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Measuring the Intangible Values of Natural Streams, Part II

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MEASURING THE INTANGIBLE VALUES OF NATURAL STREAMS, PART II
Preference Studies and Completion Report

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ABSTRACT

This report describes the work done during Part II of a project which had as its aim the development of a way to quantify those intangible values peculiar to a small stream and its watershed. Part I was concerned with an application of the "uniqueness concept" in the evaluation of fifty-eight Kentucky streams. The results of this effort are in Report #40, U. K. Water Resources Institute (1971).

During the second part of the project:

(1) A method was developed whereby peoples' preferences for natural landscapes could be measured. The method utilized projected color slides and a rating system based on the semantic differential.

(2) Fourteen preference studies were conducted using different types of subjects and stimuli (color slides).

(3) The data were factor analyzed and scores computed for three factors (Natural Beauty, Force and Starkness) for each slide-subject group combination.

(4) The scenic content of each slide was measured and related to the factor scores by a series of linear regression equations.

(5) The uniqueness ratio approach was modified to include fewer stream characteristics (thirty-seven) and the work of Part I essentially repeated.

(6) A new method of stream evaluation was developed which yields a factor score for a given stream on each of six factors (Scenic Attractiveness, Land Use-Topo, Litter, Aquatic Habitat, Extractive Industry, Development).

Conclusions were as follows:

(1) A scene that includes a view of running water is usually preferred over one that includes still water or no water at all.

(2) The stark beauty of a desert, lava flow or a winter pasture is not perceived by most people.

(3) Some types of visual pollution (i. e.; misfit billboards) are not recognized as such by some groups of people.

(4) Familiar scenes are not considered particularly beautiful even though they may be so to outsiders.

(5) Occupation and life style seem to have more effect on an individual's concept of natural beauty than age or sex.

(6) People agree on what's very beautiful or very ugly in a scene but disagree on the in-between.

(7) The semantic differential method as applied in this study yields measures of preference that are well-correlated with on-site evaluations by competent judges.

(8) Predicting preference from the physical content of a scene yields only approximate results.

(9) Reducing the number of stream characteristics used to compute uniqueness ratios did not greatly change the uniqueness rankings of the fifty-eight study streams.

(10) The recommended procedure for evaluating small streams is the factor score approach supplemented by a carefully conceived and executed preference study. The procedure should be applied to a random sample of all small streams in a state or region to establish a stream hierarchy. Factor scores and/or rankings for a given stream could, if desired, be worked into a benefit-cost or other such computation in the form of a weight or multiplier.

Keywords: Aesthetics*, Psychological aspects*, Scenery*, Value*, Intangible Benefits, Intangible Costs, Conservation, Environmental Effects, Recreation, Regional Analysis, Planning.

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CHAPTER I

INTRODUCTION

PROJECT OBJECTIVES

The following is excerpted, with some editing, from the original proposal for this project:

> "Public attitudes and preferences are becoming increasingly important to decision makers in evaluating alternative highway designs, flood control schemes, power generating proposals and other public and private works. The long term effects, both good and bad, of such projects are presently of great concern to the public and will become more so with its growing awareness that there are overlapping and often conflicting relationships among man's many activities on a crowded earth.
>
> Confrontations between interested segments of the public and land developers, governmental agencies and private industry over the use, misuse or destruction of naturalistic and historic areas have occurred frequently during the past several years. In most such cases public protestations are based on value concepts difficult to quantify in monetary terms. These protests are essentially verbalizations of a preference for one set of values (intangible) over another (tangible) and mean little in a conventional economic analysis.
>
> So the decision makers, lacking a way to evaluate intangibles in their analysis of alternatives, almost invariably yield to the numerical logic of the benefit-cost ratio or some other measure of economic effectiveness. There is then, a need to be able to quantify the value of intangibles of all kinds in assessing the consequences of land development plans and the management or exploitation of natural resources.
>
> The foregoing is particularly important in the case of small streams and their watersheds. Seldom can the protection or preservation of such landscapes be justified on economic grounds alone. And yet, because of the delicate ecological balance that exists in small watersheds, every change in land use has an effect which can range from minor detriment to disaster. A consideration of intangibles therefore becomes a necessity if good decisions are to be made about the use of these areas.

Purpose and Scope:

Actual attempts to represent or measure public preferences for the esthetic and other intangible values fall into at least three procedural categories:

(1) The inclusion of a consideration of intangibles in a rating system whereby the judgment of a rater or group of raters is expressed numerically either directly (e. g.; ugly = 1, beautiful = 5) or through the computation of a "score" made up of weighted components thought to be the major constituents of a given aspect of esthetics (e. g.; the procedures developed in a previous OWRR project for rating scenery)(10, pp. 57-59).*

(2) The sampling of attitudes through the use of a formal questionnaire, written or verbal. This is the procedure used at present for measuring public attitudes and opinions in many areas.

(3) Observation and analysis of the preferential behavior of individuals confronted with the task of ranking the relative desirability of an assortment of stimuli (usually photographs) that depict various intangible values or lack of same. Quantification of the results of this type of study has usually been accomplished through the statistical procedures of factor analysis.

In the present research it is proposed to apply the procedures and analyses of (3) to determine the preferences of a number of randomly selected individuals for those intangible qualities peculiar to natural streams and their surroundings and then to establish the extent to which these preferences may be correlated with the numerical rating systems of (1). The objective is the development of a general procedure that will yield a meaningful quantitative expression of the intangible worth of a given stream area.

The research will be limited primarily to free-flowing streams of sixth order or less. Most of the study streams will be selected from those designated by the Kentucky Outdoor Recreation Plan and the Kentucky Wild Rivers Commission (45, 56, 1) as suitable for preservation and/or development as "wild" or "scenic" streams. These streams are distributed throughout six of the eight physiographic regions of Kentucky. Generalization of the research will be enhanced by selecting at least one study stream from each of the six regions (see Fig. 21), thereby recognizing possible variations in quality due to differences in geology, hydrology, gemorphology

*Underlined numbers in parentheses refer to the list of references at the end of this report.

and related natural and man-modified conditions.

Procedures:

The research plan includes:

(1) Selection of the streams to be used in the preference study; (see above).

(2) Collection of sets of photographs depicting esthetic values, disvalues and other amenities peculiar to each of the selected streams. Emphasis will be placed on obtaining pictures that will evoke, as much as is possible, a reaction like that experienced when viewing the actual scene.

(3) Application to the study streams of the evaluation methodology developed in the previous OWRR project for those key elements usually thought of as being intangible. It is expected that the methodology will be simplified and modified to some extent as recommended in the completion report of the project (10 , pp. 173-74). Some new concepts of "uniqueness" in the physical aspects of small stream areas may also be introduced into the methodology (20, p. 714-15).

(4) The design and conductance of a preference study using certain of the collected photographs and a randomly selected sample of the public. Development of the specific procedures for this part of the work are crucial and will constitute an important part of the total effort. A pilot study using photographs and data from the previous OWRR project is envisioned as a first step.

(5) Analysis of the results of the preference study to determine which set of factors perceived in the photographs are most (or least) preferred by the public and which are the most reliable measures of their preferences.

(6) Determination of the degree of correlation between the factors isolated in (5) and the ratings computed in (3).

(7) Development of a way of expressing the intangible worth of a small stream area, given its physical attributes and a knowledge of how these attributes are related to the amenities found in the area.

(8) Test applications of the developed procedures to determine their general efficacy and applicability.

Significance of the Project:

The results of the proposed research should help resolve part of the dilemma facing those who must make decisions about the fate of small streams and their watersheds. Recognition of the value of these places for recreation, education and esthetic enjoyment is long overdue. In some localities a clean, free flowing stream of any size is fast becoming a scarce feature in the landscape. Intensive residential or commercial development or lodgement of a large extractive industry within a small watershed usually means the diminution or total obliteration of its natural and esthetic qualities. The existence of a way to quantitatively evaluate these intangibles will enable better and more equitable judgments to be made in problems involving the alternate uses of land and water resources in general and the small stream in particular."

In the early stages of the project, parts (1) and (3) of the research plan were changed as follows:

(1) A total of fifty eight Kentucky streams were selected for study. Sixteen of these were picked arbitrarily from the above mentioned lists of "wild" and "scenic" streams. The other forty-two streams were chosen randomly, by physiographic region, from a Kentucky small watershed map prepared by the U.S. Soil Conservation Service (see Figure 21).* (3) Instead of applying directly the methodology of OWRR A-010-KY (10), it was decided to pursue Leopold's ideas (20, 21) on uniqueness as a measure of relative value.

As a result of these changes and the consequent increase in the amount of work to be done, it was necessary to divide the project into two parts. Part One, completed in 1971, included the identification and measurement of fifty four physical, biological and esthetic characteristics for each of the fifty eight streams. Uniqueness ratios (20) were computed and various stream raking schemes were analyzed. The results of Part One have been previously reported (11).

The present report covers the second (preference study) part of the research as well as some further refinements of the uniqueness approach developed in Part One. It also serves as a Completion Report for the project.

BACKGROUND

Some of the background material on evaluation of intangibles was included in the report on Part One (11), Chap. I). It will not be repeated here. The following review covers the philosophy, procedures and analyses of Part Two of the project.

The word "value" has been defined in many different ways.

*A list of these streams, by county and physiographic region, is in Appendix J.

Rescher (32, p. 2) lists nine definitions of the word taken from a still longer list of K. Baier. Deal and Halbert (9, Ch. II) in their study of the uses of value theory in water resources planning, did an extensive analysis of the various definitions of "value". They decided that the ordinary concept of value was too limited for their purposes and consequently supplemented it with Rokeach's (33) definitions of "belief" and "attitude". Their accepted definition of "attitude" is germane to the present study:

> ".... a relatively enduring organization of beliefs around an object or situation which predisposes one to respond in some preferential manner."

In his classic "Varieties of Human Value", C. W. Morris set out three "aspects of value"; operative, conceived and object (25, pp. 9-12). The operative aspect, i.e.;

> ".... the tendencies or disposition of living beings to prefer one kind of object rather than another."

subsumed in the broader definition of "attitude" quoted above comes close to the concept of "value" as it is used in this study.

As for the adjective "intangible", Deal and Halbert recognize it as being nearly synonymous with "non-market" and include, as examples, such attributes as "scenic beauty, recreation opportunities, wildlife protection and water quality improvement." (9, p. 9). Leopold (20), Morisawa & Murie (24), Dearinger, Harper and James (10) and others have come up with similar lists of intangible values peculiar to streams and their watersheds.

The desirability of devising ways to measure intangible values is becoming increasingly obvious as the many-faceted, interlocking effects of growth and change on the earth's environments continue to appear. Referring, for example, to the need for quantifying one particularly elusive intangible, Richard Tybout (50) has written:

> "We must measure beauty -- not because we want to and despite the fact that we don't know how. We must measure it because if we don't it will not receive due consideration. The unsavory prospect of assigning numbers to a concept fraught with moral considerations must be balanced against the more unsavory concept of inadequate pollution control, strip mined landscapes and rings of junkyards around our cities."

At least two ideas have been advanced for actually including numerical measures of intangible values in conventional benefit-cost analyses. Stead and McGauhey (47) concentrated on so-called "human values" as quality-of-life indicators at different levels of air, water and land pollution. The human values for water quality included the highest level, "total scenic enjoyment"; then decreasing levels: enjoyment of swimming, fishing, boating, watching sunsets and "night-time vistas from hillsides". The monetary unit for evaluating the benefits of increasing increments of pollution control was taken as the value of one day in one human life (estimated to be $10.). Each upward step in water quality was valued at about $2/person/day. An example problem was worked out for the San Francisco Bay Area. Sonnen, Davis and Norton (42) developed two procedures for evaluating wild rivers that also utilize an incremental approach; the "Benefits Foregone - Subjective Decision Method" and the "Nonmonetary Expression of Benefits Method". The latter method lists a number of specific intangible values, most of them as sub-subfactors under the "purpose" heading of Recreation, which is in turn one of nine land and water development purposes considered in the Method. Of particular relevance is the group of "uniqueness attraction" subfactors which includes scientific, historical, scenic, recreational opportunity and recreational facilities elements. These amenities are assigned values ranging from 0.0 to 0.50 ("not unique" to "one-of-a-kind"). Multipliers estimated from this process and similar quantifications for eight other "purposes" are then combined to form an overall factor which when multiplied by the monetary benefits of a given stage of watershed development yields an estimate of the nonmonetary benefits for that stage.

Some of the most important intangible values of small streams and their watersheds are in the realm of the esthetic. The theory of esthetics and its relation to value and preference have been well developed by philosophers like Santayana (36) who seems to imply by the following that a measure of preference may also be a measure of value:

"There is no value apart from some appreciation of it and no good apart from some preference of it before its absence or its opposite. In appreciation, in preference lies the root and essence of all excellence".

The job of measuring and analyzing preference or preferential behavior belongs to the experimental or as he would be called in this case, the environmental psychologist. Much work has recently been done in this field because of the need to know and understand more about public opinion on environmental matters, and the availability of electronic computers with which to perform the complex analyses. A general treatment of the subject of preference measurement appears in a 1966 paper by Stevens (48). A review of the applications of environmental psychology in engineering decision-making has been prepared by Scroggin (38). Specific applications have been described by Craik (7, 8), Peterson (28, 29, 30), Canter (4), E. L. Shafer (40), Sawyer and Harbaugh (37), M. T. Shafer (41), Wohlwill (52, 53), Winkel (51), Gould (14), Sanoff (35), Deal & Halbert (9), C. W. Morris (25) and others.

A four-part structure for designing preference studies has been suggested by Craik (6). His "Process Model for the Comprehension of Environmental Displays" is used here as a framework for outlining the background of the procedures used in this project.

(1) Observers: Craik recognizes four groups of potential observers or subjects: Special Competence, Special user-clients, Relevant Personalities and Everyman. The observers in this study were mostly from the second group (college students and tourists). There were also included, however; one group of city-planners, some randomly gathered small town folk and at least one "relevant personality". Availability was, by necessity, the overriding criterion in selecting subjects.

(2) Presentation of Enviromental Displays: Possible ways of presenting the environment to the observer range from no presentation at all to a direct, living experience. In this study, projected color slides of landscapes, stream areas, etc. were used as surrogates for the real thing. The use of photographs obviously restricts the stimuli imparted to the observer to just one, the visual. Much depends upon whether or not that one type of stimulus can, in the observer's mind,

evoke a reaction similar to that of viewing the actual scene. Recent work on this problem by Coughlin and Goldstein (5) and Rabinowitz and Coughlin (31) has provided "some evidence that responses to viewing slides tend to be consistent with responses to the same environments in the field". They also report that "almost no significant correlations were found between preference ratings (from viewing landscapes in the field) and pleasant non-visual characteristics".

(3) Nature and Format of Judgements: Craik lists thirteen formats that may be used to assess an environmental display. For this study, a response format was sought that would be simple to understand, relatively fast to use and analyze, and yet be sophisticated enough to measure something more than just the extent to which a display was liked or disliked. The format selected was the Semantic Differential (S. D.), a type of rating scale which requires the observer (in the present context) to rate, on a scale of one to seven, his judgement of each scene (environmental display) as it is related to each pair of a set of pairs of antonymous adjectives, i. e.; hot ------cold, light----dark, etc. The S. D. was devised in 1955 by Osgood and Suci (26, 27) as "a scaling instrument which gives representation to the major dimension along which meaningful reactions or judgements vary". The S. D. has, among other things, been used to scale observer reactions to: building architecture (Canter, 4, and Sanoff, 35), building interiors (Kasmar, 19), concepts of snow, fog and rain (Sonnenfeld, 44), recreation sites (Peterson and Neumann, 30) and roadsides (Winkel, 51).

The specific way in which the S. D. was used in the present study is described in Chapter II of this Report.

(4) Validational Criteria: The validity of the preference studies conducted during this project was checked by correlating the results with additional data obtained in two ways: first, by the on-site evaluations by two experienced observers of certain "intangibles" for eleven of the study streams and, secondly, through measurement of the objective characteristics (physical scenic content) of the scenes depicted on the slides. The procedure followed in the latter case was like that used by Shafer, et al (39) and is further described in Chapter II.

The primary mathematical tool used in processing the multivariate data collected during both parts of this project was that of factor analysis. The purpose of factor analysis is to identify those "parsimonious few" dimensions (concepts, factors) which can be interpreted and used to represent or "explain" major variational patterns in large, complex sets of data. What is actually "analyzed" is the matrix of linear correlation coefficients (r) that relates each variable to each of the others. In Part I, for example (11), a 54 x 54 matrix of stream characteristics was factor analyzed. Six factors were extracted which together accounted for about two thirds of the variance in the data. In other words, the six factors came close to representing the same things as the original fifty four variables. A simplified summary of factor analysis and its application in a water resources study is included in a report by Deal and Halbert (9). A non-technical, example-filled, explanation of the computations involved may be found in Fruchter (13). A highly detailed, research-oriented, step-by-step presentation of factor analysis and many of its bypaths has been published by Rummel (34).

CHAPTER II

RESEARCH PROCEDURES

This chapter is about the development and application of the preference study methodology and the measurement of the scenic content of the preference study slides.

PREFERENCE STUDY METHODOLOGY

In their original experiment from which the Semantic Differential (S. D.) evolved (26), Osgood and Suci asked 100 subjects to rate, on a seven space scale, each of 20 concepts (such things as House, Cloud, etc.) against each of 50 pairs of bi-polar adjectives (antonyms; cold-hot, etc.). So, for N=20 concepts, S=100 subjects and n=50 scales, a "data cube" of NxSxn=100,000 cells was obtained, each cell containing an integer ranging in value from 1 to 7. From these raw data a 50 x 50 correlation matrix relating each scale (bi-polar adjective pair) to every other scale was formed. This matrix was then factor analyzed by the centroid factor method (13) with rotation to simple structure. By this process, the fifty possible dimensions of word meanings were reduced to three that were statistically significant and interpretable. Osgood and Suci named these: Evaluative, Potency and Activity. The three dimensions or factors together accounted for about half the total variance in judgements (26, Table 1).

PILOT STUDY I

To use the Semantic Differential in this project, it was first necessary to find out something about the range and variability of peoples' preferences for scenery and to determine what words they might tend to use in verbalizing their preferences. Or, to put it more simply; some ideas about the concepts (slides or scenes) and the scales (bi-polar adjectives) were needed.

Eighty color slides depicting various types of landscapes were selected from a larger collection. The landscapes were classified (see Table 1) according to compositional types (panoramic, feature, focal, enclosed, canopied, detail, ephemeral) suggested by Litton (22). Each slide was shown to a group of twelve Arts and Sciences graduate students for a period of about twenty five seconds. Each subject was asked to rate the scene depicted on a scale of one to ten (low to high). The rating was intended to express the subject's preference on the basis of relative attractiveness. Each subject was also asked to list, in the space provided on the rating form, as many adjectives as he could which he felt to be objectively or subjectively descriptive of the scene being shown.

Mean ratings and standard deviations were computed for each scene (see Table 1). The lists of descriptive adjectives were sorted alphabetically and the number of occurrences was determined for each adjective. From this listing, a dictionary of 105 bi-polar adjectives was compiled (see Appendix A).

It was inferred from the ratings and their standard deviations that:

(1) People like scenes that include water, particularly running water and water falls (e.g.; #6, #10, #14, #17, #29, #66, #72).

(2) Ephemeral conditions such as clouds, mist, sun position, etc. tend to enhance the attractiveness of a scene (e.g.; #5, #16, #43).

(3) Perception of a polluted environment is not always attained through the visual sense alone (e.g.; #79). There also seems to be a divergence of opinion as to what pollution, disvalues or misfits look like (e.g.; #2, #15).

(4) Locally commonplace, yet beautiful scenes evoke a somewhat indifferent response (e.g.; #7, #9, #55, #60).

(5) Too many "pretty" scenes were included in the 80 slide sample used in this pilot study. An attempt was made in later studies to include a wider range of attractiveness.

Copies of the bi-polar adjective dictionary were distributed to faculty members of the University of Kentucky's Department of Psychology with the request that they pick from the list those adjective pairs most like those categorized by Osgood & Suci (26) and Heise (16) as Evaluative, Potent or Active and which were also descriptive of natural landscapes or the feelings evoked by them. The psychologists' selections were evaluated and a list of twenty five pairs were selected for use in the second pilot study.

