of the best interpretive techniques.

Strongly Disagree statements with Z-scores less than -1.0 which support this theme:

Statement No.	Statement
*#04	It is the interpreter's duty to impart as many facts as possible.
#12	Nature center activities should deal with nature, not soap-making, cloth-dying, and other pioneer activities.
15	Stuffed animals on display to touch cheapen the value of the life of the animal and further strengthens the "Bambi-complex" in visitors.

& Denotes lowest Z-score less than -1.0 in this type.

@ Denotes highest Z-score greater than +1.0 in this type.

* Denotes highest Z-score greater than +1.0 from among all types on this statement.

# Denotes lowest Z-score less than -1.0 from among all types on this statement.

C. Sharing--"People-Orientation"--Expressing a concern for the visitor in the interpretive process.

Strongly Agree statements with Z-scores greater than +1.0 which support this theme:

Statement No.	Statement
21	The chief aim of interpretation is provocation, not instruction.
*57	The content of a field trip is not as important as the feelings a person gets as he comes back from it.
*60	Interpretation should aim to present itself to a whole rather than to a part. It must address itself to the whole man rather than to any particular phase.
*01	Acclimatization-types of total immersion environmental experiences are one of the best interpretive techniques.
16	No display or mechanical interpretive device is as good as interpretation by direct contact with the visitor.

Strong Disagree statements with Z-scores less than -1.0 which support this theme:

Statement No.	Statement
50	Types of visitors should somehow be limited to those who are interested in nature and agree with the purposes of a nature center.
52	Nursery and pre-school groups--in reality--gain very little from a field trip. That time might be better spent with an older, more capable group.
*29	Nature centers should be competitive to insure high standards of design and performance.

* Denotes highest Z-score greater than +1.0 from among all types on this statement.

Statement No.	Statement
*25	Volunteer naturalists usually don't have the expertise or depth necessary to make good holistic presentations of the natural community on field trips.

Part 3--Summary of Themes Which Relate Strongly to Type I Interpreters

Awareness, emphasis on tactile and multi-sensory discovery, holistic approaches to the natural world. Aversion to factual approaches to interpretation. Belief that people of all ages and backgrounds can have a valid experience at a nature center.

Description of Type I Interpreters--The Naturists

Type I interpreters, the Naturists, seek to integrate nature into the very lives of the visitors with which they come in contact. They believe that the best interpretive methods are those with which the visitor not only sees and hears, but has the opportunity to touch and smell and perhaps even taste in the natural world. In this manner, the Naturist feels that the visitor absorbs the interpretive experience and internalizes the natural world until it becomes a psychological part of the visitor.

Naturists feel that while awareness is based on fact, awareness is of much greater importance than facts, especially on field trips. A person's attitudes about his relationship with the natural world are of primary concern to the Naturist. The visitor must be led to see wholeness of nature, not just the parts. Feelings are also of concern

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* Denotes lowest Z-score less than -1.0 from among all types on this statement.

to the Naturist. Until a visitor truly feels, develops an empathetic relationship with the environment, the task of interpretation has not been completed.

To the Naturist, many approaches are available to bring the visitor to an internalized relationship with nature. Activities which involve crafts and pioneer skills in nature serve as yet another means to understanding. The Naturist recognizes that people learn better by touching and feeling than by listening. The activities to which the Naturist is attuned reflect that belief. Acclimatization types of experiences which seek to involve the entire person in an outdoor experience rate highly as recommended interpretive techniques for the Naturist. Stuffed animals on display at the nature center provide yet another means of personal interaction with natural objects.

Naturists seem to reflect a deep desire to not only involve the whole person, but to involve all persons. They express that an interpretive facility should be available and accessable to all types of people. To limit visitors to those already interested in nature might deny the opportunity for someone who was simply curious about the outdoors to ever become involved with it. Groups of younger children, even pre-schoolers, can have a valid experience in the natural world. They seem, to the Naturist, to be as able as older groups to internalize a feeling of excitement and personal enjoyment of the out-of-doors.

In keeping with the "involve everyone" philosophy, Naturist-naturalists feel that volunteer naturalists can make a valid contribution to the interpretive programs offered at their nature centers.

At most interpretive facilities, budget size does not allow for as large an interpretive staff as is necessary to handle all the requests

for programs that come in. Naturists, more than any other type of naturalist involved in this study, believe that the volunteer can make good holistic presentations of the natural community on field trips. Perhaps the strong "everyone can be involved" orientation of the Naturist accounts for this, or perhaps the trend for the naturist to de-emphasize factual approaches to intepretation allow untrained volunteers to fit into a Naturist's program offerings better.

Tilden (1957) recommends that nature centers should be competitive to insure high standards of design and performance. Naturists, more than any other group, disagree with this concept. Perhaps the "people-orientation" of the naturists does not make for a competitive spirit, or perhaps the "everyone can be involved" philosophy expressed in other places applies equally here as well.

Type II Interpreters--The Pragmatists

Part 1--List of Statements and Z-scores

Following is a list of statements from the factor array of Type II interpreters. This array presents all statements for Type II whose Z-scores were greater than +1.0 and less than -1.0, and are thus considered to be predictive of attitudes, beliefs, and priorities of interpretation for those interpreters.

Strongly Agree statements with Z-scores greater than +1.0:

Statement No.	Statement	Z-score
*20	The building of proper attitudes and an ecological conservation philosophy is the greatest value of a nature center.	2.52
*05	A person cannot understand the environment without knowing something about the taxonomy, the physiology, and the behavior of the animals and plants which make it up.	2.31

* Denotes highest Z-score from among all types of interpreters on that particular statement.

Statement No.	Statement	Z-score
*08	A person cannot hope to become environmentally aware without first having some factual information upon which to base that awareness.	2.05
*35	Interpretation is more of an art than a science.	1.43
44	Tactile experiences are every bit as important as verbal communication in interpretation.	1.35
*56	Interpretation is revelation based on information.	1.16
*09	A knowledge of the biological workings of nature is of little value without an equal emphasis on aesthetic and philosophical values as well.	1.04
42	Knowing the wholeness of nature is more important than being able to name each plant and animal which inhabits it.	1.04
23	The raw material of interpretation is information.	1.01

Strongly Disagree statements with Z-scores less than -1.0:

Statement No.	Statement	Z-score
04	It is the interpreter's duty to impart as many facts as possible.	-2.11
#15	Stuffed animals on display to touch cheapens the value of the animal and further strengthens the "Bambi-complex" in visitors.	-1.84
#07	A naturalist should know the taxonomy of plants and animals, but I feel that it has very little place in interpretation.	-1.83

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* Denotes highest Z-score from among all types of interpreters on that particular statement.

# Denotes lowest Z-score from among all types of interpreters on that particular statement.

Statement No.	Statement	Z-score
#17	An interpretive center should utilize every means at its disposal and sponsor any type of outdoor activity to bring people of all kinds closer to nature.	-1.61
#43	A modern, stylized nature center is important in the public's image of a program being in keeping with the times.	-1.41
39	A good interpreter must be a good artist as well.	-1.40
50	Types of visitors to a nature center should somehow be limited to those who are interested in nature and agree with the purposes of a nature center.	-1.26
#53	Nature centers should offer their services free of charge so that no one is excluded from their benefits.	-1.24
11	Younger interpreters relate better to younger groups.	-1.05

Part 2--General Themes of Type II Interpreters

The following general themes for Type II interpreters, the Pragmatists, have been extracted by the writer from statements listed in the preceding section. Each general theme is then listed with statements which support it.

General Themes

A. Factual Orientation

B. Philosophical Orientation

C. Reality Orientation

# Denotes lowest Z-score from among all types of interpreters on that particular statement.

A. Factual Orientation--An emphasis upon factual information as being an important building-block in the interpretive process.

Strongly Agree statements with Z-scores greater than +1.0 which support this theme:

Statement No.	Statement
@*20	The building of proper attitudes and an ecological conservation philosophy is the greatest value of a nature center.
*05	A person cannot understand the environment without first knowing something about the taxonomy, the physiology, and the behavior of the animals and plants which make it up.
44	Tactile experiences are every bit as important as verbal communications in interpretation.
*56	Interpretation is revelation based on information.
23	The raw material of interpretation is information.

Strongly Disagree statements with Z-scores less than -1.0 which support this theme:

Statement No.	Statement
*07	A naturalist should know the taxonomy of plants, and animals, but I feel it has very little place in interpretation.

B. Philosophical Orientation--An emphasis on statements involving philosophies, attitudes and involving a holistic understanding of the natural world.

@ Denotes highest Z-score greater than +1.0 in this type.

* Denotes highest Z-score greater than +1.0 from among all types on this statement.

Strongly Agree statements with Z-scores greater than +1.0 which support this theme:

Statement No.	Statement
@#20	The building of proper attitudes, and an ecological conservation philosophy is the greatest value of a nature center.
#35	Interpretation is more of an art than a science.
44	Tactile experiences are every bit as important as verbal communication in interpretation.
#56	Interpretation is revelation based on information.
#09	A knowledge of the biological workings of nature is of little value without an equal emphasis on aesthetic and philosophical values as well.
42	Knowing the wholeness of nature is more important than being able to name each plant and animal which inhabits it.

Strongly Disagree statements with Z-scores less than -1.0 which support this theme:

Statement No.	Statement
@#04	It is the interpreter's duty to impart as many facts as possible.
11	Younger interpreters relate better to younger groups.

C. Reality Orientation--practical emphasis on program content and methods of interpretation.

@ Denotes lowest Z-score less than -1.0 in this type.

# Denotes lowest Z-score less than -1.0 from among all types on this statement.

Strongly Agree statement with Z-scores greater than +1.0 which support this theme:

Statement No.	Statement
*35	Interpretation is more of an art than a science.
*09	A knowledge of the biological workings of nature is of little value without an equal emphasis on aesthetic and philosophical values as well.
23	The raw material of interpretation is information.