TABLE 1

SCENE DESCRIPTIONS AND RATINGS

PILOT STUDY I

Scene No.	Description & Location	Landscape Type	Mean Rating	Std. Dev.
1	Foothills of Front Range-Boulder, Colo.	PAN.	7.25	1.91
2	Coal Mine Wastepile-Perry Co., Ky.	FEAT.	3.50	2.43
3	Cliff & Forest-Nat'l. Bridge Park, Ky.	FEAT.	6.58	1.93
4	Trash Dump-Jessamine Cr., Ky.	FEAT.	1.42	0.79
5	Vine Reflection in Pool-Jessamine Cr., Ky.	EPHEM.	5.75	2.30
6	Riffle & Young Sycamores-Hickman Cr., "	FOCAL	6.58	1.51
7	Nov. Day-Spindletop Farm, Ky.	PAN.	5.17	1.11
8	Tall Spruce-Bear Lake-Rocky Mtn. N.P.	FEAT.	6.92	1.51
9	Farm & Hillside-Nr. Lexington, Ky.	PAN.	5.58	1.24
10	Connecticut River-Central Mass.	PAN.	7.75	1.36
11	Bear Lake-Rocky Mtn. Nat'l Park	FOCAL	6.92	1.08
12	Kentucky River From D. Boone's Grave	PAN.	5.83	1.40
13	Clear Creek-Summer-Woodford Co., Ky.	ENCL.	8.00	1.91
14	Lake-Trappist Monastery-Nelson Co., Ky.	ENCL.	6.67	1.56
15	Min. Golf & Motel-Ent. to Rocky Mtn.	FEAT.	3.92	1.98
16	Frozen Stream-Boone Creek, Ky.	EPHEM.	6.67	1.67
17	Concord River from Concord Bridge, Mass	FOCAL	7.50	1.45
18	Bank of Creek in Autumn-Jessamine Co.,	DETAIL	5.83	2.04
19	Dissected Plateau, Wooded-Red River, Ky.	PAN.	6.58	1.98
20	Eroded Limestone Cliffs-Jessamine " "	FEAT.	6.50	1.57
21	Wheat Field-Trappist Monastery-Nelson Co	PAN.	6.08	1.38
22	Boulder Creek-Boulder, Colo.	FOCAL	8.42	1.68
23	Rockhouse & Cliff - Clear Creek, Ky.	DETAIL	6.17	2.33
24	Incoming Tide, and Surf-York Beach, Maine	PAN.	7.50	1.57
25	Walden Pond-Concord, Mass.	ENCL.	5.83	1.53
26	Dry Limestone Creek Bed-Woodford Co.	CANO.	7.33	1.97
27	Pool & Large Rocks-Red River Gorge, Ky.	FOCAL	7.08	1.68
28	Pool & Rocks, Small Stream in Fall-Grier's	FOCAL	7.33	1.30
29	Falls, Boulder Cr., - Boulder, Colo.	FOCAL	8.08	1.56

TABLE 1
(cont'd)

Scene No	Description & Location	Landscape Type	Mean Rating	Std. Dev.
30	Brown Winter Pasture w/trees-Woodford	PAN.	5.00	2.30
31	Nubble Lighthouse & Sea-York Beach, Me.	FEAT.	7.00	1.60
32	Kentucky River Gorge-Camp Nelson, Ky.	PAN.	7.67	0.98
33	Backwater Pool w/trees. Winter-Jess. Cr.	FOCAL	6.25	1.96
34	Kentucky River Bridge, Autumn	PAN.	5.33	1.44
35	Pool w/overhanging Trees, Fall	CANO.	7.17	1.34
36	View to West, Cumb. Mtn. & Fern Lake-Cumberland Gap, Kentucky	PAN.	7.58	1.62
37	High Cliff in Fall-Jessamine Cr., Ky.	FEAT.	6.00	1.81
38	View from Mt. Greylock-North Adams, Ma.	PAN.	6.50	2.02
39	Sun Reflection from Brook-Woodford Co.	EPHEM.	5.25	1.71
40	Riffle, Cliffs, Springtime-Jessamine Cr.	FOCAL	7.50	1.51
41	Curved Limestone Cliff & Pool-Boone Cr.	FEAT.	6.33	1.61
42	Sunset, Front Range-Colorado	PAN. EPHEM.	8.58	1.24
43	Pond, Trees, Reflections-Woodford Co.	EPHEM.	6.33	1.23
44	Old Stone House-Boone Cr., Ky.	FEAT.	6.33	1.37
45	Taconic Mts. from Petersburgh, N.Y.	PAN.	6.17	1.85
46	Mossy Rocks in Brook-Harlan Co., Ky.	DETAIL	7.42	2.31
47	Gorge in Winter-Indian Falls Cr., Ky.	ENCL.	6.00	1.91
48	Cliff & Pool, Fall-Boone Cr., Ky.	FEAT.	6.75	1.60
49	Flatiron, Tilted Sandstone-Boulder, Colo.	FEAT.	7.42	1.56
50	Creek Valley, Winter Mists-Hickman Cr.	PAN.	5.50	2.20
51	Sun on River-Niagara River, N.Y.	PAN. EPHEM.	5.75	1.76
52	Rapids, Springtime-Jessamine Cr., Ky.	FEAT.	7.42	1.88
53	Windblown Willow-Fayette Co., Ky.	EPHEM. FEAT.	6.58	1.44
54	Frozen Riffle & Creek-Boone Cr., Ky.	ENCL.	7.58	1.78
55	Spring View w/House-Clear Cr., Ky.	FOCAL	4.42	1.73
56	Lake at Nederland, Colo.	ENCL.	7.75	1.54
57	Dry Falls-Jessamine Cr., Ky.	FEAT.	6.33	2.10
58	Sunset over Mts. & City-Boulder, Colo.	EPHEM.	7.25	2.22

TABLE 1
(cont'd)

Scene No.	Description & Location	Type	Mean Rating	Std. Dev.
59	Brook in Dry Nov. Pasture-Woodford Co.	FEAT.	4.75	2.05
60	Field & Hill in Alleghenies -W. Virginia	FEAT.	5.50	2.20
61	Field of Flowers & Cabin-Colorado	DETAIL	5.67	1.92
62	Rock Pillar at Cave Mouth-Jessamine Cr.	FEAT.	7.42	1.24
63	Mtn. Brook, Rapids-Rocky Mtn. Nat'l. Pk.	FOCAL	7.58	1.62
64	Pool in Autumn w/Reflections - Boone Cr.	EPHEM.	7.17	2.04
65	Bear Lake - Rocky Mtn. Nat'l Park	ENCL.	7.17	1.34
66	Indian Falls, Winter-Jessamine Cr., Ky.	FEAT.	7.58	1.62
67	Canaan Valley, West Virginia	PAN.	6.00	1.76
68	Allegheny Mts., Pastures-W. Virginia	PAN.	5.92	1.08
69	Pool, Red River Gorge-Wolfe Co., Ky.	ENCL.	7.83	1.99
70	Rock, Leaves & Pool-Clear Cr., Ky.	DETAIL	6.92	1.51
71	Crater Mtn.-Berthoud Pass, Colo.	PAN.	7.83	1.85
72	Falls of Blackwater R.-W. Virginia	FEAT.	8.42	1.44
73	Hillside & Road, Pastures-Woodford Co.	PAN.	6.50	1.45
74	Ferns in Forest-Stony Man Mtn., Va.	CANO.	7.17	2.52
75	Mt. Rainier, Washington	FEAT.	9.00	1.28
76	Brook in Winter-Woodford Co., Ky.	FOCAL	6.25	1.29
77	Cliffs in Spring-Jessamine Cr., Ky.	FEAT.	6.83	1.90
78	View to North from Pine Mtn.-Harlan Co.	PAN.	6.75	1.81
79	Detergent foam & Pollution-S. Elkhorn Cr.	EPHEM.	5.83	1.59
80	Valley, Abandoned Meander-Boone Cr.	ENCL.	5.83	1.19

PILOT STUDIES II-1 AND II-2

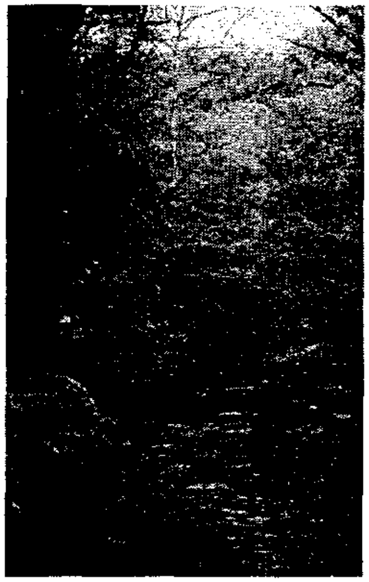
Twenty scenes were selected for the initial application of the S. D. procedure. Black and White reproductions of these scenes, in the sequence in which they were shown are in Figures 1, 2 and 3. The twenty five adjective pairs were randomly arranged both vertically and horizontally (i. e.; the "good" adjective of each pair was sometimes on the left, sometimes on the right) and reproduced with the appropriate headings and a 7-space rating box, one sheet for each scene (see Appendix A). A set of instructions including a provision for two trial runs was attached to each set of twenty rating forms.

The group of subjects for Pilot Study II-1 consisted of twenty-five college seniors enrolled in a summer-session psychometrics class. After a brief introduction the twenty slides were shown to the group. About two minutes per slide were required for each subject to make his twenty five judgements and mark the forms.

Pilot Study II-2 was essentially a replication of II-1 using a different set of slides (Figures 4, 5 and 6) and a different group of subjects twenty one summer-session students, mostly teachers.

Raw data for the two pilot studies constituted two data cubes (see Figure 22) of 20 x 25 x 25 = 12,500 cells and 20 x 21 x 25 = 10,500 cells, respectively; each cell containing an integer ranging from 1 through 7. The integers (ratings) were meaned for all subjects by scene (row) and scale (column) forming a scenes x scales (20 x 25) matrix of mean ratings for each pilot study. The mean ratings were then inter-correlated and the resulting 25 x 25 correlation matrix factor analyzed by the principal component method with varimax rotation (15, 17, 18).* Results for the two pilot studies were very similar. Three factors accounted for over 85% of the variance in mean ratings. Ten factors accounted for practically all the variance (99%). Table 2 shows the rank-ordered loadings equal to or greater than 0.30 on

*These procedures and the computer programs used are described in more detail in the following section and in Appendix C.



SCENE 1, SLIDE 072

SAME AS SCENE 15
PILOT STUDY III

SCENE 2, SLIDE 000

SCENE 3, SLIDE 902

SCENE 4, SLIDE 233

SCENE 5, SLIDE 241

SCENE 6, SLIDE 242

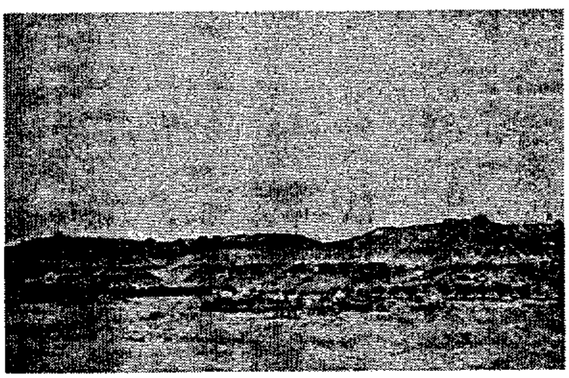
FIGURE 1 SCENES-PILOT STUDY II-1

SAME AS
SCENE 13
PILOT STUDY III

SCENE 7, SLIDE 001

SAME AS SCENE 7
PILOT STUDY III

SCENE 8, SLIDE 196



SCENE 9, SLIDE 900

SCENE 10, SLIDE 901

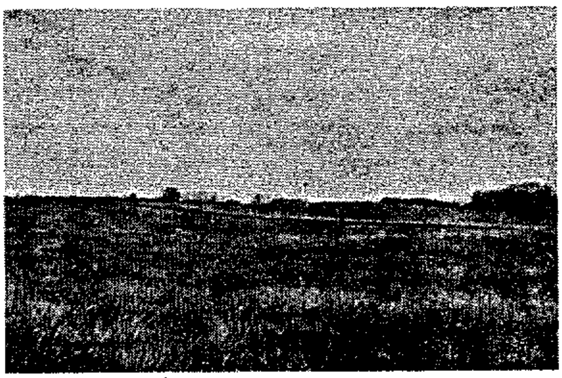
SCENE 11, SLIDE 023

SCENE 12, SLIDE 243

FIGURE 2 SCENES PILOT STUDY II-1

SCENE 13, SLIDE 174

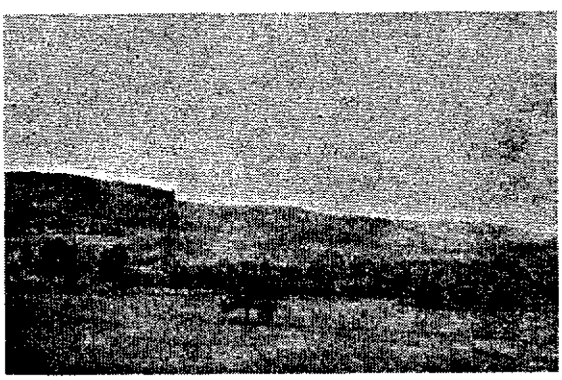
SCENE 14, SLIDE 244



SCENE 15, SLIDE 245

SAME AS SCENE 4
PILOT STUDY III

SCENE 16, SLIDE 025



SCENE 17, SLIDE 202

SCENE 18, SLIDE 046

SCENE 19, SLIDE 094

SAME AS SCENE 12
PILOT STUDY III

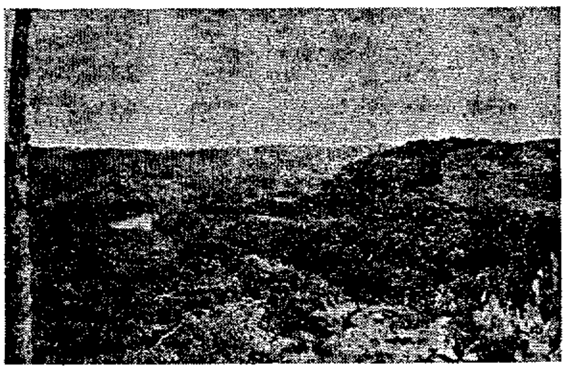
SCENE 20, SLIDE 109

FIGURE 3 SCENES-PILOT STUDY II-I

SCENE 1, SLIDE 246

SAME AS SCENE 8
PILOT STUDY III

SCENE 2, SLIDE 061



SCENE 3, SLIDE 097

SCENE 4, SLIDE 235

SAME AS SCENE 2
PILOT STUDY III

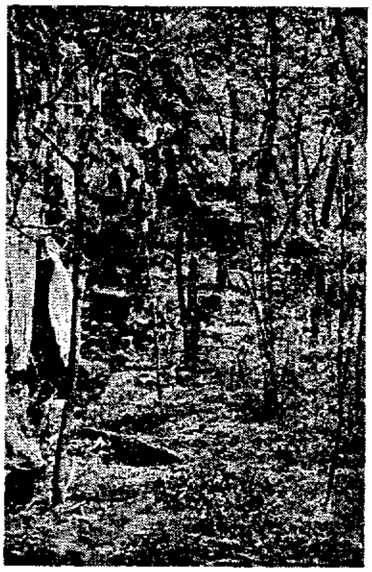
SCENE 5, SLIDE 031

SCENE 6, SLIDE 106

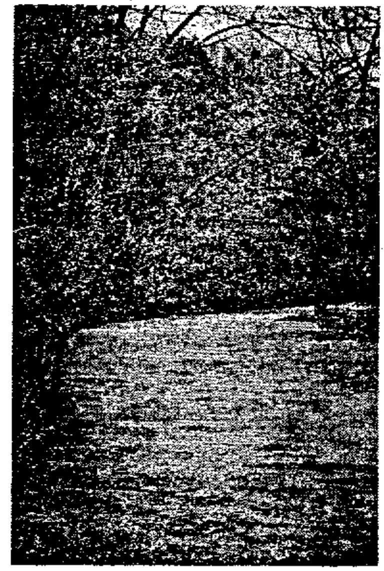
SCENE 7, SLIDE 111

SCENE 8, SLIDE 247

FIGURE 4 SCENES-PILOT STUDY II-2



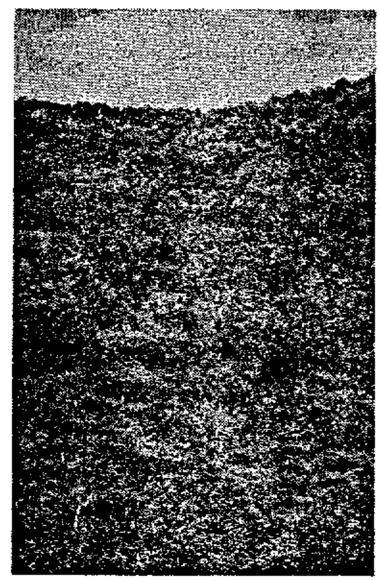
SCENE 9, SLIDE 248



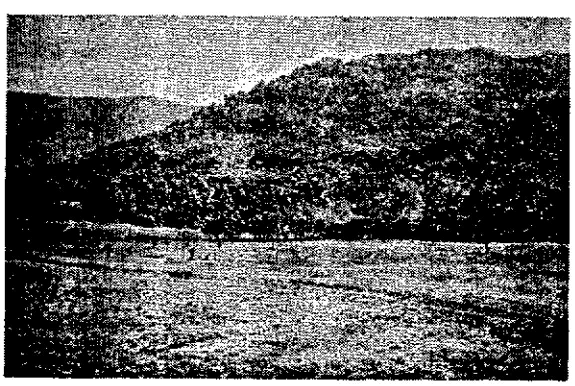
SCENE 10, SLIDE 249

SAME AS SCENE 10
PILOT STUDY II-1

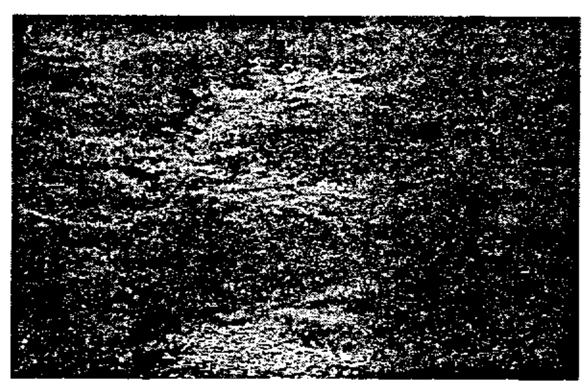
SCENE 11, SLIDE 901



SCENE 12, SLIDE 036

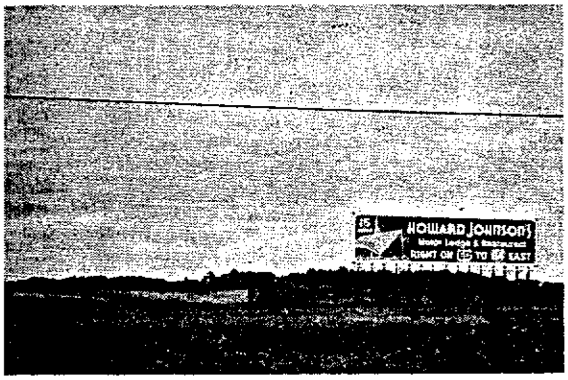


SCENE 13, SLIDE 176

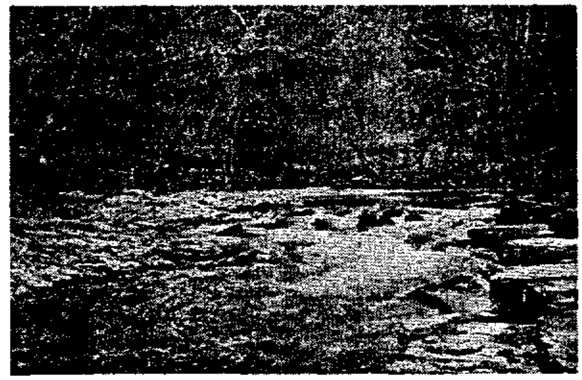


SCENE 14, SLIDE 016

FIGURE 5 SCENES-PILOT STUDY II-2



SCENE 15, SLIDE 250



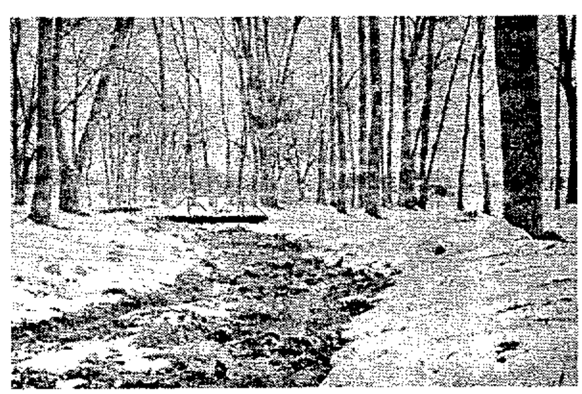
SCENE 16, SLIDE 251

SCENE 17, SLIDE 032

SCENE 18, SLIDE 252

SAME AS
SCENE 11
PILOT STUDY III

SCENE 19, SLIDE 129



SCENE 20, SLIDE 206

FIGURE 6 SCENES - PILOT STUDY II-2

TABLE 2

FACTOR LOADINGS ≥ |0.30| , PILOT STUDY II-2

Varimax Loading Matrix for Three Factors, Rank ordered

Factor I

(Explains 44.83% of the Variation)

Beautiful - Ugly	0.92
Good - Bad	0.91
Pleasant - Unpleasant	0.91
Inspiring - Unimpressive	0.89
Graceful - Awkward	0.88
Colorful - Drab	0.85
Boring - Exciting	-0.77
Artificial - Natural	-0.71
Barren - Fertile	-0.70
Full - Empty	0.64
Unique - Commonplace	0.63
Disturbing - Restful	-0.61
Cold - Warm	-0.52
Active - Passive	0.50
Weak - Powerful	-0.48
Peaceful - Ferocious	0.44
Primitive - Civilized	0.42
Simple - Complex	0.42
Wild - Tame	-0.31

Factor II

(Explains 31.54% of Variation)

Hushed - Loud	0.97
Turbulent - Tranquil	-0.93
Peaceful - Ferocious	0.87
Active - Passive	-0.79
Disturbing - Restful	-0.75
Simple - Complex	0.64

Weak -Powerful	0.59
Delicate - Rugged	0.53
Unique - Commonplace	- 0.35
Wild - Tame	- 0.32
Cold - Warm	- 0.31
Barren - Fertile	- 0.30

Factor III

(Explains 8.43% of Variation)

Wild - Tame	0.85
Primitive - Civilized	0.83
Heavy - Light	0.79
Closed - Open	0.70
Delicate - Rugged	- 0.69
Full - Empty	0.65
Artificial - Natural	- 0.62
Unique - Commonplace	0.60
Weak - Powerful	- 0.55
Boring - Exciting	- 0.50
Simple - Complex	- 0.46
Inspiring - Unimpressive	0.40
Cold - Warm	0.30

Cumulative % explained by 3 factors = 84.79.

Cumulative % explained by 10 factors = 98.74.

the first three factors for Pilot Study II-2. The three factors were tentatively interpreted (positively speaking) as:

I. Attributes of a preferred environment

II. Attributes of a quiet, commonplace environment

III. Wilderness or wildness.

The close agreement between these factor interpretation and the Evaluative, Potency and Activity factors of Osgood and Suci is obvious.

To shorten the length of time required to apply the S. D. method it was decided to reduce the number of both scales and scenes for the next pilot study. The correlation matrix and the factor loadings indicated that at least five of the bi-polar adjectives were redundant and could be eliminated. These were: Inspiring-Unimpressive, Heavy-Light, Closed-Open, Peaceful-Ferocious and Pleasant-Unpleasant. Removing these five from the adjective list and adding the question; "How much do you like or dislike this scene?" ..along with a seven space (Like it very much-Dislike it very much) rating scale brought the rating sheet to the final form used in all subsequent preference studies. A typical rating sheet and a set of instructions are in Appendix B.

PILOT STUDY III

The fifteen scenes used in this study are shown in Figures 7, 8 and 9. Recalling the results of the first two pilot studies, an attempt was made to include as much scenic variety as possible in the fifteen slides. The subject group was an introductory psychology class of one hundred thirty nine students. Because the course was an elective, the student group represented no particular college or undergraduate classification. This group, in fact, came closer to being a random selection than any other studied during the course of the project.

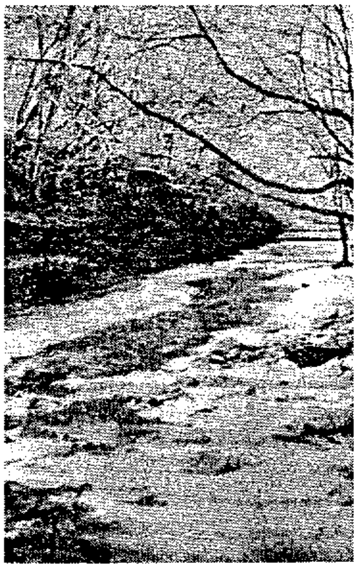
About forty-five minutes were required for the class to view the slides and mark the rating sheets. An explanation of the purpose of the study was given after the data were collected.

The responses of the one hundred thirty nine students were divided randomly into two groups of seventy (Set #1) and sixty nine (Set #2). Each set was analyzed separately to see if the data were biased in any way by the composition of the subject group.

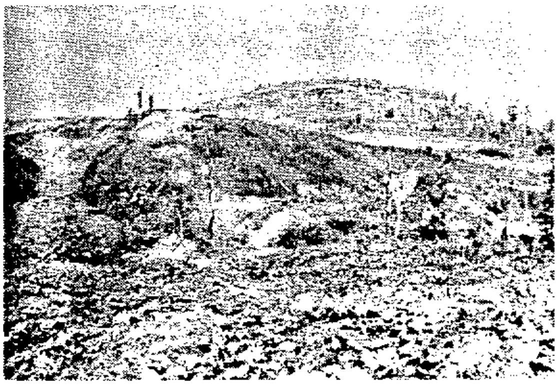
SCENE 1, SLIDE 199

SCENE 2, SLIDE 130

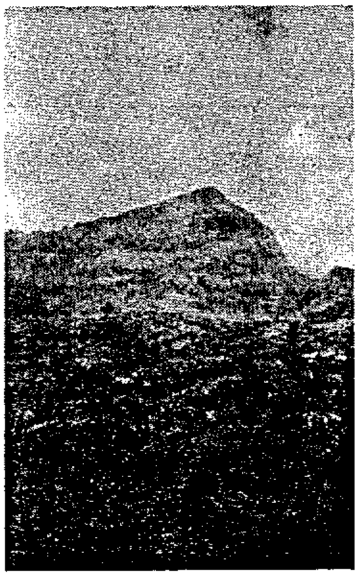
SCENE 3, SLIDE 605



SCENE 4, SLIDE 025



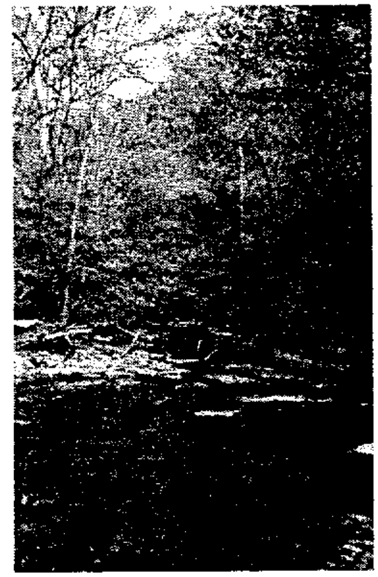
SCENE 5, SLIDE 603



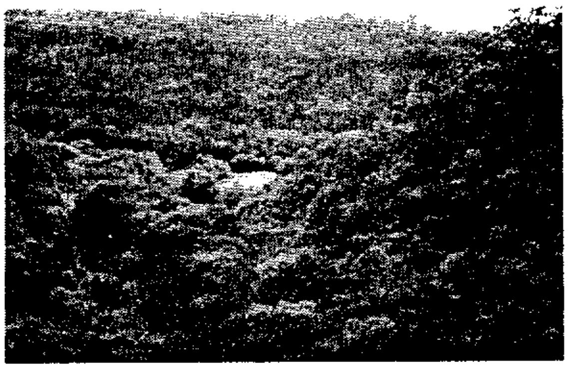
SCENE 6, SLIDE 216

FIGURE 7 SCENES - PILOT STUDY III

SCENE 7, SLIDE 196

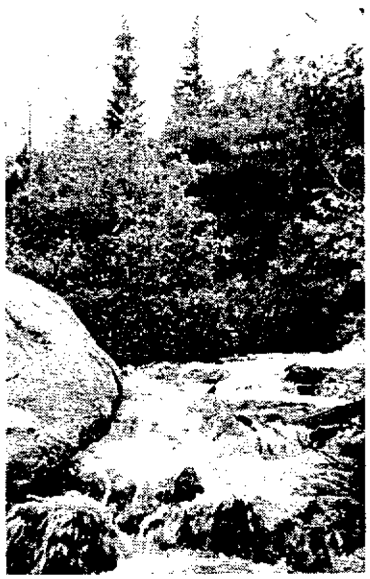


SCENE 8, SLIDE 061



SCENE 9, SLIDE 033

SCENE 10, SLIDE 336



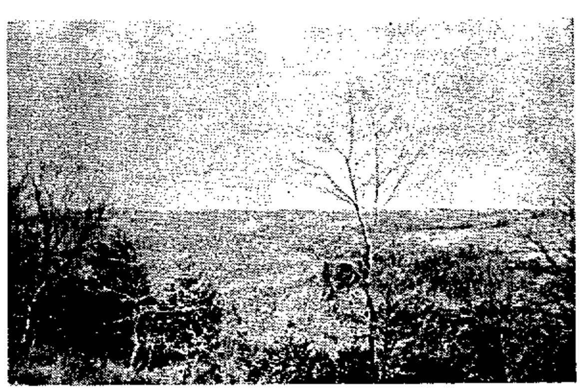
SCENE 11, SLIDE 129

SCENE 12, SLIDE 109

FIGURE 8 SCENES-PILOT STUDY III

SCENE 13, SLIDE 001

SCENE 14, SLIDE 604



SCENE 15, SLIDE 000

FIGURE 9 SCENES-PILOT STUDY III

Results of the statistical analyses for Pilot Study III are included in this chapter to illustrate the computational procedures used in this and all subsequent studies. Appendix C is an outline of the computations, beginning with the raw data matrix and ending with the factor scores for each of the scenes. Identification of the computer programs used and what they do are in Appendix C.

The mean ratings for each scene and scale are shown for Set #1 in Table 3. Column grand means and standard deviations are also tabulated. The close similarity between the mean ratings for Sets #1 and #2 indicated that for all practical purposes the two sets were identical and either could be used to represent the group of 139 subjects.

Table 4 is the correlation matrix derived from the mean rating matrix for Set #1. It shows the degree of linear correlation between each scale and all the other scales**. This matrix contains the numbers and relationships that are actually "analyzed" by a factor analysis. As above, a principal components factor analysis (15, 17) was used and the resulting factor structure rotated by the varimax ("maximizing the variance") procedure (18). Rotated factor loadings for Sets #1 and #2 are in Table 5. Also in Table 5 are the eigenvalues (sums of the squares of the loadings) for each factor and the percentage of the total variance of the input data "explained" by each factor.

It can be seen that the results of Pilot Study III resemble those obtained in Pilot Studies II-1 and II-2. Nearly 93% of the total variance is explained by the first three factors.

The first factor was interpreted (3) as "Natural Scenic Beauty" since it seemed to represent variations in scenes that were Colorful or Drab, Beautiful or Ugly, Natural or Artificial, etc. It is quite obviously an Evaluative factor and accounts for about 62% of the variation among scenes.

The second factor, termed "Natural Force", had high loadings on such scales as Wild-Tame, Turbulent-Tranquil, Loud-Hushed,

**Scale 21, the response to the Like-Dislike question, was included in these computations. The effect of leaving Scale 21 in or out of the data analyses was negligible.

TABLE 3
(All values x 100)
MEAN RATINGS - PILOT STUDY III SET#1

Scales	1	2	3	4	5	6	7	8	9	10	11	12
Scene 1	164	287	599	191	187	596	162	120	572	190	681	470
Scene 2	271	474	413	416	380	587	348	278	375	519	580	210
Scene 3	230	323	559	242	235	506	299	206	530	399	623	248
Scene 4	239	300	555	275	281	536	246	210	464	335	623	312
Scene 5	533	351	278	400	570	223	557	591	349	510	319	367
Scene 6	261	258	545	241	267	484	307	235	565	396	632	275
Scene 7	188	372	561	299	225	596	171	167	480	393	636	262
Scene 8	259	252	570	280	264	533	207	191	503	270	638	375
Scene 9	322	293	443	341	259	488	330	280	464	423	609	268
Scene 10	399	384	388	409	403	357	365	432	339	513	461	294
Scene 11	280	151	649	175	188	412	219	157	633	152	658	577
Scene 12	245	428	471	345	255	564	281	242	412	433	591	217
Scene 13	299	297	514	317	243	510	254	245	406	394	596	267
Scene 14	614	413	232	559	513	142	565	657	330	528	178	386
Scene 15	272	393	415	363	394	509	440	312	378	465	554	240
Mean	305	332	479	323	311	469	317	288	453	395	559	318
Std. Dev.	123	082	118	099	116	135	124	155	094	116	138	101

TABLE 3

PILOT STUDY III, Set #1 (cont'd.)

Scales	13	14	15	16	17	18	19	20	21
Scene 1	175	271	486	168	326	571	378	390	143
Scene 2	262	358	323	387	593	481	265	464	304
Scene 3	261	274	474	303	477	488	407	314	236
Scene 4	252	296	404	304	471	388	336	206	229
Scene 5	574	410	604	597	406	159	374	325	586
Scene 6	252	262	557	313	481	436	396	354	264
Scene 7	199	300	365	232	539	614	358	507	220
Scene 8	225	277	451	216	391	541	367	394	217
Scene 9	277	257	480	290	494	572	397	459	319
Scene 10	461	372	432	462	499	390	378	438	438
Scene 11	193	232	599	152	201	491	455	290	157
Scene 12	254	323	367	291	548	549	368	496	287
Scene 13	267	288	370	246	528	586	383	516	261
Scene 14	652	557	538	626	338	191	422	252	662
Scene 15	303	334	384	399	522	382	349	368	346
Mean	307	321	456	332	454	456	376	385	311
Std. Dev.	141	081	089	141	104	136	042	095	147

TABLE 4

CORRELATION MATRIX, SCALES - PILOT STUDY III. SET # 1

(Each entry is r x 1000)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	---																				
2	101	---																			
3	-897	-506	---																		
4	834	558	-978	---																	
5	857	471	-904	847	---																
6	-958	039	790	-696	-767	---															
7	868	362	-884	800	924	-800	---														
8	950	381	-968	929	941	-878	912	---													
9	-671	-695	877	-905	-824	506	-716	-796	---												
10	519	757	-766	756	717	-365	700	668	-836	---											
11	-952	-317	944	-889	-892	903	883	-967	755	-588	---										
12	215	-651	105	-171	-050	-376	-004	046	411	-632	-138	---									
13	968	251	-926	863	886	-942	872	968	-720	577	-977	126	---								
14	821	521	-917	898	855	-753	800	909	-820	606	-949	007	902	---							
15	512	-613	-180	050	225	-621	385	311	237	-191	-365	697	404	108	---						
16	889	442	-926	862	950	-831	944	949	-811	737	-940	-071	942	903	270	---					
17	-189	730	-162	239	094	374	009	-005	-468	686	093	-948	-108	049	-707	083	---				
18	-837	-206	751	-660	-882	835	-890	-855	593	-483	861	-149	-876	-798	-427	-925	186	---			
19	168	-618	095	-172	-229	-366	-021	-027	438	-445	-097	676	139	-047	669	-061	716	-048	---		
20	-182	338	-042	117	-078	301	-230	-113	-240	261	160	-393	-179	-086	-443	-191	552	478	-293	---	
21	961	328	-967	911	905	-895	908	973	-787	690	-971	008	978	893	368	954	022	-835	057	-071	--

TABLE 5

VARIMAX ROTATED FACTOR LOADINGS PILOT STUDY III

(x 1000)

Scale	Set #1 I	Set #1 II	Set #1 III	Set #2 I	Set #2 II	Set #2 III
1. graceful-awkward	956	-244	-003	958	216	-002
2. wild-tame	510	778	042	364	827	088
3. boring-exciting	-962	-220	-012	-972	-157	-118
4. unique-commonplace	889	353	095	918	238	186
5. full-empty	931	143	-245	935	177	-135
6. disturbing-restful	-876	460	065	-894	396	018
7. colorful-drab	937	038	-162	924	054	-210
8. beautiful-ugly	996	-046	-046	989	023	-024
9. weak-powerful	-788	-540	-090	-804	-512	-151
10. active-passive	759	580	121	678	634	114
11. artificial-natural	-081	092	062	-984	076	022
12. hushed-loud	-081	-869	-216	046	-905	-102
13. good-bad	984	-107	-061	980	-113	-031
14. primitive-civilized	915	114	-113	922	118	-016
15. delicate-rugged	276	-867	-176	339	-810	-166
16. alive-dead	963	149	-187	967	125	-171
17. turbulent-tranquil	-009	920	234	-006	921	257
18. barren-fertile	-837	164	493	-865	073	454
19. simple-complex	080	880	286	029	-863	105
20. cold-warm	-213	482	785	-100	368	884
21. like it very much-dislike it very much	997	013	-014	992	-012	045

TABLE 5 (cont'd.)

Scale	Set #1 I	II	III	Set #2 I	II	III
Eigenvalues	13.117	5.139	1.256	13.022	4.925	1.295
Percentage of Total Variance	62.46	24.43	5.98	62.01	23.45	6.17

Rugged-Delicate, Simple-Complex, etc. It is apparently a Potency factor and accounts for about 24% of the variation among scenes.

The third factor explains only an additional 6% of the total variance and is of doubtful significance. It probably distinguishes between scenes that are Warm or Cold, Fertile or Barren and could be construed as an Activity factor, though the connection is somewhat nebulous. Factor III was named "Natural Starkness."

All other factors (beyon d the first three) extracted in the analysis had eigenvalues less than one and were not considered significant.

Since it was desired to develop a numerical scale on which the various scenes could be ranked, factor scores were computed. These scores are, in effect, standardized mean ratings for each scene on each scale weighted by the factor loadings for the scales. The calculations were made following the procedures of Thompson (49) and Harman (15) as outlined in Appendix C. The factor scores computed for Set #1 of Pilot Study III are in Table 6.

The factor scores in Table 6 range from a high negative value, through zero, to a high positive value. The negative signs do not connote "badness" but are simply due to the horizontal placement of the bi-polar adjectives along the scales. All signs could be reversed without affecting the relationships represented by the factor scores.

The magnitude and algebraic signs of the factor scores shown in Table 6 are indicative of the following:

(1) For Factor I, a large negative score indicates that the scene is high in natural scenic beauty (e. g.; Scenes 1 and 11). A score near zero denotes a scene that is neither beautiful nor ugly, perhaps just commonplace (e. g.; Scenes 9 and 12). A large positive score designates a scene that is considered ugly or a misfit (e. g.; Scenes 5 and 14).

(2) For Factor II, scenes with large negative scores tend to convey an impression of wildness, turbulence, noise or complexity as in Scenes 1 and 11. Large positive scores denote scenes that are quiet and simple like Scenes 2, 7 and 12.

(3) Even though they are of doubtful statistical significance the

TABLE 6

FACTOR SCORES, PILOT STUDY III, SET #1

Scene & Slide No.	Factors I	Factors II	Factors III
1. Blackwater Falls (199)	- 1.17	- 0.96	0.24
2. Clear Creek meadow (031)	- 0.21	1.91	0.75
3. Black Mountain (605)	- 0.46	- 0.22	0.11
4. Boone Creek (025)	- 0.40	- 0.02	- 1.31
5. Rock Creek, waste pile (603)	1.82	- 0.36	- 2.84
6. Mountain, Rocky Mtn. Pk. (216)	- 0.41	- 0.52	- 0.14
7. Taconic Mountains (196)	- 0.73	0.74	2.10
8. Jessamine Creek, rapids (061)	- 0.70	- 0.48	- 0.32
9. Jessamine Creek (033)	- 0.18	0.07	1.30
10. North Elkhorn, Algae (336)	0.87	0.53	0.30
11. Brook, Rocky Mtn. Pk. (129)	- 1.04	- 2.57	- 1.06
12. Kentucky River (109)	- 0.16	1.04	1.81
13. Boone Creek, path (001)	- 0.38	0.47	2.01
14. Riverside dump (604)	2.39	- 0.44	- 3.08
15. Jessamine Creek (000)	0.36	0.86	- 0.27

scores for Factor III seem to make sense in the context of natural starkness. Scenes with large negative scores are cold and barren as in Scene 14 (roadside dump) and Scene 5 (coal mine gob pile). Scenes with large positive scores appear to be warm and fertile like Scenes 7 and 12.

The foregoing interpretation of the meaning of the three Factors and the Factor scores was applied to all the preference studies of this project. To summarize in simpler terms:

Factor I; Natural Scenic Beauty:

Beautiful (-) Ugly (+)

Factor II; Natural Force:

Turbulent, Complex (-) Tranquil, Simple (+)

Factor III; Natural Starkness:

Cold, Barren (-) Warm, Fertile (+)

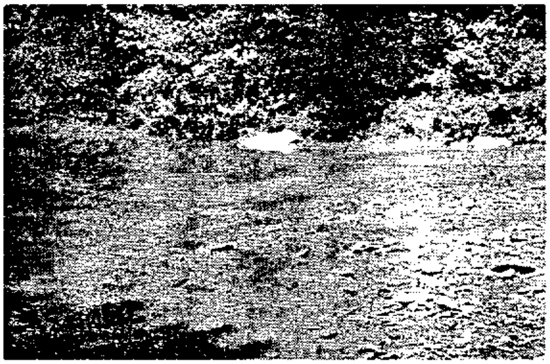
STUDY 1

The seventeen scenes used in this study are shown in Figures 10, 11 and 12. They were selected from a large collection of photographs (color slides) taken along several of the study streams during the summer of 1970. The streams represented in the seventeen scenes are: South Fork of Grassy Creek (1, 4, 13), Clear Creek (3, 6, 9), Martin's Fork,(5, 11, 14), Doe Run (8, 12) Russell Creek (7, 17), Rock Creek (2, 10, 8), and Red River (16).

Subjects for Study 1 were gathered more or less by chance from among the friends and neighbors of one of the research associates working on this project. The locale was Dry Ridge, a small rural town in North Central Kentucky. There were twenty two subjects, ranging in age from 11 to 65 and in occupation from housewife to city clerk. Also participating was a "relevant personality", a 26 year old doctoral candidate and environmental activist (see Appendix D for a tabulation of age and occupational characteristics of the subjects in Study 1 and Studies 4-11).

The responses of the Study 1 subjects were factor analyzed as a group and individually, i.e.; the data cube was taken first, as a whole and then in 23 slices of dimensions, N=17, S=1, n=21. The latter

SCENE 1, SLIDE 533

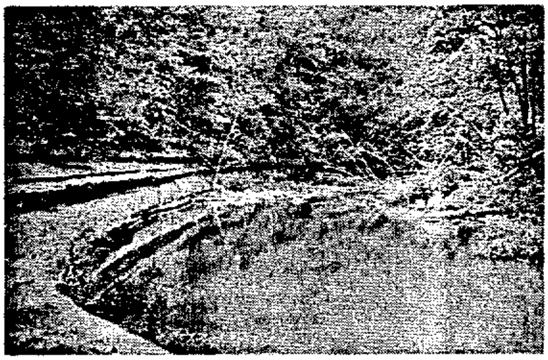


SCENE 2, SLIDE 498

SCENE 3, SLIDE 273

SCENE 4, SLIDE 545

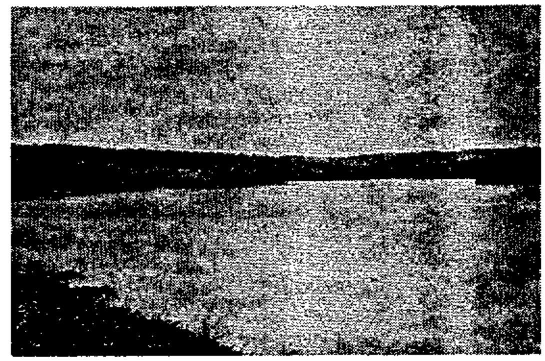
SCENE 5, SLIDE 514



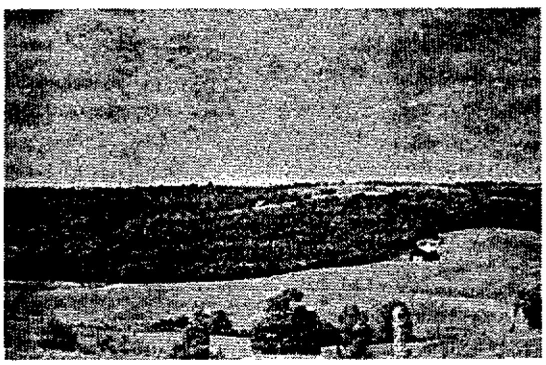
SCENE 6, SLIDE 275

FIGURE 10 SCENES-PREFERENCE STUDY #1

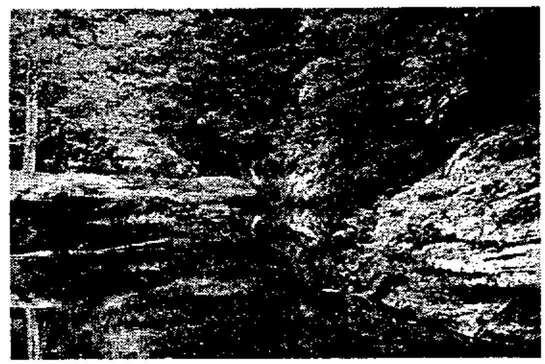
SCENE 7, SLIDE 561



SCENE 8, SLIDE 319



SCENE 9, SLIDE 271

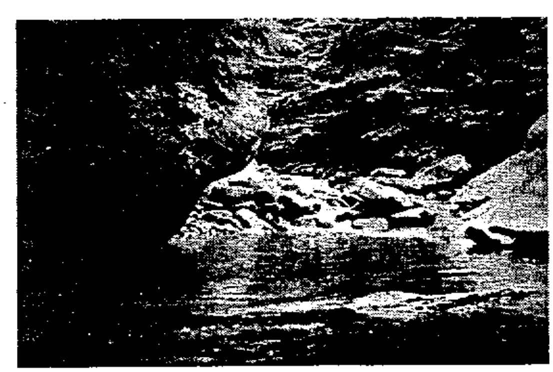


SCENE 10, SLIDE 495

SCENE 11, SLIDE 521

SCENE 12, SLIDE 314

SCENE 13, SLIDE 548



SCENE 14, SLIDE 516

FIGURE 11 SCENES-PREFERENCE STUDY #1

SCENE 15, SLIDE 559

SCENE 16, SLIDE 414

SCENE 17, SLIDE 567

FIGURE 12 SCENES-PREFERENCE STUDY #1

analyses were an attempt to evaluate individual differences. The results of this effort are discussed in Chapter III.

STUDY 2

The seventeen scenes of Study 2, all taken from the slide collection of 1970, are shown in Figure 13, 14 and 15. Streams represented are: North Elkhorn Creek (1, 4, 5, 13, 17), Crooked Creek (2, 9, 14), Buckhorn Creek (5, 8, 11, 16), Caney Creek (3, 10, 15), and Clear Creek (6, 12).

The subject group consisted of thirty four members of an environmental geography class, a sophomore level elective attended mostly by students with an interest in ecological matters.

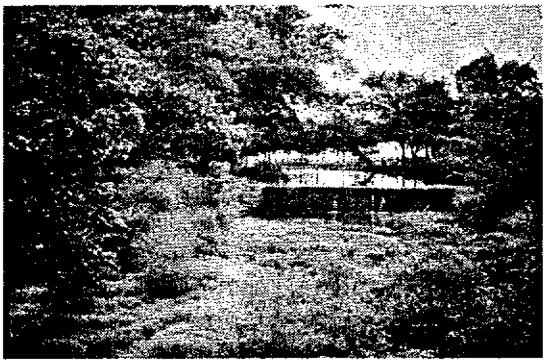
STUDIES 4, 5, 6 and 11

After analyzing the results of the pilot studies and the first three preference studies, it was decided to put together three groups of slides of maximum scenic variety (as indicated by the factor scores). These slides would be used in the remaining studies. Because of the anticipated nature of the subject groups and the limited time available for administering the procedure only ten slides were selected for each group. Slide Groups I, II, and III are shown or referenced in Figures 16 through 20.

Study 4 utilized slide group I. The subjects were seven members of the planning staff of the Lexington, Kentucky Planning Commission.