Strong Disagree statements with Z-scores less than -1.0 which support this theme:

Statement No.	Statement
#15	Stuffed animals on display to touch cheapens the value of the life of the animal and further strengthens the "Bambi-complex" in visitors.
#17	An interpretive center should utilize every means at its disposal and sponsor any type of outdoor activity to bring people of all kinds closer to nature.
#43	A modern, stylized nature center is important in the public's image of a program's being in keeping with the times.
50	Types of visitors to a nature center should somehow be limited to those who are interested in nature and agree with the purposes of a nature center.
#53	Nature centers should offer their services free of charge so that no one is excluded from their benefits.
11	Younger interpreters relate better to younger groups.

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* Denotes highest Z-score greater than +1.0 from among all types on this statement.

# Denotes lowest Z-score less than -1.0 from among all types on this statement.

Part 3--Summary of Themes Which Relate Strongly to Type II Interpreters

Interpretation is a balance between facts, attitudes, and philosophies. Factual content is a basic step to proper understanding. Attitudes must be balanced with the realities of everyday life.

Description of Type II Interpreters--The Pragmatists

The Pragmatist-naturalist feels, first and foremost, that the interpretive center should be a place whose ultimate goal is the building of attitudes and conservation philosophies which will insure a quality environment. The Pragmatist believes that proper attitudes and philosophies rest on foundations of scientific fact, and place the gaining of those facts of primary importance in interpretation. He believes that not all information gained can be verbal or written--tactile experiences are important and in fact are the method by which younger children in particular gain most of their information. The Pragmatist sees interpretation as not just learning, but as Tilden (1957) suggests, revelation. The internalization process, however, remains on a firm foundation of factual information for the Pragmatist.

Unlike any of the other types of interpreters discovered, the Pragmatist places an emphasis on conservation philosophies as well. More than any other interpreters, he believes that nature centers should be in the business of fostering environmental philosophies and attitudes, but philosophies based on fact, not emotion. He, more than any other interpreter type, states that a knowledge of the biological workings of nature is of little value without an equal emphasis on aesthetic and philosophical values as well. This shows more of a truly holistic approach to interpretation than any other type studied.

The Pragmatist appears to be a realist as well. He does not allow many of his own emotions and personal prejudices to interfere with the nature center's operation. Interpretation, he agrees, is more an art than a science. He agrees that the raw material of interpretation is facts, but people need an interpretation of those facts, thus the need for a naturalist. Visitors are not all reached in the same manner. Persons, like the natural world which fascinates them, are diverse. Many different methods must be employed to reach many different types of persons. Stuffed animals on display at a nature center does not cheapen the value of the life of the animal, he feels. Perhaps it is yet another way to reach certain kinds of people.

Although Pragmatists choose to disagree with any attempt to limit types of people that visit a nature center, he does agree that nature centers are, after all, primarily intended as nature centers. He, among all other types, feels that the interpretive center should not try to sponsor any kind of outdoor activity to draw as many different people closer to nature. For the Pragmatist, nature centers are for nature. To use it as a meeting ground for other types of outdoor activities--without limitation--invites disaster.

The interpretive center is, however, merely a central hub for interpretation. Above all others, the Pragmatist felt that a modern, stylized nature center had no real effect on the public's image of programs. Perhaps the opposite might be true. A rustic, woodsy-looking nature center building would look more outdoorish, and perhaps inspire more confidence in programs and staff. Programs and staff are expensive. The Pragmatist also strongly believed that a nature center should be allowed to charge for its services in admission fees, even though some

types of persons might be excluded from entry. There exists a practical balance in the pragmatist-naturalist which is not found in any other type of interpreter studied.

Type III Interpreters--The Educators

Part 1--List of Statements and Z-scores

Following is a list of statements from the factor array of Type III interpreters. This array represents all statements for Type III whose Z-scores were greater than +1.0 and less than -1.0, and are thus considered to be predictive of attitudes, beliefs, and priorities of interpretation for those interpreters.

Strongly Agree statements with Z-scores greater than +1.0:

Statement No.	Statement	Z-score
20	The building of proper attitudes and an ecological conservation philosophy is the greatest value of nature centers.	1.87
08	A person cannot hope to become environmentally aware without first having some factual information upon which to base that awareness.	1.82
*19	To be "nature-minded" is more important than to be "nature-wise."	1.76
*58	Attitudes are more important to teach than taxonomy on the trail.	1.74
59	Teaching awareness of the outdoors is far more important than teaching facts about it.	1.71
*17	An interpretive center should utilize every means at its disposal and sponsor any type of outdoor experience to bring people of all kinds closer to nature.	1.40

* Denotes highest Z-score from among all types of interpreters on that particular statement.

Statement No.	Statement	Z-score
42	Knowing the wholeness of nature is more important than being able to name each plant and animal which inhabits it.	1.37
16	No display or mechanical interpretive device is as good as is interpretation by direct contact with the visitors.	1.34
*28	The total operation of a nature center should be geared toward educating as many different people as possible in as many different topics relating to nature as possible.	1.28
57	The content of a field trip is not as important as the feelings a person gets as he comes back from it.	1.25
05	A person cannot hope to understand the environment without knowing something about the taxonomy, the physiology, and the behavior of the animals and plants which make it up.	1.18
09	A knowledge of the biological workings of nature is of little value without an equal emphasis on aesthetic and philosophical values as well.	1.00

Strongly Disagree statements with Z-scores less than -1.0:

Statement No.	Statement	Z-score
#27	An interpretive naturalist is a leader, not a teacher.	-2.42
04	It is the interpreter's duty to impart as many facts as possible.	-2.04
50	Types of visitors to a nature center should somehow be limited to those who are interested in nature and agree with the purposes of a nature center.	-1.89
#11	Younger interpreters relate better to younger groups.	-1.57

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* Denotes highest Z-score from among all types of interpreters on that particular statement.

# Denotes lowest Z-scores from among all types of interpreters on that particular statement.

Statement No.	Statement	Z-score
#54	A small fee charged each visitor serves to increase that person's respect for the center and its true worth.	-1.25
#55	Nature trails should not have signs pointing out the sights of nature. They distract from the naturalness of things.	-1.24
52	Nursery and pre-school groups--in reality--gain very little from a field trip. That time might be better spent on a somewhat older, more capable group.	-1.23
43	A modern, stylized nature center is important in the public's image of a program being in keeping with the times.	-1.11
15	Stuffed animals on display to touch cheapens the value of the life of the animal and further strengthens the "Bambi-complex" in visitors.	-1.01
39	A good interpreter must be a good artist as well.	-1.00

Part 2--General Themes of Type III Interpreters

The following general themes for Type III interpreters, the Educators, have been extracted by the writer from statements listed in the preceding section. Each general theme is then listed with statements which support it.

General Themes

A. Factual Orientation

B. Education Orientation

C. Attitudes Orientation

D. Philosophy Orientation

# Denotes lowest Z-score from among all types of interpreters on that particular statement.

A. Factual Orientation--Interpretation is built on a factual foundation. Some factual emphasis is necessary to interpretation.

Strongly Agree statements with Z-scores greater than +1.0 which support this theme:

Statement No.	Statement
08	A person cannot hope to become environmentally aware without first having some factual information upon which to base that awareness.
@28	The total operation of a nature center should be geared toward educating as many different people as possible in as many different topics relating to nature as possible.
05	A person cannot hope to understand the environment without knowing something about the taxonomy, the physiology, and the behavior of the animals and plants which make it up.

Strongly Disagree statement with Z-scores less than -1.0 which support this theme:

Statement No.	Statement
#55	Nature trails should not have signs pointing out the sights of nature. They distract from the naturalness of things.

B. Education Orientation--Emphasis on interpretation as education and on statements mentioning or involving educational philosophies.

@ Denotes highest Z-score greater than +1.0 in this type.

# Denotes lowest Z-score less than -1.0 from among all types on this statement.

Strongly Agree statements with Z-scores greater than +1.0 which support this theme:

Statement No.	Statement
@20	The building of proper attitudes and an ecological conservation philosophy is the greatest value of nature centers.
*19	To be "nature-minded" is more important than to be "nature-wise."
*58	Attitudes are far more important to teach than taxonomy on the trail.
59	Teaching awareness of the outdoors is far more important than teaching facts about it.
*17	An interpretive center should utilize every means at its disposal and sponsor any type of outdoor experience to bring people of all kinds closer to nature.
42	Knowing the wholeness of nature is more impor-tnat than being able to name each plant and animal which inhabits it.
*28	The total operation of a nature center should be geared toward educating as many different people as possible in as many different topics relating to nature as possible.
09	A knowledge of the biological workings of nature is of little value without an equal emphasis on aesthetic and philosophical values as well.

Strongly Disagree statements with Z-scores less than -1.0 which support this theme:

Statement No.	Statement
*&27	An interpretive naturalist is a leader, not a teacher.

@ Denotes highest Z-score greater than +1.0 in this type.

* Denotes highest Z-score greater than +1.0 from among all types on this statement.

& Denotes lowest Z-score less than -1.0 in this type.

Statement No.	Statement
&04	It is the interpreter's duty to impart as many facts as possible.
&11	Younger interpreters relate better to younger groups.
&54	A small fee charged each visitor serves to increase that person's respect for the center and its true worth.
52	Nursery and pre-school groups--in reality--gain very little from a field trip. That time might be better spent with an older, more capable group.

C. Attitudes Orientation--Emphasis on statements relating to formation of environmental attitudes. Note that some attitude statements conflict with fact-orientation statements.

Strongly Agree statements with Z-scores greater than +1.0 which support this theme:

Statement No.	Statement
#19	To be "nature-minded" is more important than to be "nature-wise."
#58	Attitudes are more important to teach than taxonomy on the trail.
50	Teaching awareness of the outdoors is far more important than teaching facts about it.
42	Knowing the wholeness of nature is more important than being able to name each plant and animal which inhabits it.
57	The content of a field trip is not as important as the feeling a person gets as he comes back from it.

& Denotes lowest Z-score less than -1.0 in this type.