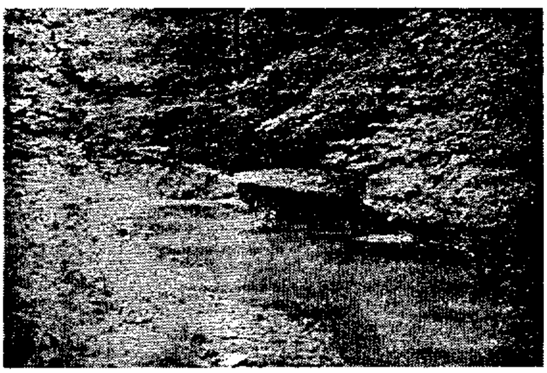
Study 5 subjects were students enrolled in two sections of a Civil Engineering Seminar. The first section (seven students) viewed the Group I slides and responded through the S. D. procedure. The second section (eighteen students) viewed the same slides in all possible (45) pair combinations and responded through the Method of Paired Comparisons (12). The results of applying the two procedures are compared in Chapter III. See Appendix E for the Paired Comparisons rating form.

Studies 6 and 11 utilized Slide Group I and were conducted (summer, 1972) in conjunction with nature lectures at Carter Caves and Cumberland Falls State Parks. The subject groups consisted, respectively, of thirty two and eighteen tourists of assorted occupations and backgrounds



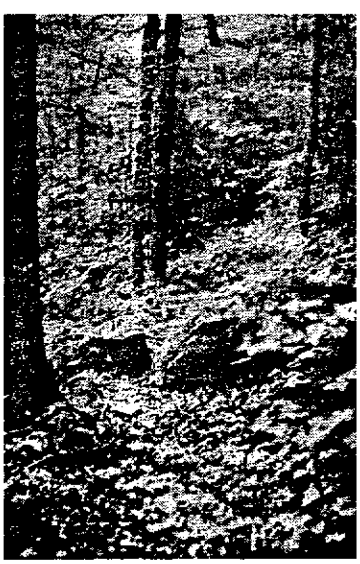
SCENE 1, SLIDE 344

SCENE 2, SLIDE 464



SCENE 3, SLIDE 380

SCENE 4, SLIDE 359

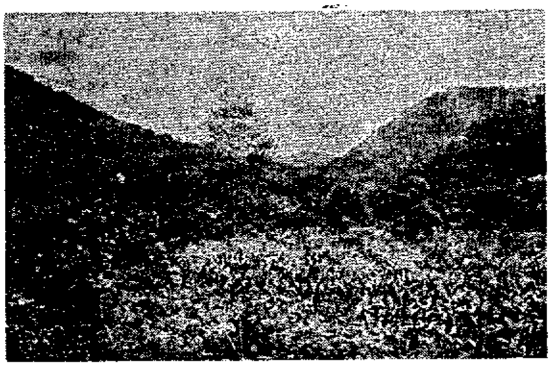


SCENE 5, SLIDE 438

SCENE 6, SLIDE 623

SCENE 7, SLIDE 337

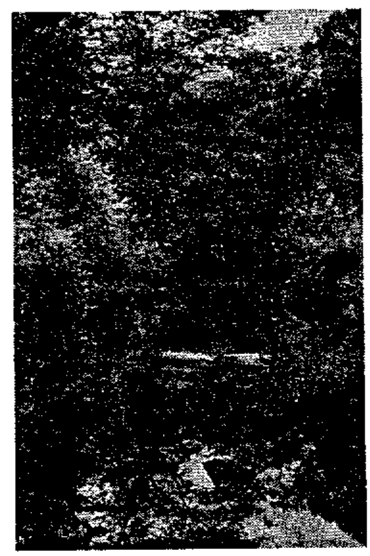
FIGURE 13 SCENES-PREFERENCE STUDY #2



SCENE 8, SLIDE 441

SCENE 9, SLIDE 450

SCENE 10, SLIDE 395



SCENE 11, SLIDE 425

SCENE 12, SLIDE 622

SCENE 13, SLIDE 343

FIGURE 14 SCENES-PREFERENCE STUDY #2

SCENE 14, SLIDE 458

SCENE 15, SLIDE 398

SCENE 16, SLIDE 445

SCENE 17, SLIDE 333

FIGURE 15 SCENES-PREFERENCE STUDY #2

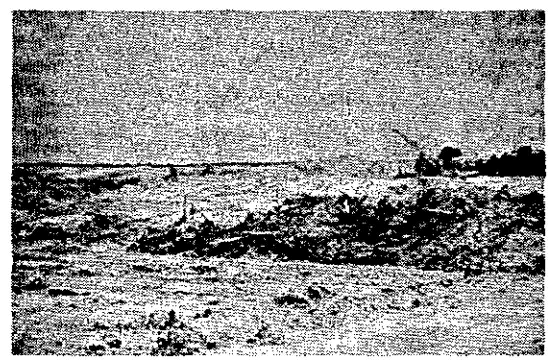
SAME AS PILOT STUDY II-2, SCENE 9

SCENE 1, SLIDE 248

SCENE 2, SLIDE 802

SAME AS PILOT STUDY III, SCENE 12

SCENE 3, SLIDE 109



SCENE 4, SLIDE 700

SAME AS PILOT STUDY II-1 SCENE 11

SCENE 5, SLIDE 023

SAME AS PILOT STUDY II-2, SCENE 15

SCENE 6, SLIDE 250

FIGURE 16 GROUP I, SCENES

(see Appendix D).

STUDIES 7, 8, 9 and 10

Studies 7, 8 and 10 utilized slide Group II and were conducted (summer, 1972) at Pine Mountain, Natural Bridge and Jenny Wiley State Parks. The subject groups were composed respectively, of ten, twelve and six tourists.

Study 9 utilized slide Group III. The respondents were thirty two tourists attending a nature talk at Natural Bridge State Park during the summer of 1972.

SCENIC CONTENT OF THE STUDY SLIDES

Each of ninety-five different color slides was used at least once during the course of the three pilot studies and eleven preference studies. At least one set of three factor scores was obtained for each slide. Regarding these scores as dependent variables, the problem was to determine whether or not there was a significant relationship between the factor scores and the com position of the scenes depicted on the slides. Quantitative measures of the various elements making up each scene would be considered as independent variables. Or, as Shafer has phrased it (40):

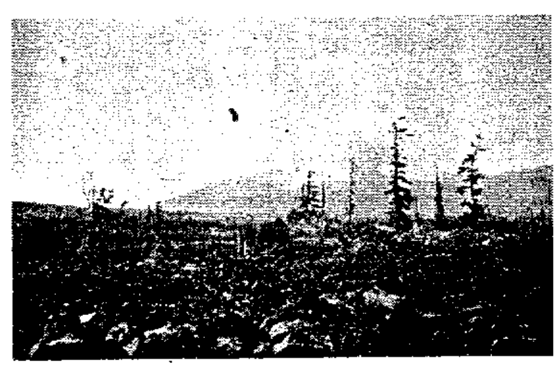
> "What quantitative variables in a landscape are significantly related to public preference for those landscapes?"

Shafer's attempt to answer his own question (39) involved, among other things, areal and perimetric measurements of sky, water, vegetation and non-vegetation as they appeared in the foreground, middleground and background of each scene. In all, twenty six "picture variables" were identified and measured on five of the 100 scenes (8" x 10" black & white photographs) used in the study. The five scenes selected were those which ranked first, twenty fifth, fiftieth, seventy fifth and one-hundredth in a preference study involving 250 respondents. The twenty six variables were intercorrelated and the correlation matrix factor analyzed. Nine factors were identified. By choosing the variable with the highest loading on each factor and doing some rearranging and combining, six measures were finally selected

SCENE 7, SLIDE 221

SCENE 8, SLIDE 806

SCENE 9, SLIDE 310



SCENE 10, SLIDE 810

FIGURE 17 GROUP I, SCENES

SCENE 1, SLIDE 213

SAME AS STUDY I, SCENE 7

SCENE 2, SLIDE 561

SAME AS PILOT STUDY III, SCENE 5

SCENE 3, SLIDE 603

SAME AS PILOT STUDY II-1, SCENE 4

SCENE 4, SLIDE 233

SAME AS PILOT STUDY II-2 SCENE 17

SCENE 5, SLIDE 032

SAME AS PILOT STUDY II-2, SCENE 18

SCENE 6, SLIDE 252

SAME AS PILOT STUDY III, SCENE 11

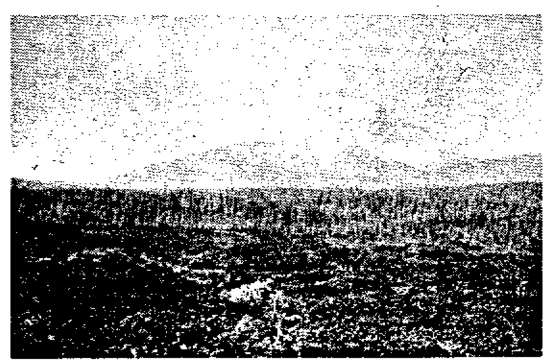
SCENE 7, SLIDE 129

SAME AS STUDY 2, SCENE 1

SCENE 8, SLIDE 344

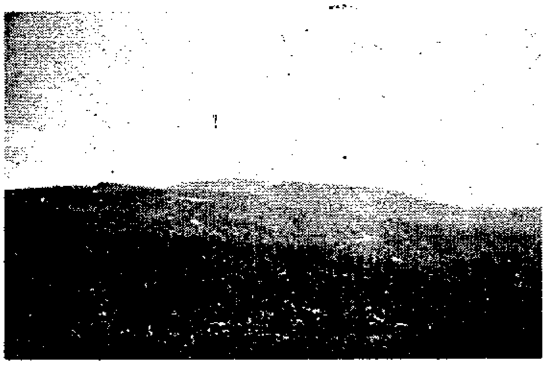
SAME AS STUDY, SCENE 8

SCENE 9, SLIDE 319

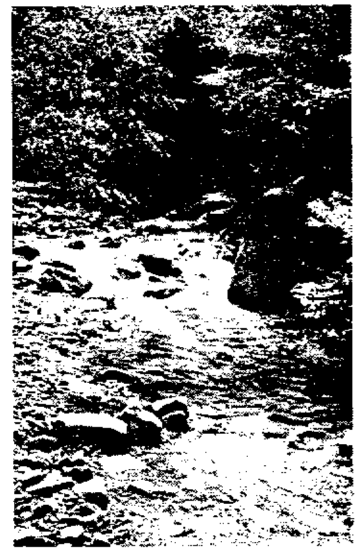


SCENE 10, SLIDE 803

FIGURE 18 GROUP II, SCENES



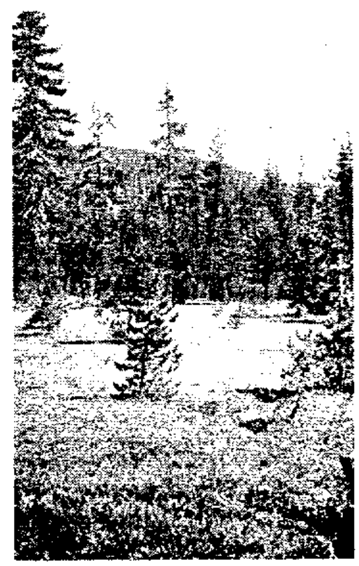
SCENE 1, SLIDE 804



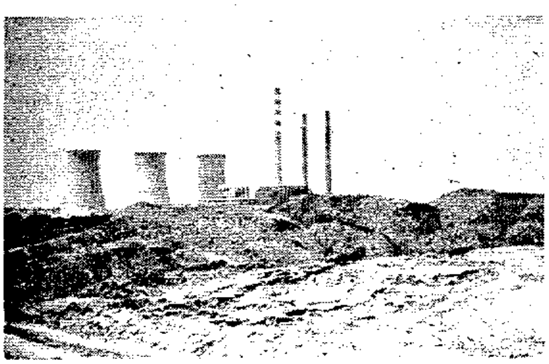
SCENE 2, SLIDE 513

SAME AS STUDY 2, SCENE 7

SCENE 3, SLIDE 337



SCENE 4, SLIDE 801



SCENE 5, SLIDE 704

SCENE 6, SLIDE 703

FIGURE 19 GROUP III, SCENES

SAME AS STUDY 2, SCENE 5

SCENE 7, SLIDE 438

SAME AS PILOT STUDY III, SCENE I

SCENE 8, SLIDE 199

SAME AS STUDY I, SCENE I

SCENE 9, SLIDE 533

SCENE 10, SLIDE 800

FIGURE 20 GROUP III, SCENES

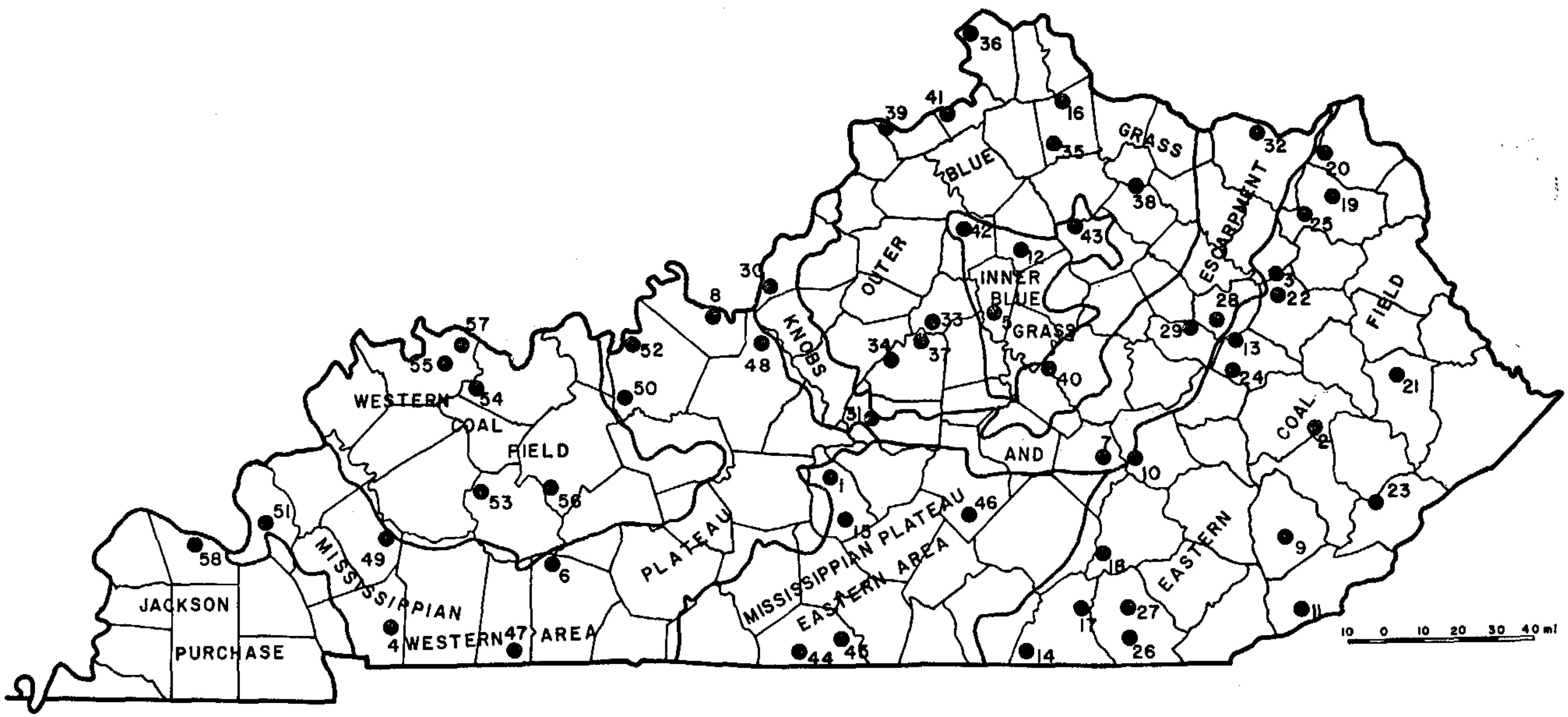


Figure 21. Map of Kentucky Showing Study Stream Locations

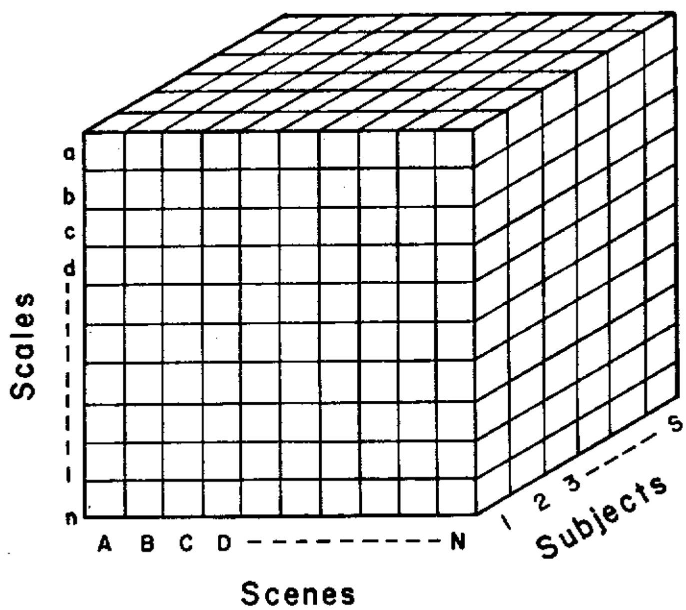


Figure 22. The Data Cube.

as the independent variables. From these data a multiple regression equation was derived which explained 66 percent of the variation in preference scores*. The six independent variables were: perimeters of immediate vegetation, intermediate nonvegetation and distant vegetation, and; areas of intermediate vegetation, water, and distant nonvegetation.

In the present study it was desired to follow a procedure like Shafer's but in a much simplified form. Upon examining the factor loadings in Shafer's paper (39, Table 1), it was found that the "area" variables were all highly loaded on one or the other of the factors extracted in the analysis, though not all had the highest loading on a given factor. With this in mind, it was decided to simply measure the percentage of the total area of each scene that was occupied by sky, water, waterfalls, and; vegetation or nonvegetation in the foreground, middleground or background, a total of nine "compositional" variables. To measure these percentages, each of the 95 slides was projected on a ground glass screen mounted vertically and covered with a sheet of clear acetate. With a felt tip marking pen the boundaries of the slide were marked on the acetate and the areas covered by those variables appearing in the slide were outlined and labeled. The acetate sheet was then removed from the screen and cut along the lines demarking the various areas. Each section was weighed on an electronic balance to the nearest 0.1 gram and the weights used to compute the areal percentages for each variable.

In addition to the nine measures of scenic composition, three classificatory variables represented by nominal scales were used; these were; Landscape Type, Landscape Pattern, and Color. The nominal scales and their meanings are in Table 7.

The Landscape Types were selected from among those suggested by Litton (22). Landscape Pattern Classifications were similar to those used by Rabinowitz and Coughlin (31) in their analyses of landscape preferences. The color triads were chosen on the basis of frequency

*Various transformations were performed on the six variables so that the final equation actually contained ten terms.

TABLE 7

NOMINAL SCALES

(X_1) LANDSCAPE TYPE

1. PANORAMA
2. FEATURE
3. ENCLOSED
4. FOCAL
5. UNDERGROWTH or CANOPIED
6. POLLUTION or MISFIT

(X_2) LANDSCAPE PATTERN

1. STRATIFIED - HORIZONTALLY
2. INTEGRATED BLOCK & CLUSTER - LOGICAL ARRANGEMENT
3. NON-INTEGRATED - RANDOM ARRANGEMENT
4. HOMOGENEOUS

(X_3) COLOR TRIADS

1. BLUE - GREEN - YELLOW
2. BLUE - GREEN - WHITE
3. BLUE - GREEN - BROWN
4. BLUE - GREEN - GREY
5. BLUE - WHITE - GREY
6. GREEN - WHITE - YELLOW
7. GREEN - BROWN - YELLOW
8. GREEN - BROWN - GREY
9. GREEN - BROWN - WHITE
10. BLUE -BROWN - GREY

of occurrence in the group of ninety five slides. Classification of the slides on the three nominal scales was done judgementally by two observers.

To summarize; the independent variables used in the attempt to relate factor scores with scenic content were:

X_1 = Landscape Type
X_2 = Landscape Pattern
X_3 = Color
X_4 = % of slide area in sky
X_5 = % of slide area in immediate vegetation
X_6 = % of slide area in intermediate vegetation
X_7 = % of slide area in distant vegetation
X_8 = % of slide area in immediate nonvegetation
X_9 = % of slide area in intermediate nonvegetation
X_{10} = % of slide area in distant non-vegetation
X_{11} = % of slide area in stream or lake
X_{12} = % of slide area in water falls.

The names of the areal variables have the same meanings as in Shafer's paper. "Sky" includes only sky and clouds. "Vegetation" means trees and shrubs. "Non-vegetation" includes grass, snow, rocks, earth, etc. "Immediate" means that characteristics of individual leaves or rocks are easily distinguishable. The "intermediate" zone is the middleground, where outlines of individual trees, shrubs, or rocks can be recognized. In the "distant" zone the existence of trees, shrubs, rocks, etc. can be perceived but no distinguishing individual features can be seen.

By stepwise multiple regression procedures, data for the twelve variables for each of the ninety five slides (see Appendix G) were correlated successively with the three factor scores for the slides. A regression equation was also developed independently for each of the fourteen preference studies. The basic data and the results of the regression computations are in the next chapter of this report.

CHAPTER III

DATA AND RESULTS

The first section of this chapter is about the results of analyses of data collected during the preference studies and the measurement of scenic content. Some of the raw and processed data are tabulated in appendices. The end results of the work; the factor scores for the study slides and the regression equations relating preference to scenic content, are presented in tabular and graphic form and discussed in the text.

The second section is devoted to the aforementioned modification of the uniqueness approach that was developed and reported in Part One (11) of the project.

In the third section, the results described in the first two sections are correlated and an evaluation made of the total project with respect to its original objectives.

THE PREFERENCE STUDIES

The data collected in Studies 1 through 11 were processed as outlined in Appendix C and exemplified (for PS-III) in Chapter II. Data from Pilot Studies II-1 and II-2 were also processed to obtain factor scores based on the 25 bi-polar adjective format used in those studies.

Space limitations precluded the customary inclusion, in this report, of the mean rating matrices and correlation matrices for PS II-1, PS II-2 and the eleven preference studies. These are reserved in the project archives. The factor loading matrices (unrotated and varimax rotated) for Studies 1-11 are however, tabulated in Appendix F.

A review of the one hundred sixty two sets of factor scores obtained from the thirteen studies revealed that all the scores for Factor I were consistent with common sense and with the interpretative pattern established by the analysis of PS-III*. Scores for Factors II and III, however, did not in all cases fall into sensible patterns in either magnitude or algebraic sign, e.g.; a scene that was obviously turbulent or barren might be scored as quiet or fertile.

To investigate the nature and extent of these disparities, correlations among factor loadings (varimax rotated) were computed for all studies, including PS II-1, PS II-2 and PS III, Set #1. The resulting 14 x 14 correlation matrices for each of the three factors are in Tables 8, 9 and 10.

Table 8 shows that correlations among Factor I loadings are all quite high with only Study 2 loadings yielding "r" values < 0.80.

For Factor II loadings (Table 9), Studies 3, 5, 6, 7, 8 and 11 and PS II-2 are fairly well correlated with PS-III ($r > 0.75$) while PS II-1 and Studies 1, 4, 9, and 10 are negatively correlated. Loadings for Study 2 are not strongly correlated with PS-III ($r < 0.50$) or any of the other studies.