# Denotes lowest Z-score less than -1.0 from among all types on this statement.

Strongly Disagree statements with Z-scores less than -1.0 which support this theme:

Statement No.	Statement
*54	A small fee charged each visitor serves to increase that person's respect for the center and its true worth.
43	A modern, stylized nature center is important in the public's image of a program being in keeping with the times.

D. Philosophy Orientation--Emphasis on statements which stress environmental philosophies and the role of the nature center in building such philosophies.

Strongly Agree statements with Z-scores greater than +1.0 which support this theme:

Statement No.	Statement
20	The building of proper attitudes and an ecological conservation philosophy is the greatest value of nature centers
@58	Attitudes are more important to teach than taxonomy on the trail.
59	Teaching awareness of the outdoors is far more important than being able to name each plant and animal which inhabits it.
42	Knowing the wholeness of nature is more important than being able to name each plant and animal which inhabits it.
09	A knowlege of the biological workings of nature is of little value without an equal emphasis on aesthetic and philosophical values as well.

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* Denotes lowest Z-score less than -1.0 from among all types on this statement.

@ Denotes highest Z-score greater than +1.0 in this type.

Strongly Disagree statements with Z-scores less than -1.0 which support this theme:

> No Strongly Disagree statements dealing with philosophy orientations were present.

Part 3--Summary of Themes Which Relate Strongly to Type III Interpreters

Facts, attitudes, and philosophies are all important components of a successful interpretive program, but the primary emphasis must be directed toward methods of reaching the people in order to be able to deliver those facts, attitudes, and philosophies.

Description of the Type III Interpreters--The Educators

The educator-interpreter believes that facts and interpretive techniques which help develop proper attitudes are important, but he places an extremely heavy emphasis on statements dealing with education and educational philosophies. Factual information is seen as an important building block for interpretive programs to the Educator. He agrees with other types that a person cannot truly become environmentally aware without first having some factual information upon which to base such awareness. He agrees that a person should be exposed to some of the technicalities of nature, such as taxonomy, physiology, and behavior, in order to increase that understanding. And, more than any other group, he feels that interpretive signs should be placed at strategic locations along nature trails so that the public can be exposed to some factual information in the field if an interpreter is not around to answer questions.

The Educator also shows a philosophical leaning. He believes that one of the most important functions of an interpretive facility is to build proper attitudes and an ecological conservation philosophy.

Factual information is important to him, but he agrees that a knowledge of the biological workings of nature is of little benefit without an equal emphasis on aesthetic and philosophical values as well. Perhaps to accomplish this goal of the integration of facts, attitudes, and philosophies, the Educator-naturalist loaded higher on all types of statements relating to education than any other type of naturalist described in this study. These significant statements separated him from all other types.

Attitude development seems to be another primary importance of the Educator. Teaching attitudes were placed above teaching facts in his responses. Awareness of nature and a holistic, global approach to its understanding also ranked of great importance. The Educator rated the statement, "To be nature-minded is more important than to be nature-wise" above all other types of interpreters. Knowing the wholeness of nature was regarded above being able to name each plant and animal which inhabited it.

Nearly all of the statements which the Educator loaded strongly mentioned "education" or "teaching" in some way. Particularly noticeable was the strong negative reaction to the statement, "The interpretive naturalist is a leader, not a teacher." The Educator-naturalist disagreed with this statement to the point of a higher negative loading than all others in their type as well as more negative than any other interpreter type encountered in this study. Other statements such as, "Attitudes are far more important to teach ...," "Teaching awareness ...," "The total operation of nature center should be geared toward educating..." were all conspicuous by their presence and emphasis.

Other emphatic themes also related strongly to concepts dealing with education and educational techniques and philosophies. To be effective, an interpretive center should have something to offer nearly everyone. The Educator feels that everyone should have a chance to be exposed to the benefits of a nature center. He feels, more than any other type of interpreter, that an interpreter should be actively extending himself to draw new people into nature. Statements declaring that, "an interpretive center should utilize every means at its disposal and sponsor any type of outdoor experience to bring people closer to nature," and "the total operation of a nature center should be geared toward educating as many different people as possible in as many different topics relating to nature as possible," were not only conspicuous by the extreme degree to which the Educators loaded on them, but also by their absence or disagreement in other types of interpreters described in this study. The Educator apparently feels a duty to reach as many different kinds of people as possible. This philosophy is perhaps strengthened by the extremely high negative loadings on statements relating to inabilities of pre-school groups to gain meaningful experiences from field trips, and limitng types of visitors to interpretive centers to those with a previously existing interest in nature. Only through constant exposure can the Educator-naturalist reach his public.

The Educator realizes that it is probably the skills and personality of the interpreter which allow him to relate to this audience. Educators loaded more negatively than any other group on the suggestion that "younger interpreters relate better to younger groups." This coincides with the statement relating to the inability of pre-school groups to gain from field trips and suggests that the Educator knows that it is

the individual that is important in interpretation. Each naturalist develops his own style which, if successful, can relate to nearly any group.

Type IV Interpreters--The Professionalists

Part 1--List of Statements and Z-scores

Following is a list of statements from the factor array of Type IV interpreters. This array presents all statements for Type IV whose Z-scores were greater than +1.0 and less than -1.0, and are thus considered to be predictive of attitudes, beliefs, and priorities of interpretation for those interpreters.

Strongly Agree statements with Z-scores greater than +1.0:

Statement No.	Statement	Z-score
*38	Although some visitor types may not be pleasant or easy to deal with, it is the duty of the naturalist to treat everyone fairly and equally.	1.92
*21	The chief aim of interpretation is provocation, not instruction.	1.58
*16	No display or mechanical interpretive device is as good as is interpretation by direct contact with the visitor.	1.52
20	The building of proper attitudes and an ecological conservation philosophy is the greatest value of nature centers.	1.40
*23	The raw material of interpretation is information.	1.36
*22	A nature center often reflects the personalities of its staff rather than the natural features and environmental history of the area.	1.26

* Denotes highest Z-score from among all types of interpreters on that particular statement.

Statement No.	Statement	Z-Score
*03	A naturalist should be on duty at all times while the nature center building is open.	1.24
59	Teaching awareness of the outdoors is far more important than teaching facts about it.	1.17
08	A person cannot hope to become environmentally aware without having some factual information upon which to base that awareness.	1.15
05	A person cannot understand the environment without knowing something about the taxonomy, the physiology, and the behavior of the animals and plants which make it up.	1.14
44	Tactile experiences are every bit as important as verbal communication in interpretation.	1.09
*49	A nature center should offer pre- and post-field trip suggestions for teachers who utilize its facilities.	1.06
56	Interpretation is revelation based on information.	1.00

Strongly Disagree statements with Z-scores less than -1.0:

Statement No.	Statement	Z-score
#52	Nursery and pre-school groups--in reality--gain very little from a field trip. That time might be better spent on a somewhat older, more capable group.	-2.45
#50	Types of visitors to a nature center should somehow be limited to those who are interested in nature and agree with the purposes of a nature center.	-2.37
#39	A good interpreter must be a good artist as well.	-2.19

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* Denotes highest Z-score from among all types of interpreters on that particular statement.

# Denotes lowest Z-score from among all types of interpreters on that particular statement.

Statement No.	Statement	Z-score
#12	Nature center activities should deal with nature, not soap-making, cloth-dying, and other pioneer activities.	-1.79
07	A naturalist should know the taxonomy of plants and animals, but I feel that it has very little place in interpretation.	-1.33
#13	Every nature center should have at least one trail which offers a physical challenge to those who walk it.	-1.19
#28	The operation of a nature center should be geared toward educating as many individuals as possible in as many different topics relating to nature as possible.	-1.17
#02	Trail markers distract a person from nature and are not really necessary to a satisfying interpretive experience.	-1.00

Part 2--General Themes of Type IV Interpreters

The following general themes for Type IV interpreters, the Professionalists, have been extracted by the writer from statements listed in the preceding section. Each general theme is then listed with statements which support it.

General Themes

A. Duty Orientation

B. Education Orientation

C. Non-Exclusion Orientation

A. Duty Orientation--Emphasis on duty and services which the interpreter or the nature center should offer.

# Denotes lowest Z-score from among all types of interpreters on that particular statement.

Strongly Agree statements with Z-scores greater than +1.0 which support this theme:

Statement No.	Statement
*#38	Although some types of visitors might not be pleasant or easy to deal with, the duty of the interpreter is to treat everyone fairly and equally.
#21	The chief aim of interpretation is provocation, not instruction.
#16	No display or mechanical interpretive device is as good as is interpretation by direct contact with the visitor.
20	The building of proper attitudes and an ecological conservation philosophy is the greatest value of a nature center.
#22	A nature center often reflects the personalities of its staff rather than the natural features and environmental history of the area.
#03	A naturalist should be on duty at all times while the nature center building is open.
#49	A nature center should offer pre- and post-field trip suggestions for teachers who utilize its facilities.

Strongly Disagree statements with Z-scores less than -1.0 which support this theme:

Statement No.	Statement
@50	Types of visitors to a nature center should somehow be limited to those who are interested in nature and agree with the purposes of a nature center.

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* Denotes highest Z-score greater than +1.0 in this type.

# Denotes highest Z-score greater than +1.0 from among all types on this statement.

@ Denotes lowest Z-score less than -1.0 from among all types on this statement.

Statement No.	Statement
@28	The total operation of a nature center should be geared toward educating as many individuals as possible in as many different topics relating to nature as possible.

B. Education Orientation--Emphasis on the nature center's role in environmental or outdoor education. Multi-disciplinary multi-sensory approach. Note that many statements, though education-oriented, still relate to duty and services as well.

Strongly Agree statements with Z-scores greater than +1.0 which support this theme:

Statement No.	Statement
20	The building of proper attitudes and an ecological conservation philosophy is the greatest value of nature centers.
&23	The raw material of interpretation is information.
59	Teaching awareness of the outdoors is more important than teaching facts about it.
08	A person cannot hope to become environmentally aware without having some factual information upon which to base that awareness.
05	A person cannot understand the environment without knowing something about the taxonomy, the physiology, and the behavior of the plants and animals which make it up.
44	Tactile experiences are every bit as important as verbal communication in interpretation.
&49	A nature center should offer pre- and post-field trip suggestions for teachers who utilize its facilities.
56	Interpretation is revelation based on information.

@ Denotes lowest Z-score less than -1.0 from among all types on this statement.

& Denotes highest Z-score greater than +1.0 from among all types on this statement.

Strongly Disagree statements with Z-scores less than -1.0 which support this theme:

Statement No.	Statement
%@52	Nursery and pre-school groups--in reality--gain very little from a field trip. That time might be better spent on an older, more capable group.
@12	Nature center activities should deal with nature, not soap-making, cloth-dying, and other pioneer activities.
07	A naturalist should know the taxonomy of plants and animals, but I feel it has very little place in interpretation.
@28	The operation of a nature center should be geared toward educating as many people as possible in as many different topics relating to nature as possible.
@02	Trail markers distract a person from nature and are not really necessary to a satisfying interpretive experience.

C. Non-Exclusion Orientation--Emphasis on providing services to as many visitors as possible.

Strongly Agree statements with Z-scores greater than +1.0 which support this theme:

Statement No.	Statement
*&38	Although some visitor types may not be pleasant or easy to deal with, it is the duty of the interpreter to treat everyone fairly and equally.
&03	A naturalist should be on duty at all times while the nature center building is open.

% Denotes lowest Z-score less than -1.0 in this type.

@ Denotes lowest Z-score less than -1.0 from among all types on this statement.

* Denotes highest Z-score greater than +1.0 in this type.

& Denotes highest Z-score greater than +1.0 from among all types on this statement.

Strongly Disagree statements with Z-scores less than -1.0 which support this theme:

Statement No.	Statement
@50	Types of visitors to a nature center should somehow be limited to those who are interested in nature and agree with the purposes of a nature center.
@13	Every nature center should have at least one trail which offers a physical challenge to those who walk it.
@02	Trail markers distract a person from nature and are not necessary to a satisfying interpretive experience.
@28	The total operation of a nature center should be geared toward educating as many different people as possible in as many different topics relating to nature as possible.

Part 3--Summary of Themes Which Relate Strongly to Type IV Interpreters

Duty, professionalism, and all-round concern for the visitor. Interpretation as a multi-disciplinary method of reaching people.

Description of Type IV Interpreters--The Professionalists

The Professionalist interpreters loaded most heavily on themes relating to duty. The interpretive center, for the Professional, provides a service to the community. The idea that "although some visitor types may not be pleasant or easy to deal with, it is the interpreter's duty to treat everyone fairly and equally" ranked highest in "most agree" statements for the Professionalist. Not only was it ranked highest, but Professionalists were the only group to even consider it

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@ Denotes lowest Z-score less than -1.0 from among all types on this statement.

to be a significant part of nature center operation. Another "duty" theme expressed by the Professionalists was that "a naturalist should be on duty at all times while the nature center is open." This statement, too, showed more strongly here than with any other type of interpreter. The Professionalist's responses indicate other duty and service-oriented statements as well. No other type suggested as strongly, not even the Educators, that a "nature center should provide pre- and post-field trip activities for teachers utilizing its facilities. Personal, meaningful contact with the visitor was also reflected in strong agreement with statements dealing with direct, as opposed to mechanical or visual, contact with the visitor.

Provocation, not instruction, as an interpretive theme rated higher with Professionalists than with any other group. The Professionalist sees the building of philosophies of ecological conservation and environmental-oriented attitudes as being one of the chief values of his interpretive facility. He feels also that his interpretive center probably reflects his own personality more than it reflects the surrounding environment--highest Z-score from among all types described--and thus seems to feel a personal attachment, perhaps pride, in the center.

The Professionalist expresses a degree of educational orientation as well, but he does not feel that education should be the sum total of the operational purpose of the center. He sees information being the raw material for interpretation, more so than any other type of interpreter, but places his emphasis on the application of that information through tactile experiences as well as more traditional educational methods. He sees that there are many ways to reach the visitor and interest him in nature. Crafts and pioneer activities provide not

only first-hand knowledge of native flora and fauna, but provide a method of personal involvement for the visitor, according to the Professionalist. Interpretive markers located along nature trails are rated highly--more so than any other type of naturalist--as a necessity for the Professionalist. He probably realized that not everyone will stop by the interpretive center, and this provides but one more method for reaching the public.

The importance of truly extending himself to reach all visitors and make sure the visitors have an enjoyable experience seems to be reflected further by the "duty" themes--treating all fairly and equally --and having an interpreter on duty at all times while the nature center is open. The Professionalist additionally strongly disagrees with the concept that visitors of any kind should be excluded from nature centers, even to the extent that every trail should be accessible to normal visitors. The Professionalists disagreed more emphatically than any other type of interpreter--to the extent of being the only type to load significantly upon it--that every nature center should have at least one trail which offers a physical challenge to those who walk it. Apparently, the Professionalist likes to see something for nearly everyone at his interpretive center, but not provide specialities for any one interest group.

Comparisons Among Interpreter Types

In this section, the writer will list item descriptions and a descending array of Z-scores which show differences among pairs of types. Analysis of differences will show areas of disagreement among all types described in preceding sections. This analysis should help the reader understand how each type differs among all other types

described in the study. Comparison statements listed in each case show items in which one type indicated a Z-score at least 1.0 standard deviation above or below the opposing type, or statements of one type with a Z-score of at least a positive or negative 1.0 while the other type scored below this minimum required for significance.

Comparison of Type I and II

Type I interpreters, Naturists, are shown as having significant Z-scores for the following statements, as compared to Type II, Pragmatists.

Strongly Agree statements:

59. Teaching awareness of the outdoors is more important than teaching facts about it.

58. Attitudes are more important to teach than taxonomy on the trail.

57. The content of a field trip is not as important as the feelings a person gets as he comes back from it.

50. Interpretation should aim to present a whole rather than a part. It must address itself to the whole man rather than to any particular phase.

Strongly Disagree statements:

12. Nature center activities should deal with nature, not soap-making, cloth-dying, and other pioneer activities.

25. Volunteer naturalists don't usually seem to have the expertise or depth necessary to make good holistic presentations of the natural community on field trips.

Type II interpreters, Pragmatists, are shown as having significant Z-scores for the following statements, as compared to Type I, Naturalists.

Strongly Agree statements:

08. A person cannot hope to become environmentally aware without first having some factual information upon which to base that awareness.

05. A person cannot understand the environment without knowing something about the taxonomy, the physiology, and the behavior of the animals and plants which make it up.

23. The raw material of interpretation is information.

Strongly Disagree statements:

07. A naturalist should know the taxonomy of plants and animals, but I feel that it has very little place in interpretation.

17. An interpretive center should utilize every means at its disposal and sponsor any type of outdoor experience to bring people of all kinds closer to nature.

53. Nature centers should offer their services free of charge so that no one is excluded from their benefits.

Analysis

Type I interpreters, the Naturists, are more prone to agree with statements dealing with attitudes and awareness than Type II, the Pragmatists. Naturists retain a global view of nature and desire that their holistic approach be extended to others. Statements dealing with themes relating to people and their feelings about nature are also conspicuous by their presence.

Type II interpreters, the Pragmatists, are evidenced by their extreme emphasis on information, and factual emphasis to interpretation. A realistic approach to the functioning and purposes of nature centers is evident through statements dealing with types of programs permissable at nature centers and funding of programs which are presented there.

Comparison of Type I and III

Type I interpreters, Naturists, are shown as having significant Z-scores for the following statements, as compared to Type III, Educators.

Strongly Agree statements:

21. The chief aim of interpretation is provocation, not instruction.

35. Interpretation is more of an art than a science.

11. Acclimatization-types of environmental experiences are one of the best interpretive techniques.

56. Interpretation is revelation based on information.

59. Teaching awareness of the outdoors is far more important than teaching facts about it.

Strongly Disagree statement:

12. Nature center activities should deal with nature, not soap-making, cloth-dying, and other pioneer activities.

Type III interpreters, Educators, are shown as having significant Z-scores for the following statements, as compared to Type I, Naturists.

Strongly Agree statements:

08. A person cannot hope to become environmentally aware without first having some factual information upon which to base that awareness.

28. The total operation of a nature center should be geared toward educating as many individuals as possible in as many different topics relating to nature as possible.

05. A person cannot hope to become environmentally aware without first having some factual information upon which to base that awareness.

17. An interpretive center should utilize every means at its disposal and sponsor any type of outdoor experience to bring people of all kinds closer to nature.

19. To be "nature-minded" is more important than to be "nature-wise."

Strongly Disagree statements:

27. The interpretive naturalist is a leader, not a teacher.

56. Nature trails should not have signs pointing out the sights of nature. They distract from the naturalness of things.

54. A small fee charged each visitor serves to increase that person's respect for the center and its true worth.

Analysis

Type I interpreters, the Naturists, differ from Type III interpreters, the Educators, chiefly in the Naturists insistance that factual information is not at the heart of interpretation. Here, the Naturist shows a greater emphasis on multi-sensory awareness and hands-on learning. Provocation is seen to the Naturist as the primary method by which information gained from other methods is internalized.

Type III interpreters, the Educators, show a great deal of emphasis on factual information as a base for awareness and understanding. The Educator, compared to the Naturist, believes that before the process of nature education can begin he first must attract people to the nature center, thus his willingness to sponsor any type of outdoor experience to draw them in. Once at the nature center, the Educator suggests that factual learning can then take place. He agrees with the Naturist that "nature-minded" is more important than "nature-wise," but is very much more emphatic about it. Nature trails can be equipped with interpretive signs, he feels, to perhaps provide yet another means of educating the visitor even if indirectly.

Comparison of Type I and IV

Type I interpreters, Naturists, are shown as having significant Z-scores for the following statements, as compared to Type IV, Professionalists.

Strongly Agree statements:

01. Acclimatization-types of environmental experiences are one of the best interpretive techniques.

60. Interpretation should aim to present a whole rather than a part. It must address itself to the whole man rather than to any particular phase.