Factor III loadings for Studies 2, 4, 5 and 9 (Table 10) are similar to those of PS-III ($r > 0.50$). Uncorrelated, or nearly so, are PS II-1, PS II-2 and Studies 2, 3, 6, 7, 8 and 10. Studies 1 and 10 show negative correlations.

Though the precise reasons for these discrepancies could not be fully determined, it was theorized that the relative statistical insignificance of Factors II and III might partially account for them. Acting on a suggestion of the project's psychometrics advisor, it was decided to "stabilize" the factor score computations by using, for all studies, a common loading matrix and a common set of eigenvalues (see Appendix C). The matrix and eigenvalues selected were those computed for Pilot Study III, Set #1 (Table 5)**.

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*Because of the large number and varied character of subjects involved, and the similarity of its outcome to the Osgood-Suci S. D. research, Pilot Study III was accepted as a logical basis for evaluating the results of the other studies.

**It was necessary to use a slightly different set of values for PS II-1 and PS II-2. Data for these studies were re-processed to fit a 20 scale format (with the like-dislike scale omitted) developed in some auxiliary analyses of PS-III data. See footnote, p. 28 .

TABLE 8

CORRELATION MATRIX

VARIMAX LOADINGS - FACTOR I
(Each entry is r x 1000)

	PSIII-1	PSII-1	PSII-2	S 1	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S 10	S 11
PSIII-1	---													
PSII-1	961	---												
PSII-2	953	917	---											
S 1	963	978	904	---										
S 2	831	839	715	871	---									
S 3	926	958	816	970	912	---								
S 4	910	879	941	867	810	805	---							
S 5	942	916	989	914	737	821	942	---						
S 6	942	923	882	958	842	925	857	882	---					
S 7	903	909	786	931	867	945	807	779	947	---				
S 8	924	944	826	961	854	969	793	820	970	966	---			
S 9	968	965	932	967	850	932	935	936	939	927	919	---		
S 10	957	934	915	940	878	907	910	913	931	904	912	934	---	
S 11	955	913	963	925	796	954	956	966	951	872	882	958	941	---

TABLE 9

CORRELATION MATRIX

VARIMAX LOADINGS - FACTOR II
(Each entry is r x 1000)

	PSIII-1	PSII-1	PSII-2	S 1	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S 10	S 11
PSIII-1	---													
PSII-1	-937	---												
PSII-2	807	-851	---											
S 1	-720	572	-405	---										
S 2	499	-369	163	849	---									
S 3	941	-896	878	-574	290	---								
S 4	-924	937	-772	616	-440	-885	---							
S 5	806	-861	970	-313	49	891	-789	---						
S 6	771	-783	923	-274	- 10	877	-685	942	---					
S 7	873	-857	523	-667	578	727	-869	564	504	---				
S 8	946	-910	773	-798	607	874	-901	729	682	834	---			
S 9	-963	946	-738	705	-524	-874	949	-760	-675	-934	-922	---		
S 10	-859	802	-849	757	-530	-820	778	-780	-741	-660	-886	803	---	
S 11	930	-926	752	-499	300	902	-914	789	795	885	854	-907	-712	---

TABLE 10

CORRELATION MATRIX

VARIMAX LOADINGS - FACTOR III
(Each entry is r x 1000)

	PSIII-1	PSII-1	PSII-2	S 1	S 2	S 3	S 4	S 5	S 6	S 7	S 8	S 9	S 10	S 11
PSIII-1	---													
PSII-1	103	---												
PSII-2	487	-166	---											
S 1	-533	-217	22	---										
S 2	638	-350	860	-185	---									
S 3	- 57	805	-118	- 37	-384	---								
S 4	754	-192	623	-484	853	-402	---							
S 5	822	- 61	778	-260	822	- 98	764	---						
S 6	46	913	- 60	-207	-271	750	-139	- 52	---					
S 7	- 80	852	-279	- 84	-546	896	-532	-219	799	---				
S 8	188	510	289	207	75	645	20	316	554	500	---			
S 9	550	670	358	-167	274	533	374	509	730	425	652	---		
S 10	446	-458	862	3	924	-393	726	773	-332	-596	114	176	---	
S 11	-745	-341	-590	490	-652	- 38	-805	-738	-425	26	-334	-786	-521	---

This manner of stabilizing the factor score computations means, in effect, that the standard scores for all studies were equally weighted through the matrix multiplication and scalar division operations so that differences in factor scores reflect relative differences in natural beauty, force (turbulence, complexity) and starkness rather than random statistical effects.

Stabilized scores obtained for Factor I were little different from those originally computed. The two sets of Factor I scores (original and stabilized) were, in subsequent computations, found to be highly correlated (r = 0.984). Stabilized scores for Factors II and III met, in all cases, the tests of reasonableness and common sense.

All factor scores discussed hereinafter are the stabilized scores. These scores, in slide sequence and in rank-order by factor are tabulated for all fourteen studies in Appendix G.

ANALYSIS

The factor scores of Appendix G are measures of differences; differences among scenes along the three dimensions of natural beauty, force and starkness, differences among the groups of subjects who viewed and rated the scenes, and, to some extent, differences among the individuals who made up each of the subject groups. In the following analyses scene differences and subject group differences are considered through the media of scene rankings on each factor (Appendix G) and a series of two-dimensional vector diagrams (Figures 23-44). On the latter, the magnitude and direction of the vector representing each scene were determined by plotting, as coordinates, the scores for Factors I and II on the "beauty-force plane" and the scores for Factors I and III on the "beauty-starkness plane." There are then, two diagrams for each study.

It can be seen from the diagrams that vectors for certain types of scenes tend to form groups or clusters. Though in most cases it would be possible to evaluate this grouping tendency intuitively, it was decided that some simple, form of cluster analysis would be appropriate. The procedure used was that described by Rummel

(34, Chap. 22) as "grouping on distances". In this method, distances are computed between all possible pairs of vectors by the Pythagorean theorem; the result is a symmetrical distance matrix with zeroes in the diagonal. The distance matrix is transformed into something similar to a correlation matrix by dividing each element by the greatest distance in the matrix and subtracting this quotient from one. This "scaled" distance matrix is then factor analyzed and varimax rotated. Scenes are grouped by noting those with the highest loadings on each of the clusters isolated by the factoring process. A computer program was written to do the distance calculations and punch out scaled distance matrices in a format suitable for input to the same factor analysis program (PAFA) referenced in Appendix C. Major clusters of scenes are delineated on the vector diagrams by solid lines. Scenes with significant loadings on two or more clusters are surrounded by dashed lines overlapping the major clusters to which they partially belong.

In the following review of the preference study findings, the scenes which rank in the high, middle and low ranges of the three factor score rankings are noted and their location and attributes briefly described. The results and meaning of the cluster analyses are then discussed.

Pilot Study II-1

Factor I - Scenic Beauty: Highly ranked on this factor were; slides 023 and 072 which are summertime scenes along Clear and Jessamine Creeks in Kentucky, a view of some cumulus clouds over New York's Taconic Mtns. (196), and a view of Boulder Falls in Colorado (046).

A near zero (neutral) score was accorded slide 901, a canopied scene of a portion of a Chicago city park.

Ranked lowest in scenic beauty were a brown winter pasture in Kentucky (233), the Egyptian desert (900) and a channel change excavation (242).

Factor II - Natural Force: Rated most turbulent or complex were Boulder Falls (046) and Clear Creek in flood (241). Ranked next, after a sizable gap in the scores, were a partially frozen creek (025) and the channel change (242). Regarded as neither turbulent nor quiet were views of the Red (244) and Kentucky (109) Rivers, the Taconics (196) and the desert (900).

With nearly identical scores as the quietest and simplest scenes were the winter pasture (233) and an early spring view along Jessamine Creek (094).

Factor III - Natural Starkness: Scores > 2.00 on this factor were accorded the desert (900), Boulder Falls (046) and the channel change (242). Scoring between 1.00 and 2.00 were the winter pasture (233), the frozen stream (025) and an early spring panorama of the Kentucky River gorge (000).

In the neutral category were pastoral scenes in West Virginia (202) and Kentucky (174).

Rated most fertile were Clear Creek in summer (023), a formal garden (902), the Taconics (196) and Jessamine Creek in summer (072).

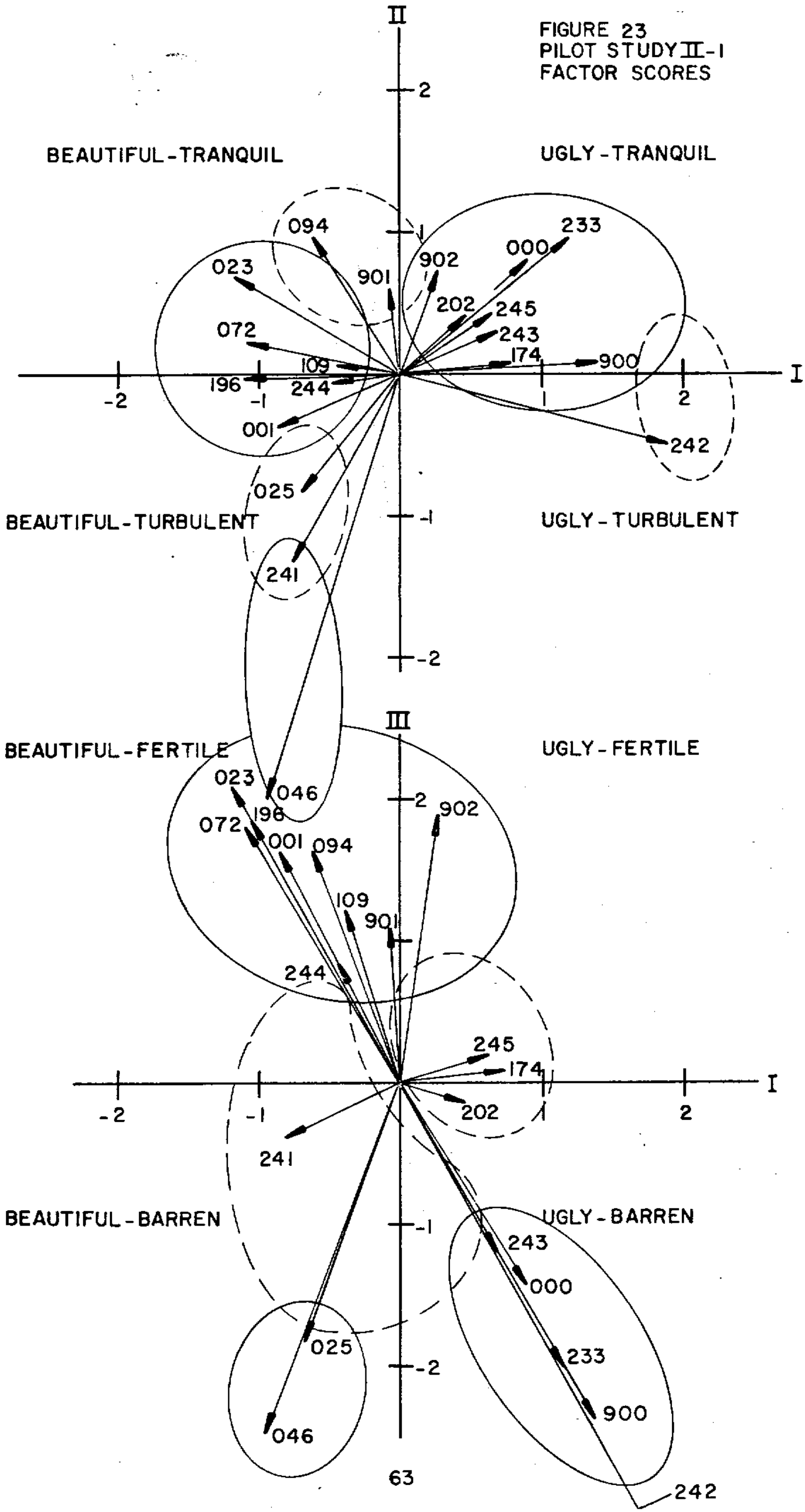
The participants in this study (and in most of the subsequent studies) tended to rate the scenes shown to them so that three major clusters were formed on both the beauty-force plane (I-II) and the beauty-starkness plane (I-III). Figure 23 shows the clusters for PS II-1.

Cluster #1* on plane I-II (I-II, #1) includes scenes that, except for the desert view (900) and the river panorama (000), are pastoral in nature. Cluster #2 (I-II, #2) contains the stream scenes (023, 072, 244, 109), the Taconics (196) and a woodland path (001). Cluster #3 (I-II, #3) consists only of Boulder Falls (046). The channel change (242) had nearly equal loadings on Cluster #1 and a possible fourth cluster. Slides 094 and 901 were about equally loaded on Clusters #1 and #2 and slides 025 and 241 seemed to have characteristics resembling both clusters #2 and #3.

Clusters on the I-III plane were somewhat better defined. I-III,#1

*Cluster numbers used in this analysis have no significance other than to represent the way the factor analysis program happened to label the columns of the loading matrix.

FIGURE 23
PILOT STUDY II-1
FACTOR SCORES



contains all of the summer stream scenes plus the park (901), garden (902) and woodland path (001). I-III, #2 is an arrangement of scenes increasing linearly in the ugly-barren direction from a late fall view of a creekside pasture (243) to the Egyptian desert (900) and the channel change (242). Similarly aligned in the beautiful-barren direction are the frozen creek (025) and Boulder Falls (046). Characteristics of all three clusters are evident in the flooded creek (241). The remaining three slides (245, 174, 202) overlap clusters #1 and #2.

This rather detailed presentation of the findings for PSII-1 (meant to serve as a guide to the briefer presentations which follow) seems to indicate that the twenty five students who participated in PS II-1:

(1) tended to prefer those scenes that included running water, with the "greener" scenes being rated highest,

(2) were not favorably impressed by either the commonplace pastures of summer or the stark beauty of a winter-browned field,

(3) were impressed by natural force, as exemplified by a waterfall in a barren, rocky gorge,

(4) were able to distinguish an environmental misfit like the channel change and,

(5) with the exception of the extreme cases (the waterfall and the channel change), tended to group their impressions of natural landscapes into fairly well-defined clusters on planes formed by the beauty-force and beauty-starkness dimensions.

Pilot Study II-2

The results of this study were similar to those of PS II-1. Though only one scene (901) was common to both studies, counterparts of many of the scenes of PS II-1 were used.

Stream scenes (061, 251, 129, 032) ranked highest on scenic beauty with pastoral views (130, 252, 235) rating near neutral and a winter panorama (247) and a misfit billboard (250) ranked lowest on the factor.

On the natural force factor, extremes were exemplified by a

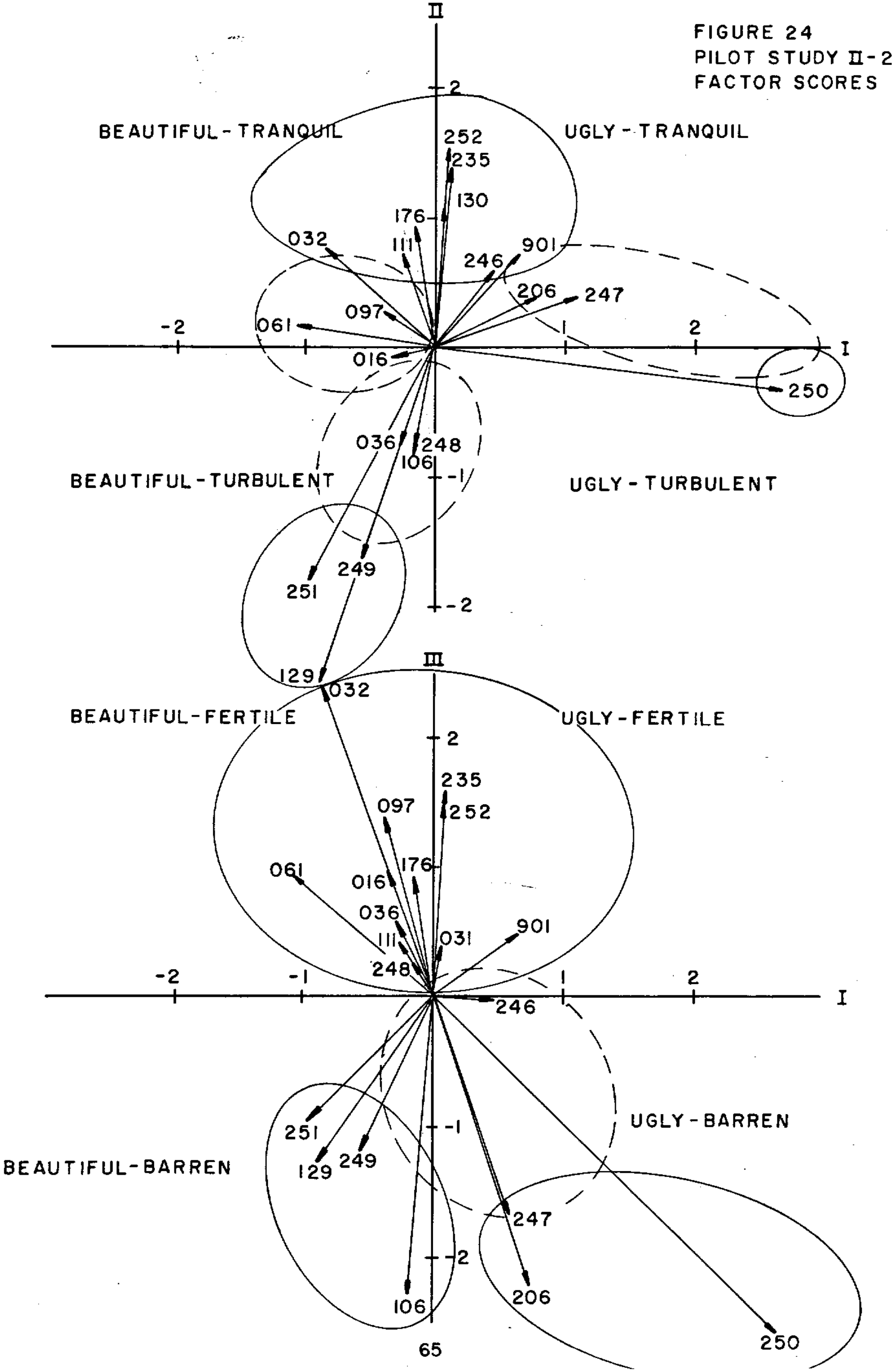


FIGURE 24
PILOT STUDY II-2
FACTOR SCORES

turbulent brook in Rocky Mtn. Nat'l. Park (129) and a late spring pasture (252). Neutral on this factor were two scenes (016 and 061) on Jessamine Cr., Ky. It should be noted here that slide 252 depicts the same area as slide 233 (the winter-browned field of PS II-1). The effect of seasonal differences is obvious, though the scene was not highly regarded in either its winter or summer version.

The billboard (250) and two snow and ice scenes (106 and 206) were regarded as very stark with factor scores >2.0. Representing the other extreme was a streamside in early May (032).

The cluster analyses (Fig. 24) revealed logical groupings and linkages among the twenty scenes like those of PS II-1. Of interest on the I-II plane is the unusual grouping of two complex woodland scenes (248, 036) and a partially frozen creek (106). On the I-III plane, two stream scenes with much bare rock in them (129, 251) are clustered with a flooded creek (248) and a frozen one (106).

The general conclusions reached in the analysis of PS II-1 may be applied to this study as well.

Pilot Study III

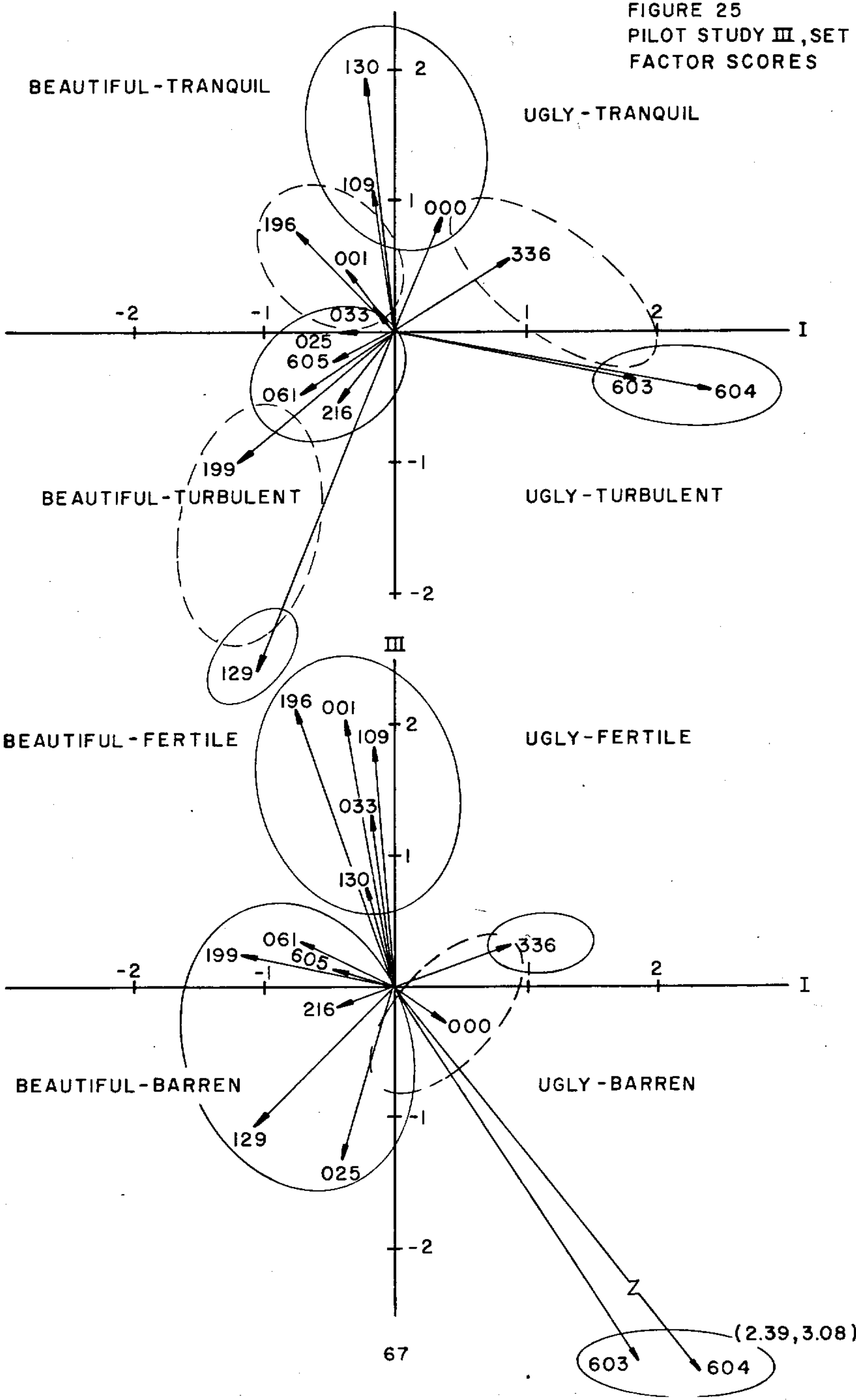
The factor scores for this study were discussed in Chapter II.