58. Attitudes are more important than taxonomy to teach on the trail.

Strongly Disagree statements:

04. It is the interpreter's duty to impart as many facts as possible.

29. Nature centers should be competitive to insure high standards of design and performance.

Type IV interpreters, Professionalists, are shown as having significant Z-scores for the following statements as compared to Type I, Naturists.

Strongly Agree statements:

08. A person cannot hope to become environmentally aware without first having some factual information upon which to base that awareness.

05. A person cannot hope to understand the environment without knowing something about the taxonomy, the physiology, and the behavior of the animals and plants which make it up.

22. A nature center often reflects the personalities of its staff rather than the natural features and environmental history of the area.

03. A naturalist should be on duty at all times while the nature center building is open.

23. The raw material of interpretation is information.

Strongly Disagree statements:

39. A good interpreter is a good artist as well.

07. A naturalist should know the taxonomy of plants and animals, but I feel that it has very little place in interpretation.

52. Nursery and pre-school groups--in reality--gain very little from field trips. That time might be better spent with an older, more capable group.

Analysis

Type I interpreters, the Naturists, differ from Type IV interpreters, the Professionalists, chiefly in their continued stress on attitudes, wholeness of understanding of nature, and de-emphasis of facts. The "generality" nature of the Naturist is displayed by his strongest disagreement with the competition between nature center statements.

Type IV interpreters display in this comparison with Type I, a greatly stronger emphasis on the importance of factual information in general, in interpretation. Themes of duty to visitors continually load highly in Type IV statements, showing what may be a greater interest in the physical intricacies of interpretation than in real concern for the visitor.

Comparison of Type II and III

Type II interpreters, Pragmatists, are shown as having significant Z-scores for the following statements as compared to Type III, Educators.

Strongly Agree statements:

35. Interpretation is more of an art than a science.

23. The raw material of interpretation is information.

05. A person cannot understand the environment without knowing something about the taxonomy, the physiology, and the behavior of the animals and plants which make it up.

56. Interpretation is revelation based on information.

20. The building of proper attitudes and an ecological conservation philosophy is the greatest value of a nature center.

44. Tactile experiences are every bit as important as verbal communication in interpretation.

Strongly Disagree statements:

17. An interpretive center should utilize every means at its disposal and sponsor any type of outdoor experience to bring people of all kinds closer to nature.

07. A naturalist should know the taxonomy of plants and animals, but I feel it has little place in interpretation.

53. Nature centers should offer their services free of charge so that no one is excluded from their benefits.

Type III interpreters, Educators, are shown as having significant Z-scores for the following statements as compared to Type II, Pragmatists.

Strongly Agree statements:

59. Teaching awareness of the outdoors is more important than teaching facts about it.

57. The content of a field trip is not as important as the feelings a person gets as he comes back from it.

58. Attitudes are more important to teach than taxonomy on the trail.

19. To be "nature-minded" is more important than to be "nature-wise."

28. The total operation of a nature center should be geared toward educating as many individuals as possible in as many different topics relating to nature as possible.

16. No display or mechanical interpretative device is as good as is interpretation by direct contact with the visitor.

Strongly Disagree statements:

27. An interpretive naturalist is a leader, not a teacher.

54. A small fee charged each visitor serves to increase that person's respect for the center and its true worth.

55. Nature centers should not have signs pointing out the sights of nature. They distract from the naturalness of things.

Analysis

Type II interpreters, the Pragmatists, differ chiefly from Type III interpreters, the Educators, primarily in their emphasis upon a truly holistic approach to interpretation. The statements upon which they placed their greatest emphasis dealt with a range of priorities but those priorities which the Pragmatists expressed as filling the range of their beliefs of interpretation. Factual emphasis, philosophies, revelation in interpretation, and selective emphasis on clientele are all expressed. These differences, compared to the Educators, show a rounded interest in interpretation.

Type III interpreters, the Educators, differ from Type II, Pragmatists, primarily in their strong emphasis on attitudes, awareness, education-orientation, and personal contact with the visitor. A holistic, nature-minded emphasis rates strongly with the Educator-naturalist, but he fails to express how this holistic approach to the environment is going to be developed.

Comparison of Type II and IV

Type II interpreters, Pragmatists, differ from Type IV interpreters, Professionalists, in a number of ways, as expressed by the differences in Z-scores on certain statements.

Strongly Agree statements:

36. Collections of birds, mammals, and so forth are very useful in interpretive programs and should be a seriously considered goal early in a nature center's development.

35. Interpretation is more of an art than a science.

05. A person cannot understand the environment without knowing something about the taxonomy, the physiology, and the behavior of the animals and plants making it up.

09. A knowledge of the biological workings of nature is of little value without an equal emphasis on aesthetic and philosophical values as well.

Strongly Disagree statements:

17. An interpretive center should utilize every means at its disposal and sponsor any type of outdoor experience to bring people of all kinds closer to nature.

53. Nature centers should offer their services free of charge so that no one is excluded from their benefits.

04. It is the interpreter's duty to impart as many facts as possible.

43. A modern, stylized nature center is important in the public's image of a program's being in keeping with the times.

Type IV interpreters, Professionalists, differ from Type II interpreters, Pragmatists, in a number of ways as is evidenced by significant Z-scores on a number of key statements.

Strongly Agree statements:

59. Teaching awareness of the outdoors is far more important than teaching facts about it.

16. No display or mechanical interpretive device is as good as is interpretation by direct contact with the visitor.

38. Although some types of visitors may not be pleasant or easy to deal with, it is the interpreter's duty to treat everyone fairly and equally.

22. A nature center often reflects the personalities of its staff rather than the natural features and environmental history of the area.

21. The chief aim of interpretation is provocation, not instruction.

03. A naturalist should be on duty at all times while the nature center building is open.

Strongly Disagree statements:

52. Nursery and pre-school groups--in reality--gain very little from a field trip. That time might be better spent on an older, more capable group.

12. Nature center activities should deal with nature, not soap-making, cloth dying, and other pioneer activities.

50. Types of visitors should somehow be limited to those who are interested in nature and agree with the purposes of a nature center.

13. Every nature center should have at least one trail which offers a physical challenge to those who walk it.

28. The total operation of a nature center should be oriented toward educating as many individuals as possible in as many different topics relating to nature as possible.

02. Trail markers distract a person from nature and are not necessary to a satisfying interpretive experience.

Analysis

Type II interpreters, the Pragmatists, differ from their counterparts, the Type IV Professionalists, in several respects. Chief among the differences would be found in the Pragmatist's balanced emphasis on facts, attitudes, and philosophies. The Pragmatist emphasizes balances interpretation, and seems to reflect that not everyone will be as interested in the natural world as he. Not just any type of outdoor experience is appropriate at the Pragmatist's nature center.

The Professionalist, Type IV interpreters, place heavy emphasis on their apparent duty to provide outdoor experience to their visitors. Many different kinds of people exist, and the Professionalist seems to believe that it is possible to provide an interpretive experience for most of them. The nature center is seen as a service to the community to the Professionalist. Interpretation is his chief concern. No one should be limited from admission to the interpretive facility. Age makes no barrier. Many different methods of visitor involvement might be used by the Professionalist to involve his visitors in nature, but all lead to his primary interest, the promotion of awareness of the natural world.

Comparison of Type III and IV

Type III interpreters, Educators, differ from Type IV, Professionalists, in a number of ways, as indicated by significant Z-scores on the following statements.

Strongly Agree statements:

28. The total operation of a nature center should be geared toward educating as many individuals as possible in as many topics relating to nature as possible.

19. To be "nature-minded" is more important than to be "nature-wise."

58. Attitudes are more important than taxonomy to teach on the trail.

09. A knowledge of the biological workings of nature is of little value without an equal emphasis on aesthetic and philosophical values as well.

59. Teaching awareness of nature is far more important than teaching facts about it.

57. The content of a field trip is not as important as the feelings a person gets as he comes back from it.

Strongly Disagree statements:

27. An interpretive naturalist is a leader, not a teacher.

04. It is the interpreter's duty to impart as many facts as possible.

43. A modern, stylized nature center is important in the public's image of a program being in keeping with the times.

11. Younger interpreters relate better to younger groups.

Type IV interpreters, Professionalists, differ from the Type III interpreters, Educators, as expressed by Z-scores on the following statements.

Strongly Agree statements:

21. The chief aim of interpretation is provocation, not instruction.

23. The raw material of interpretation is information.

03. A naturalist should be on duty at all times while the nature center building is open.

22. A nature center often reflects the personalities of its staff, rather than the natural features and environmental history of its surroundings.

49. A nature center should offer pre- and post-field trip activities for teachers who utilize its facilities.

Strongly Disagree statements:

28. The total operation of a nature center should be geared toward educating as many individuals as possible in as many different topics relating to nature as possible.

12. Nature centers should deal with nature, not soap-making, cloth dying, and other pioneer activities.

07. A naturalist should know the taxonomy of plants and animals, but I feel that it has very little place in interpretation.

13. Every nature center should have at least one trail which offers a physical challenge to those who walk it.

50. Types of visitors to a nature center should somehow be limited to those who are interested in nature and agree with the purposes of nature centers.

Analysis

Type III interpreters, Educators, show very high loadings on themes relating to teaching and education compared to the Type IV. Awareness, feelings, attitude development, and a general holistic approach to an understanding of the natural world are marks of the Educator-naturalist. Their emphasis is almost entirely directed toward people, and a concern for their environmental education.

The type IV Professionalists load highly on statements dealing with duty and services which the nature center might provide for its visitors. Not even the very education-oriented Type III interpreters rated the statement dealing with nature centers providing field trip

suggestions for teachers utilizing their facilities highly. The Professionalist seems to look upon this as yet another of a multitude of ways to reach his visitors and get them involved with nature. No one should be prevented from visiting the Professionalist's nature center, and when they do come, he intends for them to be able to maximize their experience by providing a variety of ways that he can reach them. The Professionalist seems much more service-oriented than any other interpreter described in the study.