On the I-II plane (Fig. 25) four scenes (025, 605, 061 and 216) with nearly identical Factor I scores make up cluster #1. Two river valley panoramas (000, 109) and a pasture (130) are in cluster #2. An algae-covered stream (336) forms a link between cluster #2 and a cluster containing views of a coal mine gob pile (603) and a streamside dump (604). The mountain brook (129) is linked to cluster #1 by Blackwater Falls (199).

Four stream scenes (129, 199, 061, 025) and two mountain views (605, 216) are clustered on the "beautiful" side of the I-III plane. The panoramas (109, 196, 001, 033) and the pasture (130) are grouped near the positive "fertile" axis. Far in the ugly-barren direction are the two misfits (603, 604).

Eight of the scenes used in PS II-1 and PS II-2 (000, 001, 025, 061, 109, 129, 130, 196) were also used in PS III. A comparison of

FIGURE 25
PILOT STUDY III, SET I
FACTOR SCORES



the placement of these scenes on the vector diagrams of Figures 23, 24 and 25 shows that there was a significant difference in the way scenes 001, 196, 109 and 025 were regarded by the study participants. The students of PS III saw these scenes as being quieter and somewhat less beautiful than did the subjects of PS II-1 and PS II-2. There seemed to be some general agreement on the placement of the other common scenes, particularly on the high-rated mountain brook (129).

It can be seen, at this point, that the results of the three pilot studies are very similar for those scenes depicting extreme conditions of beauty or ugliness, tranquility or turbulence, fertility or barrenness. Differences of opinion on the three dimensions are most evident for scenes with scores in the mid-ranges above and below the neutral point. These basic findings were substantiated in subsequent preference studies in which the emphasis was on differences among specific stream areas and differences among selected subject groups.

Study 1

The slides used in Studies 1 and 2 were (with two exceptions) chosen from those collected along eleven Kentucky creeks during the summer of 1970. An attempt was made to select scenes that typified each stream and its surroundings. A few examples of environmental misfits and pollution found along the streams were also included.

As mentioned in Chapter II, the results of Study 1 were examined in detail to determine the extent and significance of individual differences among the twenty two participants. This was accomplished by analyzing separately each person's responses to the S. D. procedure. The result was twenty two sets of factor scores*. Scores on Factor I for each individual and for the whole group taken together were then intercorrelated. Positive correlations with the composite scores were obtained for eighteen of the subjects; r values ranged from 0.71

*These scores were computed using the loading matrix and eigenvalues derived for each individual, i.e.; the scores were not "stabilized."

for the 26 year old graduate student to 0.94 for the 51 year old beautician (see Appendix D). Negative correlations of -0.91, -0.63 and -0.84 were obtained, respectively, for the 19 year old beautician, the eleven year old and the city clerk. A near zero correlation was obtained for the retired 65 year old. Except for these four, correlations among individuals seemed to follow predictable patterns. The conservation officer's scores, for example, were well correlated ($r = 0.80$) with those of the dock operator, wildlife area manager and farmer; the two teachers' scores were similar ($r = 0.81$). There appeared to be no significant differences due to sex or age. It was not determined why the factor scores of the four outliers differed so radically from those of the other participants. The reason could lie anywhere from a misunderstanding of the instructions to a true difference of opinion.

The data were analyzed a second time, leaving out the scores of the outliers. The effect on the composite factor scores was minimal, so stabilized scores were computed from the original data and are those tabulated in Appendix G.

Rated highest on scenic beauty in this study was a focal view (514) of Martin's Fork, a small stream which lies mostly in the Cumberland Gap National Historical Park. Grouped just below this scene were a panoramic view of the Martin's Fork Watershed (521) and "running water" scenes along Russell (559), Clear (273) and Rock (495) Creeks. At the other end of the scale were views of pools (two of them muddy) on Russell Creek (567) and South Fork of Grassy Creek (545, 548). Lowest rating was given to a newly excavated area on Doe Run (314). Near the neutral point were an artificial lake on Doe Run (319) and a pastoral scene on Russell (561). Coal mine pollution on a section of Rock Creek (498) was apparently not recognized as such by the subjects.

Regarded as most turbulent or complex were two views of Martin's Fork (514, 516) and the excavated area (314); most tranquil were countryside scenes in the Russell and S. Fork of Grassy watersheds (561, 533). Nearest to a zero score were pools on Rock

(495), Russell (567) and S. Fork of Grassy (548).

The extremes of natural starkness were represented by the excavated area (314) and a summer view of Clear Creek Valley (271). At the neutral point was a riffle on Clear Creek (273). An early spring view of this same riffle (251) was rated barren and turbulent, but somewhat more beautiful by the subjects of PS II-2.

The scenes of Study 1 were clustered in well defined groups on both the I-II and I-III planes (Figure 26). I-II, #1 includes all the views of running water (514, 516, 273, 539), two clear, rock-bound pools (414, 495) and the Martin's Fork Watershed (521). I-II, #2 consists of the lake (319) and three pastoral scenes (271, 533, 561). I-II, #3 is composed of the polluted creek (498) and all the pool scenes except 275 which is linked with both I-II, #2 and I-II, #3. As in the pilot studies, the misfit (314) forms a one-scene cluster on both planes.

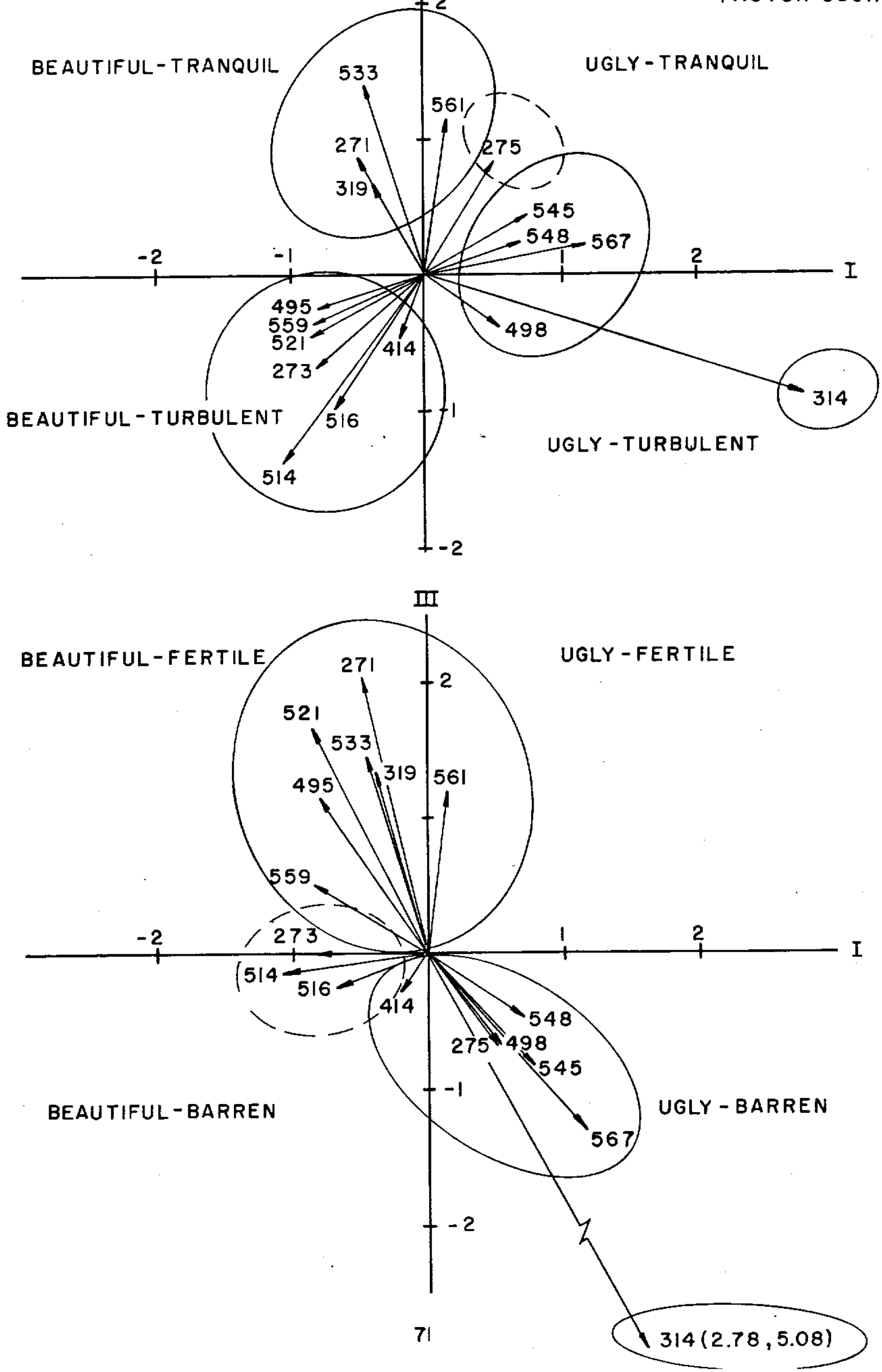
In I-III, #1 are the watershed views, the lake and the Russell Creek riffle (559). In I-III, #2 are the scenically low-rated stream pools and the polluted area of Rock Creek. Linked with both clusters in the beautiful-barren direction are the two Martin's Fork riffles (514, 516) and the Clear Creek riffle (273).

To summarize, it seems that this group of small-towners equated scenic beauty with moving water and rugged terrain. To them, farm scenes and sluggish creeks appeared commonplace or even ugly. They failed to recognize mine pollution, perhaps because their home area is far removed from the coal fields of East Kentucky.

Study 2

The thirty-four environmental geography students who rated the scenes of this study gave the highest score on Factor I to a complex melange of rocks, trees and shrubs (438) along a trail near Buckhorn Creek in Breathitt Co., Ky. A similar scene (248) was rated near neutral in PS II-2. Ranked next in scenic beauty was a view of a mill dam and pond on Elkhorn Creek in Central Ky. (344). This subject group recognized stream siltation (445) and a channel

FIGURE 26
STUDY I
FACTOR SCORES



change (450) as disvalues and rated them accordingly. A valley scene on Buckhorn Creek (441) and an algae bloom on Elkhorn Creek (333) were considered neutral.

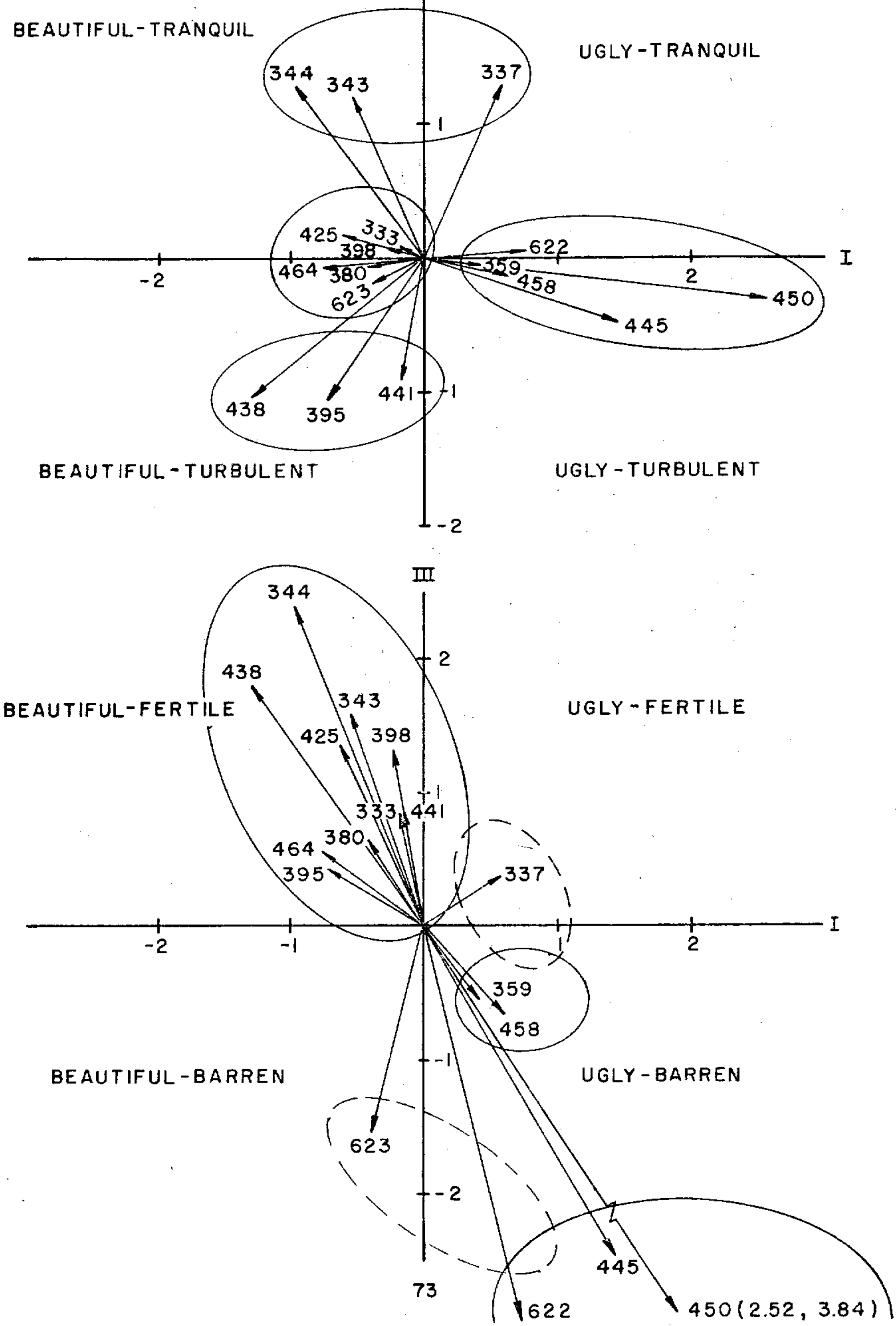
High negative scores on Factor II were related more to the concept of complexity than turbulence. This is indicated by the scores for the Buckhorn Trail (438) and Valley (441) and a rocky gorge on Caney Creek (395). Seven of the seventeen scenes were rated as neither turbulent nor tranquil; and these include a wintry creek bottom (622), pastoral scenes on Crooked (458, 464) Caney (398) and Elkhorn (359) Creeks and pools on Caney (380) and Elkhorn (333). Three views of Elkhorn Creek were rated the most tranquil with nearly identical factor scores (343, 344, 337).

The wintry creek bottom (622) was rated along with the two misfits as the most stark. Nearest to the neutral point was an Elkhorn pool (337). Rated very low on starkness was the mill dam (344), with four other "green" scenes grouped just above (398, 425, 343 and 438).

Figure 27 shows that there are four definite clusters of scenes on the I-II plane. I-II, #1 is a closeknit grouping of panoramas and pools. I-II, #2 consists of three Elkhorn Creek views, two of them highly ranked on scenic beauty. I-II, #3 includes two Buckhorn Creek scenes and the Caney Creek gorge. I-II, #4 is composed of the misfits, a rough creekside field (359), the wintry bottom and a surprisingly pretty scene of a section of Crooked Creek (458). Perhaps it is the presence of the country road in this latter scene that accounts for its placement on both the I-II and I-III planes.

Ten scenes are in cluster #1 on the I-III plane; not unusual when it is considered that all of them were collected in late summer and would therefore be expectably fertile. Grouped in the ugly-barren direction are the rough field and the road and creek in I-III, #2 and the misfits and wintry bottom in I-III, #3. Linked to clusters #1 and #2 is the Elkhorn pool (337). The only scene in the beautiful-barren direction is of a winter pool on Clear Creek (623); it is linked to I-III, #3.

FIGURE 27
STUDY 2
FACTOR SCORES



Compared to the Study 1 participants, the Study 2 subjects showed a greater degree of refinement in categorizing their seventeen scenes. This is evident from the vector diagrams. They also had different ideas about what constitutes a misfit or an ugly scene.

Study 3

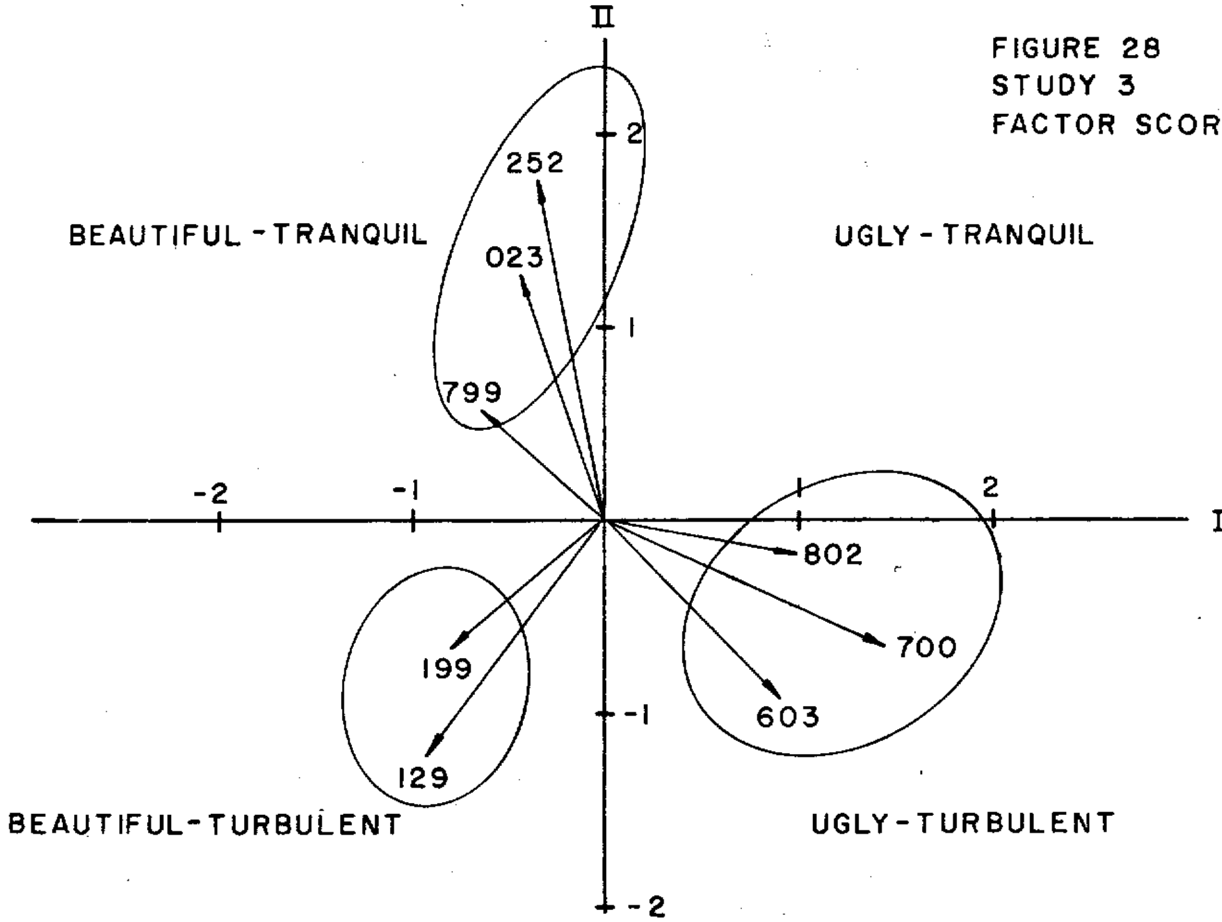
The six young matrons who viewed the eight scenes of this abbreviated study also had some definite concepts about the factor dimensions of beauty, force and starkness. Figure 28 shows the results of this definiteness. The green pasture scene (252) was placed in the same cluster with Clear Creek in summer (023) and a mountain and lake in the Cascades (799)*, a higher rating for the scene than that of PS II-2. Blackwater Falls (199) and the mountain brook (129) make up a second cluster, with scores similar to those of PS III. The strip mine (700), gob pile (603) and lava flow (802) are clustered on both planes, illustrating again that some subject groups do not distinguish between natural and manmade starkness, e. g.; the factor scores for the Egyptian desert scene of PS II-1. Of interest on the I-III plane is that all eight scenes were considered to be either beautiful-fertile or ugly-barren.

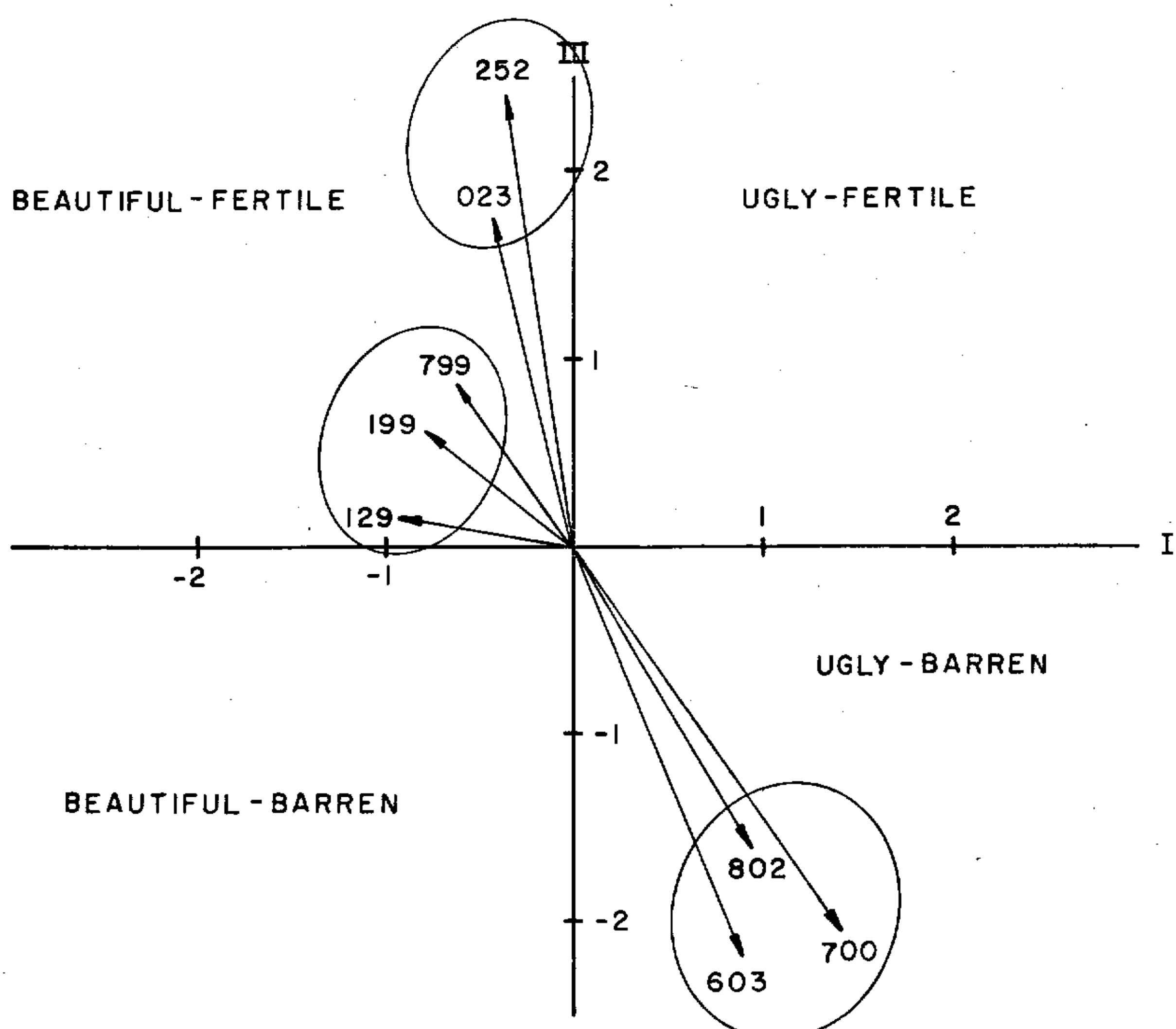
Studies 4, 5, 6 and 11 - Slide Group I

The subject groups for these preference studies were, respectively; city planners, senior civil engineering students, a tourist group at Carter Caves State Park, Ky. and a tourist group at Cumberland Falls State Park, Ky. They were each shown the same ten slides (Figures 16 and 17). The vector diagrams of Figures 29 through 36 will be utilized to establish the extent of agreement or disagreement among the four subject groups.