Relationships of Biographical Data to Type

It would be logical to assume that on the basis of the four described types of interpreters--the Naturists, Pragmatists, Educators, and Professionalists--some correlations should exist between their education backgrounds, time in service in the interpretive profession, and so forth. Following is a table (Table 3) of biographical data relating to each type described.

Few directly provable correlations seem to exist among types which might clearly indicate exactly why a given type responded as it did. The more academically-oriented interpreters--the Pragmatists and Professionalists were generally older (Average 34.4) vs. the Educators and the Naturists (Average 27.6), and possessed a considerable number of graduate and advanced degrees. Average times in service varied significantly only for the Educators as a group, as they show approximately two years average less service as a group.

Of the types encountered and described, the Pragmatists and Professionalists also held more administrative positions, such as directors, naturalists in charge, and university instructors. The types composed

Table 3.--Relation of Biographical Data to Types.

Type designation	Type I Naturalists	Type II Pragmatists	Type III Educators	Type IV Professionalists	Total
Total in type	27	8	7	5	47
Director	5	2	0	1	8
Chief naturalist	2	0	0	2	4
Naturalist	17	4	4	1	26
Naturalist trainee	2	0	3	0	5
Volunteer	1	0	0	0	1
Education staff	0	1	0	0	1
University instructor	0	1	0	1	2
Education					
Some College	5	1	2	0	8
B.S.	15	1	2	3	21
B.A.	3	0	2	0	5
M.S.	3	3	1	1	8
Ph.D.	1	3	0	1	5
Academic major					
Biology	5	0	2	0	7
Botany	1	2	0	1	4
Environ. Cons. Ed.	0	2	2	1	5
Fisheries & Wildlife	0	0	1	0	1
Natural Resources	4	0	0	0	4
Recreation	0	1	0	0	1
Wildlife Mgt/Bio	1	0	0	3	4
Zoology	2	1	1	0	4
Other	1*	0	1**	0	2

* History
** Earth Science

Table 3 (cont'd.)

Type designation	Type I Naturalists	Type II Pragmatists	Type III Educators	Type IV Professionalists	Total
Time in service					
Average (yrs)	5.3	4.9	3.6	5.7	
Range (yrs)	0.25-11.5	1-9	0.25-7.5	4-7	
Age					
Average (yrs)	28.7	32.5	26.5	36.1	
Range	20-42	23-47	20-32	22-45	20-47
Hometown					
Rural	12	2	4	2	20
Urban	15	6	3	3	27

primarily of field staff--naturalists, trainees, and volunteers--were found mostly among the Educators and Naturists.

Academic major showed no discernable correlations with types. All types described had their share of Botanists, Zoologists, Fisheries and Wildlife majors, Environmental Educators, and others. Academically-oriented responses in no way seemed to correlate with types of undergraduate or graduate majors.

Size of hometown did not enter as a factor into type determination. A nearly equal distribution was found among all types of interpreters.

CHAPTER V

SUMMARY AND DISCUSSION

The interpretive naturalist in southern Michigan seems to fill the dual roles of interpreter and environmental educator (Risk 1975). Many Many school groups in particular currently utilize the nature center as an extension of the classroom. It is important for administrators, educators, and naturalists themselves to be able to identify their orientation in program presentation and interpretive techniques as well.

This study is an attempt to identify and describe types of interpretive naturalists in southern Michigan. No concrete information exists today which alludes to types of interpretive naturalists. The study involved a structured Q-sort designed to indicate groups, or types, of interpreters based upon the factor-analyzed responses to a structured set of statements. Each statement dealt with an attitude, belief, or priority of interpretation or an issue relating to nature center operation.

Results of the factor analysis showed four sharply defined types of interpreters. Descriptions extracted from data lead to the following categories: Naturists, Educators, Pragmatists, and Professionalists.

Naturists are, in general, a younger group of interpreters. The majority possess B.A. or B.S. degrees, but few have advanced college degrees. We have discovered that they seem to believe strongly in interpretive techniques which de-emphasize factual material and choose instead to emphasize methods which involve their visitors in multisensory

discovery and learning. The Naturists believe that interpretive methods such as these tend to make the interpretive experience "live" more for the visitor and better enable the visitor to internalize what the Naturist is offering him. A general holistic approach to the outdoors leading to heightened awareness of nature is the ultimate objective of the Naturist. The Naturist indicates that he has something to offer for everyone who might come to visit his interpretive center. With his extreme emphasis on innovative methods of interpretation such as multisensory discovery and holistic approach, he probably does.

Educators are also a younger group of naturalists. Few have advanced degrees. They show an average age and length of service which indicate that, with a few notable exceptions, they are the youngest and least experienced of all types described. Interpretive positions held by Educators include only naturalists and naturalist-trainees. The Educators showed the greatest tendencies of all groups to display a concern for a rounded program of facts, attitudes, and philosophies as being important in interpretation. Their responses might be tracable to a relatively short length of service in the profession and the possibility that insufficient time has elapsed for their personal styles of interpretation to develop. Of all the interpreters described, their pattern of responses showed the greatest emphasis on statements related to or directly mentioning education, educating, or teaching.

Pragmatist interpreters were considerably older and more experienced than either of the two preceding groups. They show an extraordinary number of graduate and advanced degrees (6 of 8; all at least a bachelor's degree) compared to any of the other groups. This perhaps at least partially accounts for their concept of interpretation as being based on a

firm foundation of facts. Coupled with this extreme emphasis on facts is a nearly equal emphasis on the nature center providing a place where "proper" environmental attitudes and philosophies are developed. The Pragmatist seems to show a recognition that there are many different methods which might be used to develop these attitudes and philosophies, but places no great emphasis on any particular method. He selected several statements which showed a practical approach to interpretation and philosophies of nature center operation. The Pragmatist is perhaps the most rounded of all types of interpreters described in the study.

Professionalist interpreters are those whose Q-sort response patterns showed greatest emphasis placed upon statements relating to providing the nature center as a service to the visitor. Professionalists were the oldest and most experienced interpreters in southern Michigan. It is perhaps significant that the group includes three naturalist-administrators, one university instructor, and only one naturalist. The Professionalists indicated their trend in philosophy and gained their designation by loading most heavily on a significant number of statements relating to services provided by the nature center. No other group rated services at the 1.0 level or above in the study. Professionalists, also more than any other type of naturalist, showed a distinct preference for statements relating to duty. Professionalists seemed to look upon their nature centers as a service to the public and seemed to place greater priority on the service of the center and its staff than upon the programs offered. The fact that the majority of the members of the type were administrators of one sort or another no doubt had a considerable influence upon the choice of statements. Other administrator-naturalists were present in the study which did not load into this type. Perhaps they

hold positions which allow them more time in contact with the public and more time in the outdoors and this factor affects their orientation; or, perhaps, they simply have other orientations more suited to other types.

Four distinct types of interpreters were discovered in this study. No value judgments were placed on any one type. The writer knows a good number of the interpreters studied personally, and has observed through actual field trip experience that they are competent, capable interpretive naturalists. The importance of the information gained by this investigation relates to an ability to gain indirect information about the attitudes, beliefs, and priorities of interpreters in the nature centers of southern Michigan. From the types described, the reader can draw a number of conclusions as to what kinds of emphases are being placed in the interpretive programs being offered to the public who visit these centers. People are diverse. Methods which might be used to reach a diversity of people must in themselves be diverse. Good interpretive methodology, above all should be capable of touching everyone to some degree.

Recommendations for Further Study and Summary

The writer found that Q-methodology proved an ideal tool with which to conduct this type of research. Other investigators who may wish to pursue a Q-sort to discern types of persons are cautioned to be certain to use extreme care in assembling the initial population of statements relevant to the group being investigated. Several other investigators known to the writer experienced considerable difficulty with establishing types in their Q-studies due to use of statements which did not fully express a great range of opinions of the group under study.

Further research might be completed to verify the accuracy of type descriptions drawn from this study. Shew (1970) employed a branch-correlation instrument to verify his results, but experienced difficulty in obtaining verifiable accuracy due to a changing population under study. Branch correlation should be effective with a stable group such as the interpreters under study in this research.

Results of this study raise perhaps as many questions as they answer. How, or do, for example, interpreters change over time in their orientation to philosophies relating to interpretation? Will the Educator-naturalists later become Naturists and Pragmatists as they become more involved in their professions? Are there other types of interpreters which exist in other regions of the country? Most certainly other types of interpreters exist at non-nature interpretive facilities such as geological and historical sites. Where do they fit into the interpretive picture? There may exist within any or all of the types described a number of sub-types. More specific Q-studies oriented to one specific type of naturalist discovered in this study could probably provide the answer. Additional study might provide a number of intriguing answers.

Results of this study might have particular relevance to programs training interpretive naturalists at colleges and universities. Several different types of interpreters exist. Based on personal observations and firsthand knowledge, the writer knows that effective interpretation is being conducted by naturalists represented in each type described. Type categorization has little, if any, influence on the quality of interpretation in southern Michigan. Most interpreters' academic backgrounds also show little correlation either to type designation or most probably to effective interpretation either. Personality factors may be as important as any other factor in quality interpretation. This much

we do know, and interpreters in all types concluded on the basis of their responses--the interpretive naturalist must have a factual base upon which to base interpretation, but that factual base is ineffective without the means to communicate it. Interpretation is communication: communication of often complex facts and concepts to an audience which may have little opportunity to gain that type of factual information any other way. Interpretation may indeed be, as one authority puts it, "an affair of the heart" (Risk 1972).

As science continues to unravel more of the complexities of the natural world around us, it will remain the work of the interpretive naturalist to translate those complexities into terms which the layman can understand and relate to. If the research biologist wishes to continue to have a living ecosystem in which to carry on his research, it will be the responsibility of the interpretive naturalist as an environmental educator and disseminator of information to provide the field scientist with a public who appreciates and at least begins to understand the complex natural world in which he exists.

APPENDICES

APPENDIX A

APPENDIX A

INTERPRETIVE CENTERS PARTICIPATING IN THE STUDY

Blandford Nature Center
Grand Rapids, Michigan

Chippewa Nature Center
Midland, Michigan

Department of Natural Resources Interpretive Centers Region III

- Haven Hill Environmental Center
  Pontiac, Michigan
- Waterloo State Park Interpretive Center
  Chelsea, Michigan
- Yankee Springs State Park Headquarters
  Yankee Springs, Michigan

Fenner Arboretum
Lansing, Michigan

Huron-Clinton Metroparks Nature Centers

- Kensington Nature Center
  Brighton, Michigan
- Oakwoods Nature Center
  Flatrock, Michigan
- Stony Creek Nature Center
  Washington, Michigan

Kalamazoo Nature Center
Kalamazoo, Michigan

Sarett Nature Center
Benton Harbor, Michigan

Seven Ponds Nature Center
Dryden, Michigan

Woldumar Nature Center
Lansing, Michigan

APPENDIX B

APPENDIX B

STUDENT QUESTIONNAIRE

A STUDY OF INTERPRETER TYPES
DEPARTMENT OF FISHERIES AND WILDLIFE
MICHIGAN STATE UNIVERSITY

This study is concerned with identifying and categorizing types of interpretive naturalists by discovering their attitudes and values towards a number of areas of their concern. You can be of considerable assistance to this study by helping us with this questionnarie. Here's how it works:

1. Select from the following list the type of philosphy of interpretive naturalist that seems to fit you best:

   EDUCATOR
   NATURIST (NATURE LOVER)
   PHILOSOPHER (MUIRIST)
   PRESERVATIONIST
   BIOLOGIST
   _____(other)

2. On the index cards provided, write a statement on <u>each</u> of the issues in the following list. The statement should be typical of what you, as an interpreter of the type you have selected, would say about that issue.

   <u>EXAMPLE</u>: As a BIOLOGIST-type interpreter, reacting to the issue of PROGRAM CONTENT, you might say, "An objective of every field trip should be learning the names of a few plants and animals in the area."

   Please respond to each issue. If you can think of more than one typical response, please use both sides of the card.

   <u>ISSUES</u>

   Visitor Types
   Programs Offered
   Use of Facilities
   Exclusiveness (catering to a special group)
   Costs of Fees
   Caged Animals
   Trail Markers
   Use of Volunteers
   Stuffed Animals
   Program Content
   Evening Programs
   Handicapped Visitors
   Pre-school Visitors
   Types of Walks
   "Education"
   Habitat Management
   Trail Conditions
   Uniforms

Collections	Taxonomy
Visuals/Displays	Trail Q/A Techniques
Mechanical Interpretive Devices	Nature Center Features
Other Uses of the Nature Center Property	"On-Duty" Hours
"Environmental Awareness"	

If you wish a summary of the research results, please fill in the information indicated below.

Name_____

Address_____

_____ Zip _____

Age____18-24 ____44-52 Education____HS

____25-32 ____53-59 ____1-2 yrs College

____33-38 ____60-above ____B.S., B.A.

____39-43 ____M.S., M.A.

____Ed.S., Ph.D.

Thank you for your cooperation and assistance in compiling this research instrument.

Robert D. Hinkle
Instructor

APPENDIX C

APPENDIX C

Q-SORT RESPONSES

A STUDY OF INTERPRETER TYPES
DEPARTMENT OF FISHERIES AND WILDLIFE
MICHIGAN STATE UNIVERSITY

Nature Center_____

Interpreter_____

FOR RESEARCHER USE ONLY

Sort Date:_____ Send Abstract____Yes ____NO

Responses:	Strongly Agree				Neutral	Strongly Disagree			
	2	3	6	11	16	11	6	3	2
	____	____	____	____	____	____	____	____	____
	____	____	____	____	____	____	____	____	____
		____	____	____	____	____	____	____	
			____	____	____	____	____		
			____	____	____	____	____		
			____	____	____	____	____		
				____	____	____			
				____	____	____			
				____	____	____			
				____	____	____			
				____	____	____			
					____				
					____				
					____				
					____				

1. Name:_____

   Address:_____

   City:_____ State_____ Zip_____

2. Population of home town_____

   ____Rural ____Urban

3. Education:

   ____did not finish high school ____college graduate

   ____high school graduate ____B.S. ____B.A.

   ____some college ____M.S. ____M.A.

   ____Ed.S. ____Ph.D.

   ____other_____(specify)

   If a college graduate, what were your major and minor fields of study?

   _____

4. Current position held with this interpretive facility:_____

   length of time:_____

5. What hobbies and interests do you have which pertain to the outdoors?

   _____

   _____

6. What do you consider the chief function of your interpretive facility to be?

   _____

   _____

7. What do you consider your goal at this interpretive facility to be?

   _____

   _____

Interviewer's comments:_____

_____

_____

_____

APPENDIX D

APPENDIX D

QUANAL (Q ANALYSIS)

The QUANAL program is a single-execution method for handling all phases of Stephenson's Q analysis. It is a multiphase program which allows data manipulation, correlation, principle components factoring, orthogonal or oblique rotation to simple structure, and contains a summary procedure called WRAP in which Q-analysis indicates the response patterns of different types of people to the test items.

QUANAL consists of eight different programs arranged in four dependent phases and a main or controlling phase. The program is designed primarily for Q studies, but may also be utilized in more customary R studies as well. In Q, the final phase of the program, WRAP, provides a summary of the response of each factor types of people to each of the test items. In R, a sort of a "factor score" for each subject results and may be used to aid the investigator in identifying each subject's relative performance within the factor. A brief description of the flow of the program as it analyzes data, correlates, and type-describes follows.

1. Main Phase

   QUANAL--establishes routing among phases. Provides control over all other phases. Allows error exits at any phase if necessary.

2. Phase 1

   INVMTX--a matrix inversion sub-routine used in Phases 2 and 2.

PREPRS--evaluates user requests, echos control summary and first rows of data, reads data by one of two procedures, alters data in any one of three ways requested, including normalization of data.

3. Phase 2

   PRNCOM--computes Pearson correlations or intersection matrix and performs principle components factoring.

4. Phase 3

   ROTATE--executes varimax (orthogonal) or oblimax (oblique) rotation; or reference structure computed from user-supplied transformation matrix.

5. Phase 4

   WRAP--provides standardized arrays for each item as seen by each type (factor), and prepares a series of summary tables.
   DSCND--routine used by WRAP to form descending arrays of Z-scores for tabular presentation.

Briefly summarizing each program, the preprocessor stage (PREPRS) allows the investigator to submit his data matrix in either R or Q form. The preprocessor then makes appropriate adjustments in the data arrangement according to the user's request. This stage also provides means to normalize data and to reverse or add a constant and the reversing-of-scales function may be carried out on a set of scaled selected by the user, rather than on all scales.

In the second phase of the program (PRNCOM), a Pearson product-moment correlation matrix is produced from the data and means and standard deviations are reported. If the user is dealing with bi-nomial or other nomial type scales, he may elect to have this phase of the program

produce an intersection matrix for factoring, rather than the correlation matrix. The intersection coefficients (Deese 1965) which comprise this matrix are formed by examining every possible pairing of the variables and counting the number of observations which have the same value on both variables in the current pair. The coefficient equals this sum divided by the total number of observations.

Next, the correlation matrix is evaluated for principal components factors, using a procedure outlined by Harman. Communality estimates are used in the diagonal for factoring. The number of factors produced by this program are dependent upon one of three things: a fixed number of factors to be extracted by the user, a maximum limit fixed by the user, or the program's test of the sums of the squares for all the factor loadings for all persons on a given value, called the "eigenvalue" (Erickson 1969). In the case of the latter two specifications, the program makes its tests and continues to factor until either the user's maximum is reached or the program's test is satisfied. In this case, the user specifies the smallest eigenvalue acceptable to him as a factor. Erickson suggests that factors with an eigenvalue greater than 1.0 are significantly related to each other and are predictive of behavior or attitude. In this program, all eigenvalues greater than 1.0 were extracted for type analysis.

The third phase of the program (ROTATE) provides rotation of the factors to a user-specified varimax (orthoganal) or an oblimax (oblique reference structure) solution. The solution aimed at here should be characterized by the elements of simple structure described by Thurstone and summarized by Kerlinger and Harman. In event the research is not satisfied with either of these rotations, he may elect to determine his

own normalized transformation subjectively with the extended vector matrix, which QUANAL always lists. Varimax rotation is performed in the traditional manner. The factor matrix is normalized and a maximum is sought for the criterion. The computation of rotation angle follows the method described by Harman (1968): all rotations greater than two degrees will be performed for a pair of factors. Transformation is determined iteratively. The criterion must not increase more than 0.00001 in four successive iterations to determine a stable maximum. If, after 100 consecutive iterations a solution is not optimized, the program is terminated. The initial and final values for the criterion are reported and listed.

WRAP (Weighted Rotational Analytical Procedure) is the fourth and final phase of QUANAL and provides a summary of the Q results in terms of the semantic values of the study underway. WRAP first evaluates the rotated factor matrix to determine the presence of any bi-polar factors. A bi-polar factor is defined as one in which the absolute sum of the negative factor loadings is greater than 15% of the sum of the absolute value of this factor's loadings. When a bi-polar factor is encountered, the negative loadings are taken from that factor and replaced with zeros. These negatives are then all made positive and formed into an added factor. At this point in the data processing, all factors may be seen as types--usually in Q studies, types of people. The factor matrix is then weighted and the weighted factor values for the types are used to form standardized typal arrays of Z-scores which indicate the behavior or attitudes of each subject toward each item.

Next, each type may be compared with each other type. Here, a difference between an item's Z-score on one type and its Z-score on another

type is computed and a table is formed in descending order of these differences from highest positive Z to the highest negative Z. First, Type I is compared with each of the others, beginning with Type II, then Type II is compared with each of the others, beginning with Type III, and so on.

In the next section of WRAP, the program determines which items have their highest Z-score on Type I. These are listed as "Type I items greater than all others." Those items with their lowest Z-score on Type I are next loacted by WRAP and listed as "Type I items less than all others." This process is repeated for each type. Each of the sections of these tables is listed in descending order, according to the difference between the Z-score in question and the average or nearest Z-score for that item.