On the I-II plane (Figures 29-32) three scenes, at the extremes of beauty and ugliness, were similarly placed by all four groups. These were; a mountain brook (221), a waterfall (806) and a strip mine (700). The misfit billboard (250) was considered as turbulent or complex only by the city planners; the scene's placement was

FIGURE 28
STUDY 3
FACTOR SCORES





nearly identical for the other three groups. The two tourist groups rated both the Doe Run Lake (310) and Clear Creek (023) scenes higher in the beautiful-tranquil direction than did the planners and students. The tourists and the students agreed closely on the placement of the Taconic Mtns. scene (109). The students and the Cumberland Falls tourist group viewed the Buckhorn Creek trail scene (248) as more complex and less beautiful than did the other two groups. Disagreement was most pronounced on two views of a lava flow area in the Oregon Cascades (802 and 810). The planners and the Carter Caves tourists were in near agreement on the two scenes, placing them, respectively, in the ugly-neutral and ugly-turbulent directions. The students placed scene 802 slightly into the beautiful-turbulent quadrant while the other tourist group rated the scene as ugly-turbulent. Scene 810 differs from 802 in that it includes a long range view of a high mountain*. The Cumberland Falls tourists apparently thought this sufficient cause to place the scene in the beautiful-turbulent quadrant. The students placed 810 slightly in the ugly-turbulent direction.

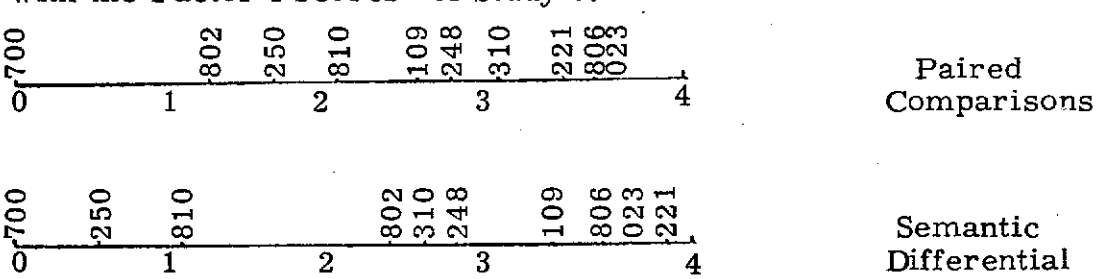
Four of the ten scenes (023, 109, 221, 700) were similarly placed on the I-III plane by all groups (see Figures 33-36). The planners and the Carter Caves group placed the billboard (250) near the strip mine scene (700) in the ugly-barren quadrant; the other groups did not regard it in the same extreme sense. Disagreement on the placement of scenes 802 and 810 followed the same pattern noted above for the I-II plane. In addition, the waterfall (806) was rated by the student group as beautiful-barren rather than beautiful-fertile, the placement given it by the other three groups.

There was a basic area of agreement among the four groups about scenes placed at or near the extremes of the diagram quadrants. Some types of scenes evoked varying interpretations of the tranquil-turbulent dimension, i.e.; the billboard (250) and the Buckhorn Creek

*This mountain failed to print visibly in the black and white reproduction of slide 810 in Figure 17.

Trail (248). Natural starkness was more accurately perceived by these groups than those of the pilot studies and, in some instances, was better liked.

The subject group of Study 5 consisted of a seminar class of senior civil engineering students. A second section of the seminar, meeting at the same time as the first, was used in an experiment to compare the results of the S. D. procedure with those of another scaling process, the Method of Paired Comparisons. The ten scenes of Slide Group I were shown, in all possible pairs, to the eighteen students attending the seminar. The subjects were asked to indicate on a simple form (Appendix E) which scene of each pair was to them the most attractive. Analysis of their preferences followed a procedure suggested by Edwards (12, Chap. 2). End result of the analysis was a scale value for each of the scenes with zero representing the least preferred scene. The following graphic scale compares the scale values of the paired comparison experiment with the Factor I scores* of Study 5:



It is suspected that the differences between the results of the two procedures may be due more to group differences than anything else. Agreement at the extremes is evident. Differences in the preferential placement of 802 and 810 are similar to those noted in the preceding analyses. Paired comparison, of course, forces a selection based on one criterion whereas the factor scores represent kind of an amalgam of scaled opinions based on the

*Factor I scores were adjusted to match the range of the paired comparisons scale (0-3.66).

FIGURE 29
SLIDE GROUP I, STUDY 4
FACTOR SCORES

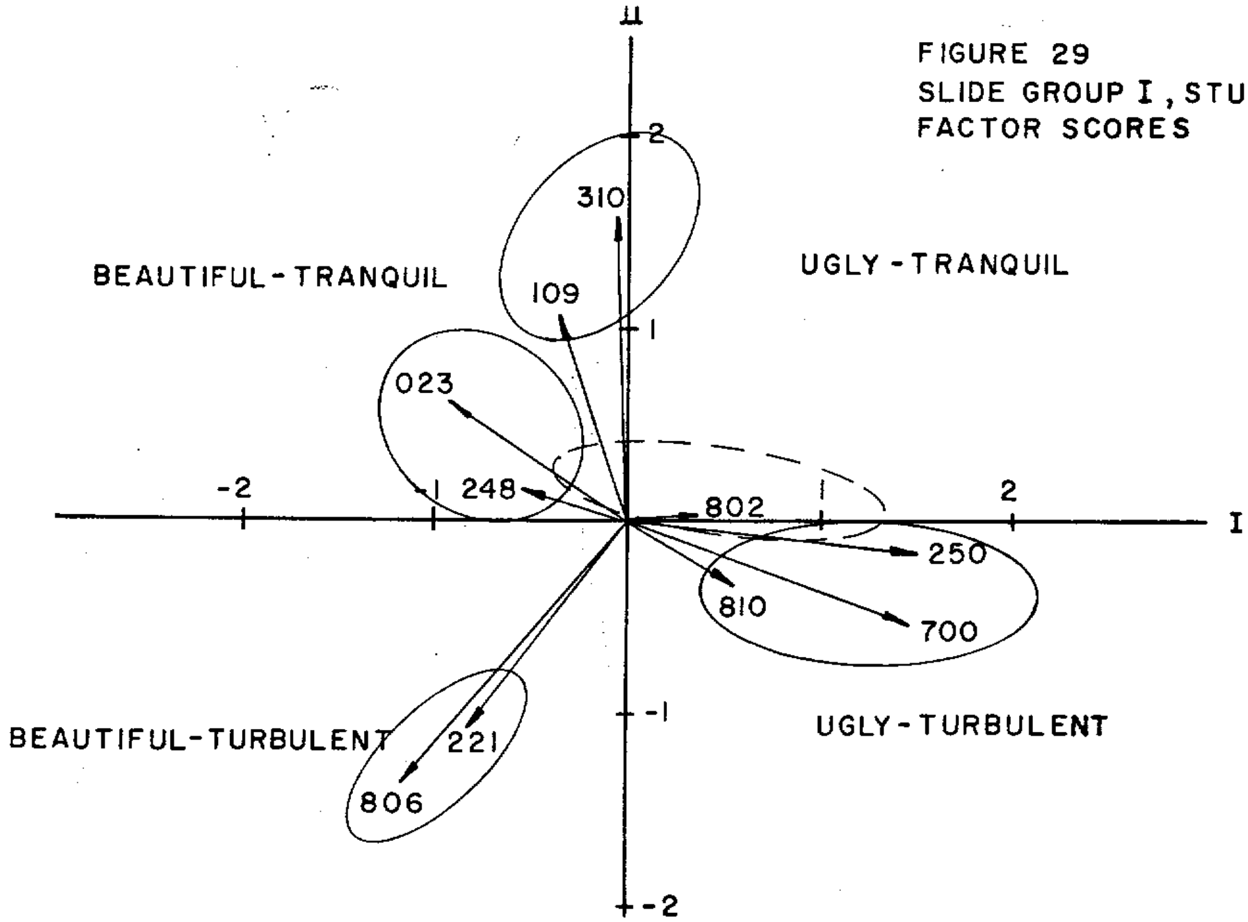
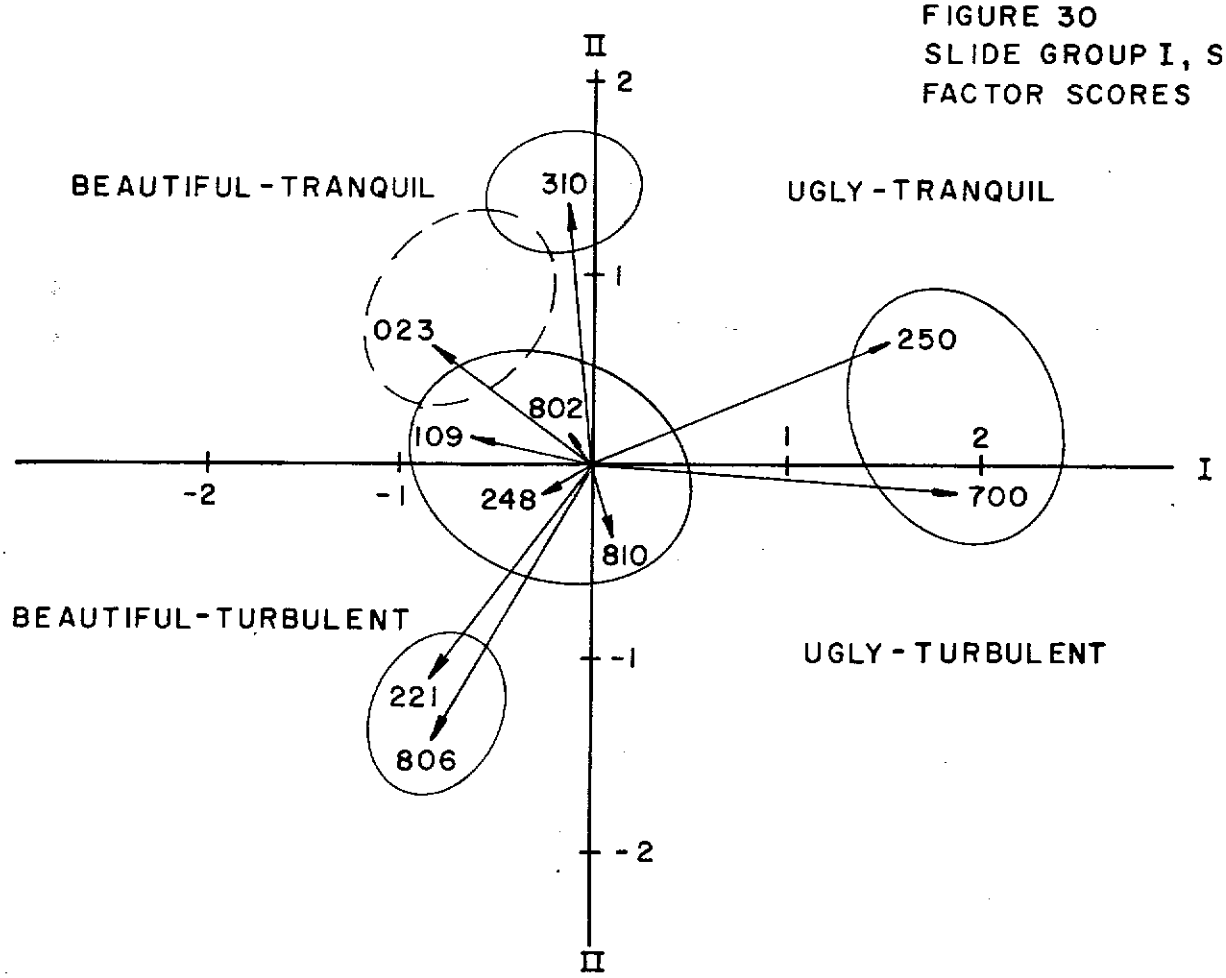