Finally, the WRAP phase locates "consensus items" and lists them in descending order of their average Z-score. A consensus item is defined as an item having a Z-score difference in types no greater than some arbitrary value. The program assumes 1.0 as a criterion value, but this is adjustable at user discretion. At this value, one could say that a consensus item is one which, from one type to another, never varies in array position more than Z = 1.0, or one standard deviation (Tenerelli 1976).

APPENDIX E

APPENDIX E

A Q-INSTRUMENT FOR DETERMINING INTERPRETER TYPES IN SOUTHERN MICHIGAN

The following statements were placed individually on index cards for sorting by interpretive naturalists.

Statement No.	Statement
01	Acclimatization-types of total emersion environmental experiences are one of the best interpretive techniques.
02	Trail markers distract a person from nature and are not really necessary to a satisfying interpretive experience.
03	A naturalist should be on duty at all times while the nature center building is open.
04	It is the interpreter's duty to impart as many facts as possible.
05	A person cannot understand the environment without knowing something about the taxonomy, the physiology, and the behavior of the plants and animals which make it up.
06	Nature centers should provide some live native animals in the building for groups to observe, since they are seldon seen on the trail.
07	A naturalist should know the taxonomy of plants and animals, but I feel that it has very little place in interpretation.
08	A person cannot hope to become environmentally aware without having some factual information upon which to base that awareness.
09	A knowledge of the biological workings of nature is of little value without an equal emphasis on aesthetic and philosophical values as well.
10	With interpretive signs, an object is never made more beautiful by calling it beautiful.

11 Younger interpreters relate better to younger groups.

12 Nature center activities should deal with nature, not soap-making, cloth-dying, and other pioneer activities.

13 Every nature center should have at least one trail which offers a physical challenge to those who walk it.

14 Cross-country skiing, jogging, and other such physical education type activities have no place on trails and should not be allowed at a nature center.

15 Stuffed animals on display to touch cheapens the value of the life of the animal and further strengthens the "Bambi-complex" in visitors.

16 No display or mechanical interpretive device is as good as interpretation by direct contact with the visitor.

17 An interpretive center should utilize every means at its disposal and spondor any type of outdoor experience to bring people of all kinds closer to nature.

18 An interpreter stating "I don't know" sometimes produces a feeling of added confidence in the listener.

19 To be "nature-minded" is more important than to be "nature-wise."

20 The building of proper attitudes and an ecological conservation philosphy is perhaps the greatest value of nature centers.

21 The chief aim of interpretation is provocation, not instruction.

22 A nature center often reflects the personalities of its staff rather than the natural features and environmental history of the area.

23 The raw material of interpretation is information.

24 Interpretation is a science.

25 Volunteer naturalists usually don't seem to have the expertise or depth necessary to make good holistic presentations of the natural community of field trip.s

26 Programs for handicapped visitors are every bit as important as those for normal visitors.

27 An interpretive naturalist is a leader, not a teacher.

28 The total operation of a nature center should be geared toward educating as many individuals as possible in as many topics relating to nature as possible.

29 Nature centers should be competitive to insure high standards of design and performance.

30 Nature centers should be located within close proximity to urban centers to be effective.

31 Habitat management is a primary goal of land development at a nature center.

32 The nature center should have a series of displays which tell the story of the natural history of the area in which it is located.

33 An objective of every field trip should be learning the names of a few plants and animals in the area.

34 Interpretation is entertainment.

35 Interpretation is more of an art than a science.

36 Collections of birds, mammals, and so forth are very useful in interpretive programs and should be a serious goal early in a nature center's development.

37 Collections of creatures are of little use at nature centers unless the ecology of those creatures is understood first.

38 Although some types of visitors may not be pleasant or easy to deal with, it is the interpreter's duty to treat everyone fairly and equally.

39 A good interpreter is a good artist as well.

40 A uniformed naturalist automatically evokes respect and credibility, and usually has an easier time with groups on the trail.

41 Providing limited care for injured wild animals and birds should be a goal considered by nature centers.

42 Knowing the wholeness of nature is more important than being able to name each plant and animal which inhabits it.

43 A modern, stylized nature center is important in the public's image of a program being in keeping with the times.

44 Tactile experiences are every bit as important as verbal communication in interpretation.

45 Certain areas of a nature center are fragile and unique and should be viewed and enjoyed only by those qualified and appreciative enough to do so.

46 Occasional use of unfamiliar terminology in interpretive exhibits may often trigger the visitor's imagination and encourage him to look deeper into its meaning.

47 Some areas of the trails will always simply have to be inaccessable to physically handicapped visitors.

48 Interpretation addressed to children should not be a dilution of the presentation to adults, but should follow a fundamentally different approach.

49 A nature center should offer pre- and post-field trip activity suggestions for teachers who utilize its facilities.

50 Types of visitors to a nature center should somehow be limited to those who are interested in nature and agree with the purposes of a nature center.

51 Nature centers should be available for extended group activities such as overnights or camping experiences on back parts of the property.

52 Nursery and preschool groups--in reality--gain very little from a field trip. That time might be better spent on an older, somewhat more able group.

53 Nature centers should offer their experiences free of charge so that no one is excluded from their benefits.

54 A small fee charged each visitor serves to increase that person's respect for the nature center and its true worth.

55 Nature trails should not have signs pointing out the sights of nature. They distract from the naturalness of things.

56 Interpretation is revelation based on information.

57 The content of a field trip is not as important as the feelings a person gets as he comes back from it.

58 Attitudes are more important to teach than taxonomy on the trail.

59 Teaching awareness of nature is far more important than teaching facts about it.

60 Interpretation should aim to present a whole rather than a part. It must address itself to the whole man rather than to any particular phase.

APPENDIX F

CONSENSUS ITEMS AND AVERAGE Z-SCORES. CRITERION IS 1.000

	ITEM DESCRIPTION	AVERAGE Z-SCORE
44.	TACTILE EXPERIENCES ARE EVERY BIT AS IMPORTANT AS VERBAL COMMUNICATION IN INTERPRETATION.	1.18
56.	INTERPRETATION IS REVELATION BASED ON INFORMATION.	.85
49.	A NATURE CENTER SHOULD OFFER PRE AND POST FIELD TRIP ACTIVITY SUGGESTIONS FOR TEACHERS WHO UTILIZE ITS FACILITIES.	.80
60.	INTERPRETATION SHOULD AIM TO PRESENT A WHOLE RATHER THAN A PART. IT MUST ADDRESS ITSELF TO THE WHOLE MAN RATHER THAN TO ANY PARTICULAR PHASE.	.66
47.	SOME AREAS OF THE TRAILS WILL ALWAYS SIMPLY HAVE TO BE INACCESSABLE TO PHYSICALLY HANDICAPPED VISITORS.	.48
43.	INTERPRETATION ADDRESSED TO CHILDREN SHOULD NOT BE A DILUTION OF THE PRESENTATION TO ADULTS, BUT SHOULD FOLLOW A FUNDAMENTALLY DIFFERENT APPROACH.	.48
32.	THE NATURE CENTER SHOULD HAVE A SERIES OF DISPLAYS WHICH TELL THE STORY OF THE NATURAL HISTORY OF THE AREA IN WHICH IT IS LOCATED.	.35
26.	PROGRAMS FOR HANDICAPPED VISITORS ARE EVERY BIT AS IMPORTANT AS THOSE FOR NORMAL VISITORS.	.25
37.	COLLECTIONS OF CREATURES ARE OF LITTLE USE AT NATURE CENTERS UNLESS THE ECOLOGY OF THOSE CREATURES IS UNDERSTOOD FIRST.	.01
41.	PROVIDING LIMITED CARE FOR INJURED WILD ANIMALS AND BIRDS SHOULD BE A GOAL CONSIDERED BY NATURE CENTERS.	-.20
46.	OCCASIONAL USE OF UNFAMILIAR TERMINOLOGY IN INTERPRETIVE EXHIBITS MAY OFTEN TRIGGER THE VISITORS IMAGINATION AND ENCOURAGE HIM TO LOOK DEEPER INTO ITS MEANING.	-.21

24.	INTERPRETATION IS A SCIENCE.	-.25
10.	WITH INTERPRETIVE SIGNS, AN OBJECT IS NEVER MADE MORE BEAUTIFUL BY CALLING IT BEAUTIFJL.	-.28
14.	CROSS COUNTRY SKIING, JOGGING, AND OTHER PHYSICAL EDUCAT ION TYPE ACTIVITIES HAVE NO PLACE ON NATURE TRAILS AND SHOULD NOT BE ALLOWED AT A NATURE CENTER.	-.40
40.	A UNIFORMED NATURALIST AUTOMATICALLY EVOKES RESPECT AND CREDABILITY, AND HAS AN EASIER TIME WITH GROUPS ON THE TRAIL.	-.47
2.	TRAIL MARKERS DISTRACT A PERSON FROM NATURE AND ARE NOT REALLY NECESSARY TO A SATISFYING INTERPRETIVE EXPERIENCE	-.47
36.	NATURE CENTERS MUST BE LOCATED WITHIN CLOSE PROXIMITY OF URBAN CENTERS TO BE EFFECTIVE.	-.49
54.	A SMALL FEE CHARGED EACH VISITOR SERVES TO INCREASE THAT PERSONS RESPECT FOR THE CENTER AND ITS TRUE WORTH.	-.74
25.	VOLUNTEER NATURALISTS USUALLY DONT SEEM TO HAVE THE EXPERTISE OR DEPTH NECESSARY TO MAKE GOOD WHOLISTIC PRESENTATIONS OF THE NATURAL COMMUNITY ON FIELD TRIPS.	-.79
55.	NATURE TRAILS SHOULD NOT HAVE SIGNS POINTING OUT THE SIGHTS OF NATURE. THEY DETRACT FROM THE NATURALNESS OF THINGS.	-.80
11.	YOUNGER INTERPRETERS RELATE BETTER TO YOUNGER GROUPS.	-1.07

NUMBER OF CONSENSUS ITEMS= 21

END OF ANALYSIS 1

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