FIGURE 30
SLIDE GROUP I, STUDY 5
FACTOR SCORES



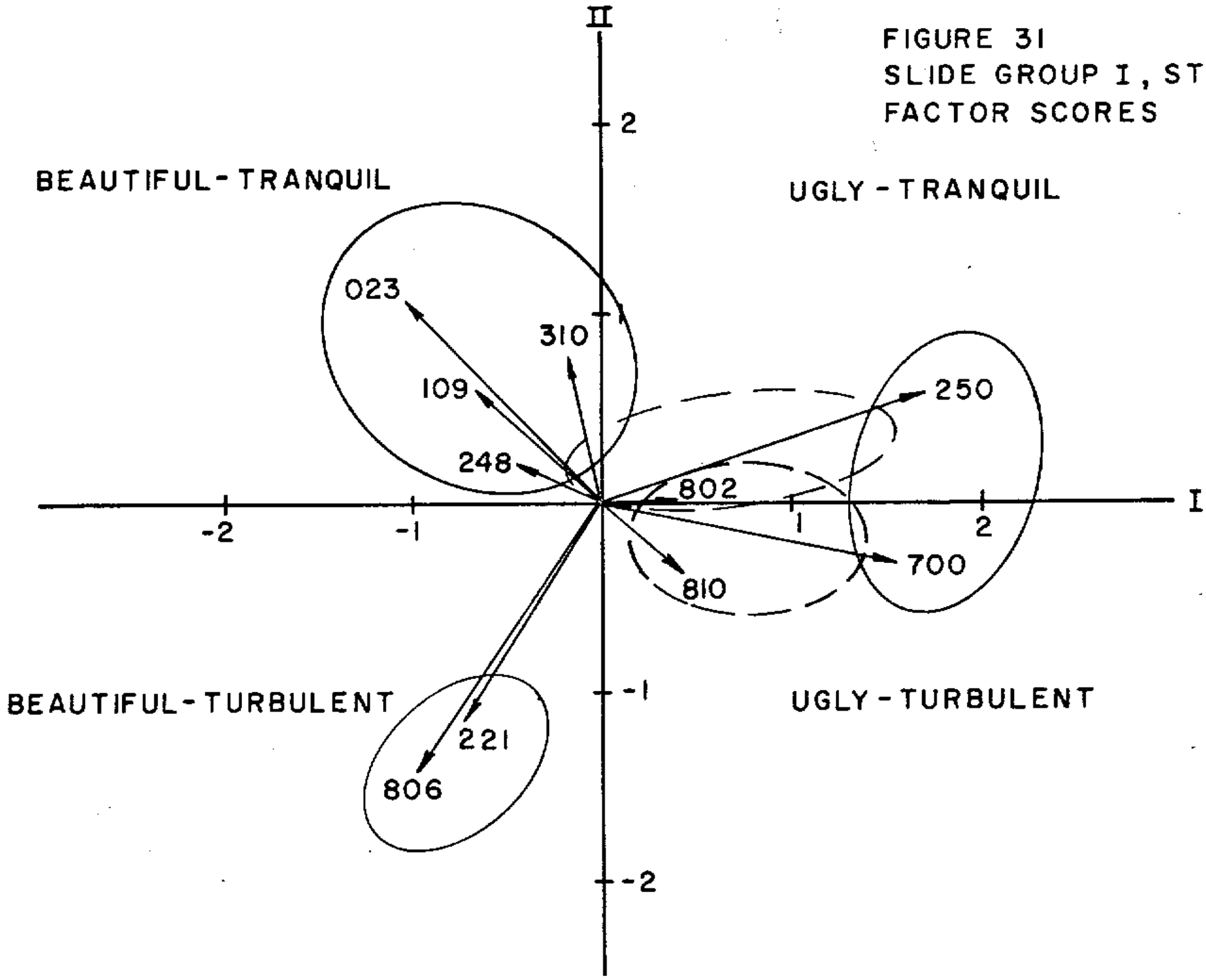


FIGURE 31
SLIDE GROUP I, STUDY 6
FACTOR SCORES

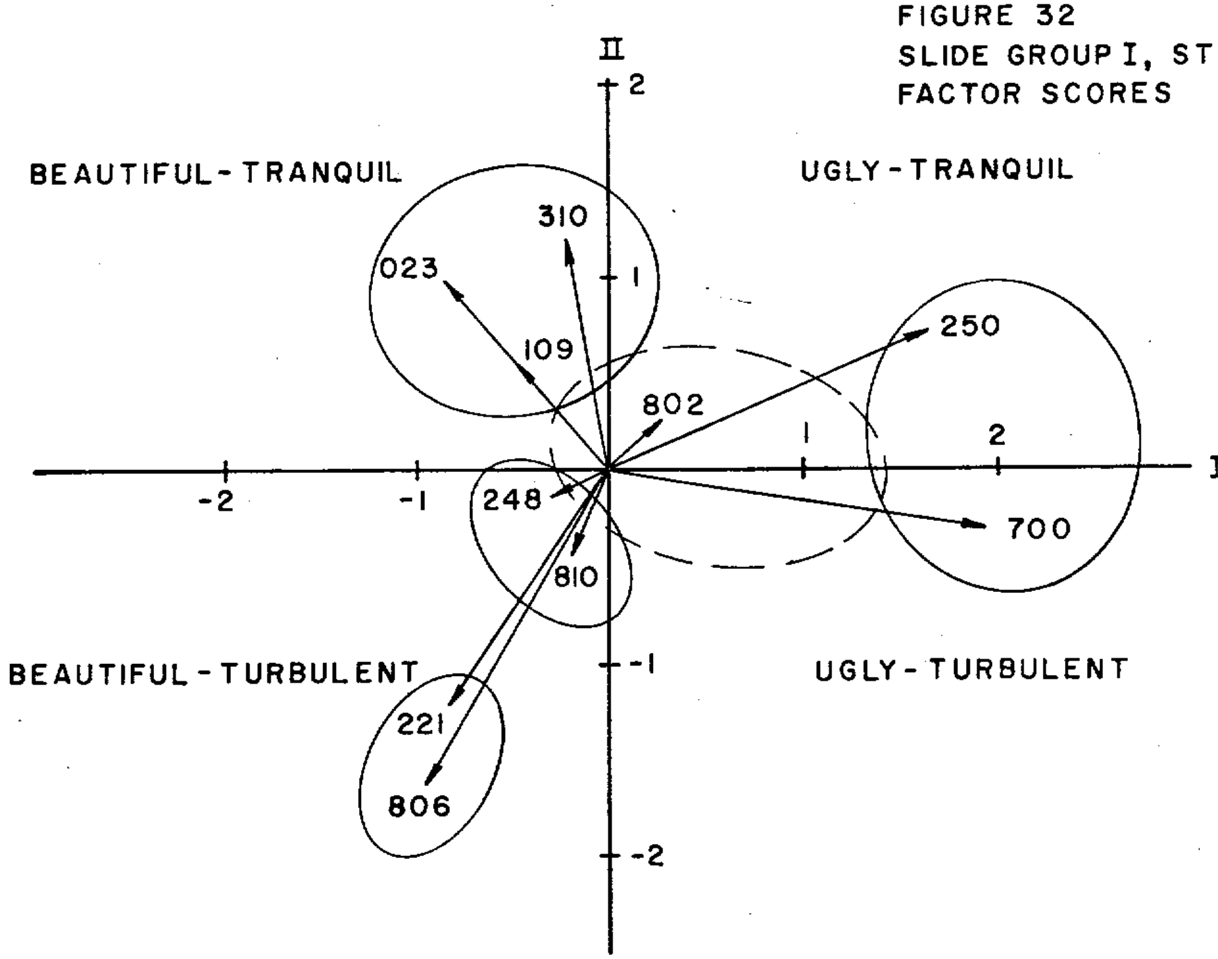


FIGURE 32
SLIDE GROUP I, STUDY 11
FACTOR SCORES

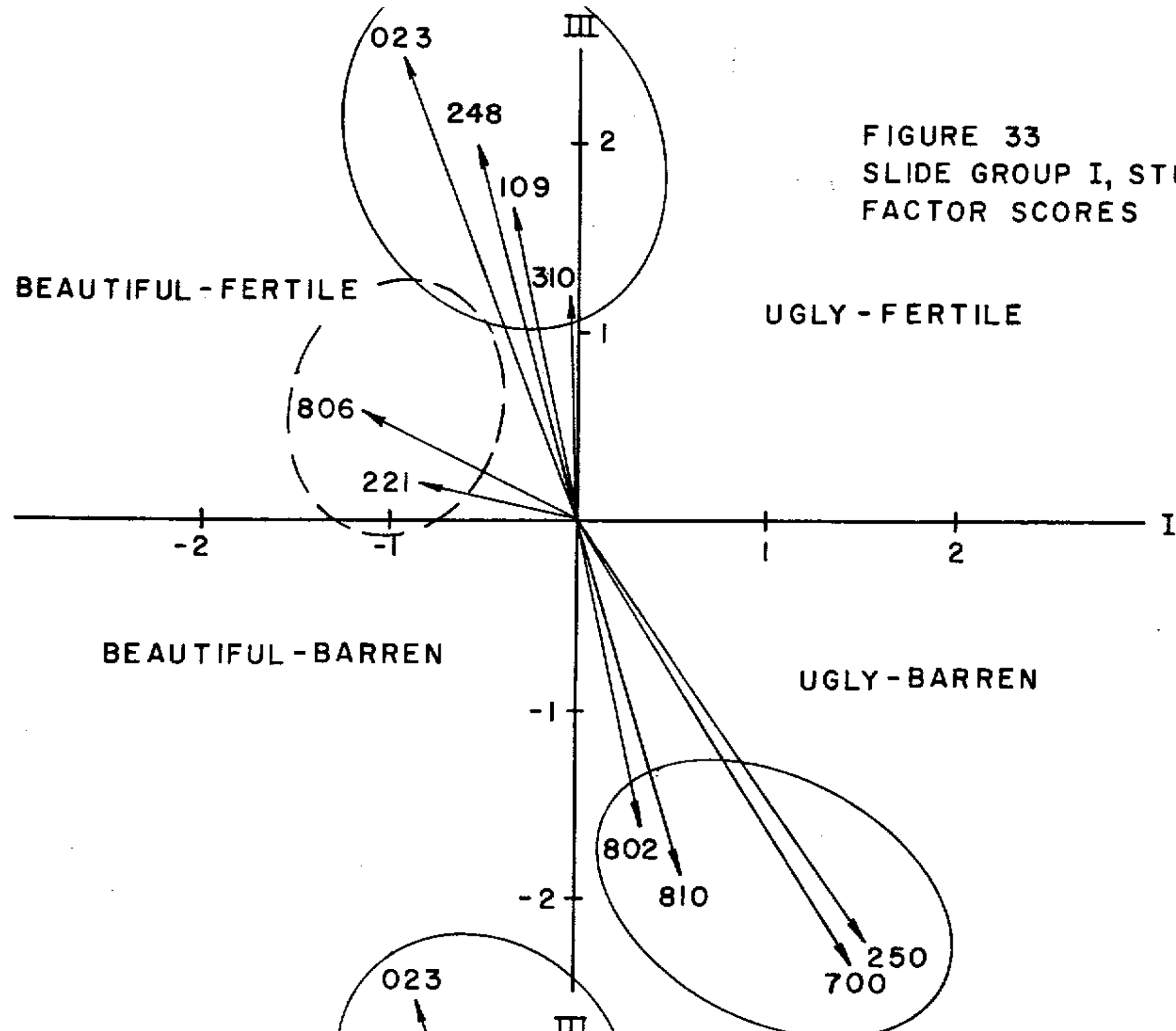


FIGURE 33
SLIDE GROUP I, STUDY 4
FACTOR SCORES

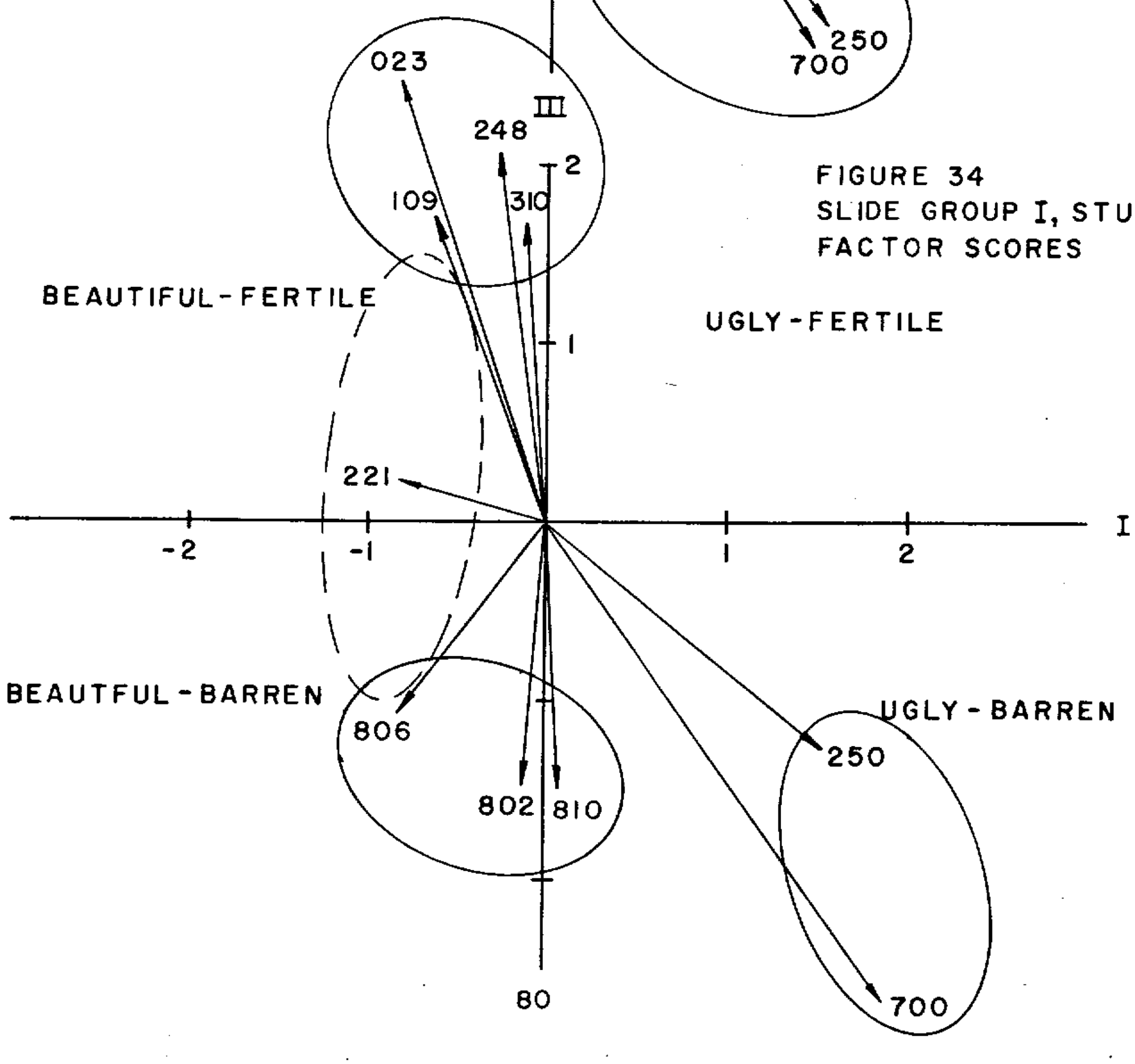


FIGURE 34
SLIDE GROUP I, STUDY 5
FACTOR SCORES

FIGURE 35
SLIDE GROUP I, STUDY 6
FACTOR SCORES

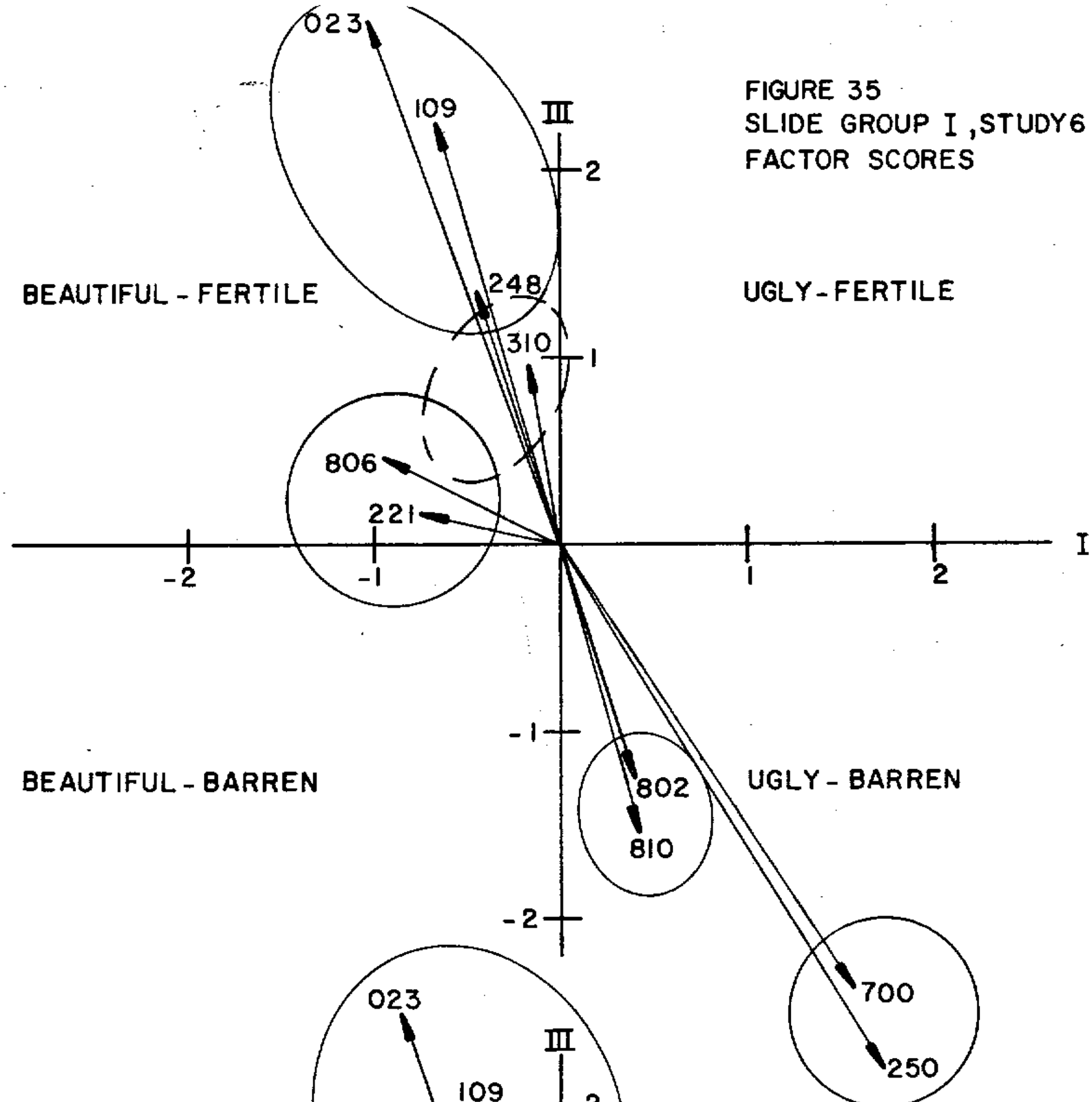
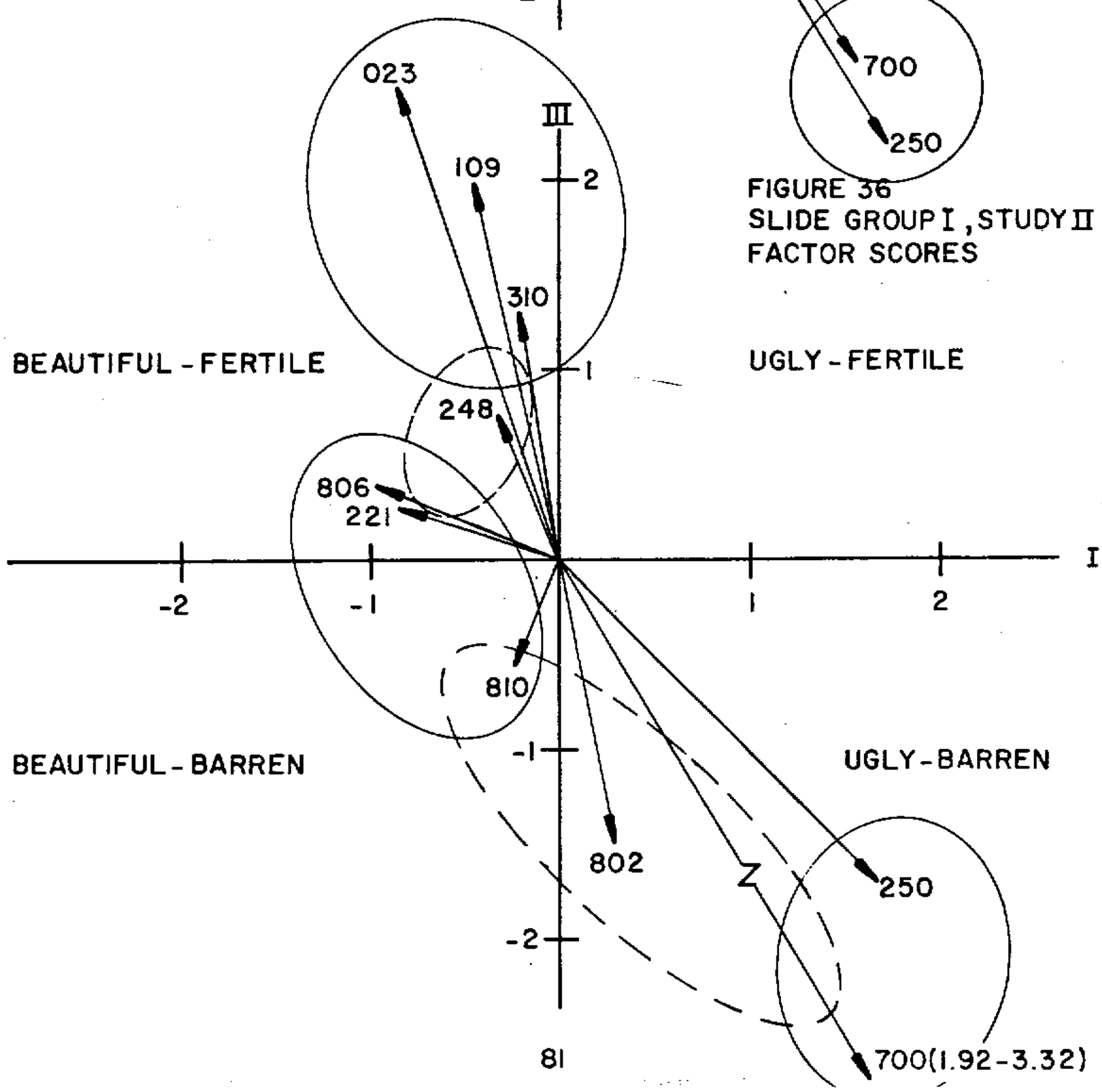


FIGURE 36
SLIDE GROUP I, STUDY II
FACTOR SCORES



extent to which the subject believes the adjective pairs are related to each scene. The outcome of this experiment seems to link beauty (Factor I) with preference, a rather logical verification of Santayana's ideas (see Chap. I).

Studies 7, 8, 10

Subject groups for these studies were tourists at Pine Mountain, Natural Bridge and Jenny Wiley State Parks in Kentucky. Slide Group II (Figure 18) was used.

On the I-II plane (Figures 37, 38, 39), only one scene (129) was similarly placed by all three groups. The Doe Run Lake (319), mill dam (344) and Clear Creek path (032) were differently placed by each group. Scene 319, for example, was most highly regarded by the Jenny Wiley group, somewhat less so by the Pine Mountain group and was rated in the ugly-tranquil quadrant by the Natural Bridge group. A landscape of broken lava, conifers and high mountains (803)* was considered ugly-turbulent by the Pine Mtn. and Natural Bridge groups and turbulent, but neither beautiful nor ugly by the Jenny Wiley group. There was substantial agreement between the Jenny Wiley and Natural Bridge groups on the placement of the other five scenes. The Pine Mountain group apparently did not regard either the gob pile (603) or the Motel-Rocky Mtn. scene (213) as misfits. Both the winter and summer views of the same pasture (233, 252) were, however, placed on the ugly side by this group.

All three groups agreed on the placement of scene 032 on the I-III plane (Figure 41, 42, 43) but all three differed as to the degree of starkness in scene 129. The Jenny Wiley group rated the lava flow (803) as very stark but neither ugly nor beautiful. The other seven scenes were almost identically rated by the subjects of Studies 8 and 10; the placement of these scenes by the Pine Mtn. group were again significantly different.

*The mountain in the background of this scene is not clearly reproduced in Figure 18.

The consistent differences between the results of Study 7 and those of Studies 8 and 10 might be partially accounted for by the differences in the state parks from which the subject groups were drawn. Jenny Wiley and Natural Bridge are both resort type parks near major highways. It is possible that tourists visiting such places might respond to the Group II scenes in a different manner than those visiting a somewhat out-of-the-way, "nature" type park like Pine Mountain.

Study 9

Slide Group III (Figures 19 and 20) was presented only once, to thirty two tourists at Natural Bridge State Park. The results, shown in the vector diagrams of Figures 40 and 44, are similar to those of some of the preceding studies. Placement of Blackwater Falls (199) and the North Elkhorn pool (337), for example, is nearly identical with that of PS III and Study 2. Placement of the Buckhorn Creek Trail (438) and a view of the S. Fork of Grassy watershed (533) differs slightly from that of Studies 2 and 1.

The other six slides of Group III were used for the first time in this study. Again, a scene on Kentucky's Martin's Fork was highly rated (513) with the other extreme represented by two views of a strip mined area (703, 704). In the mid-range of the factor scores, but all on the beautiful side, were a mountain meadow (801)*, a lake (800) and a coniferous forest and high mountain (804)*.

*A mountain appears in the background of the original color slides. It does not show in the black and white reproductions of Figure 19.

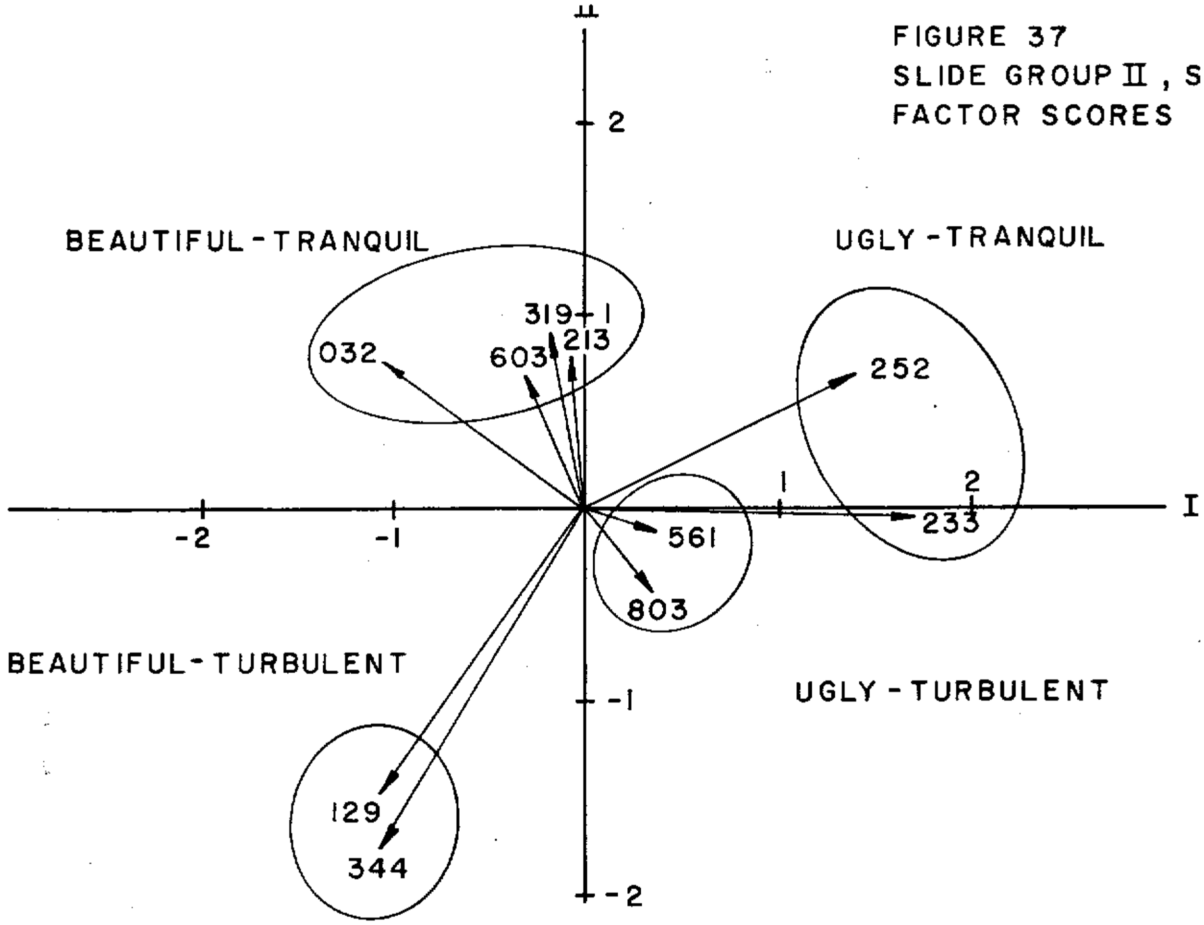


FIGURE 37
SLIDE GROUP II, STUDY 7
FACTOR SCORES

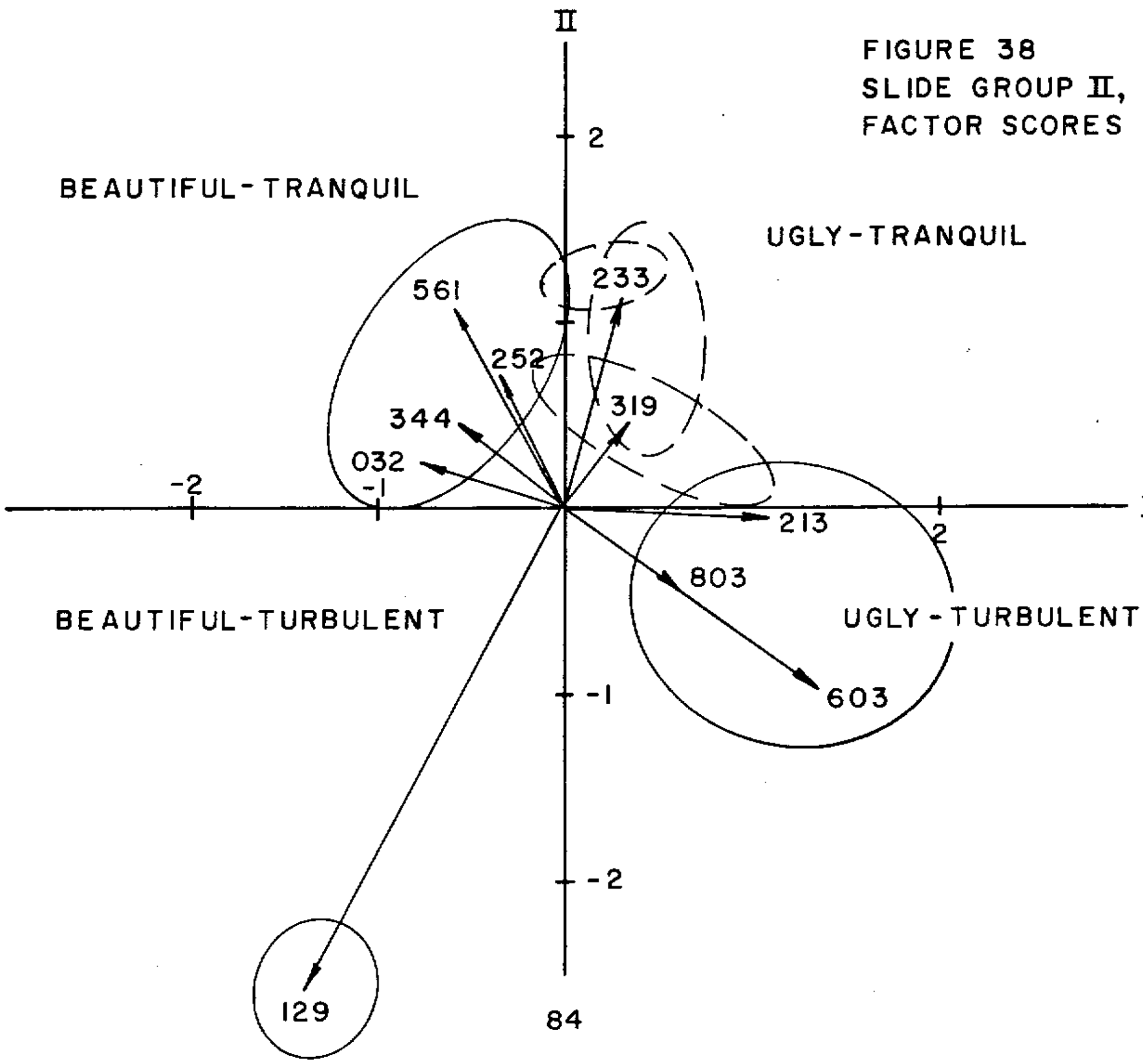


FIGURE 38
SLIDE GROUP II, STUDY 8
FACTOR SCORES

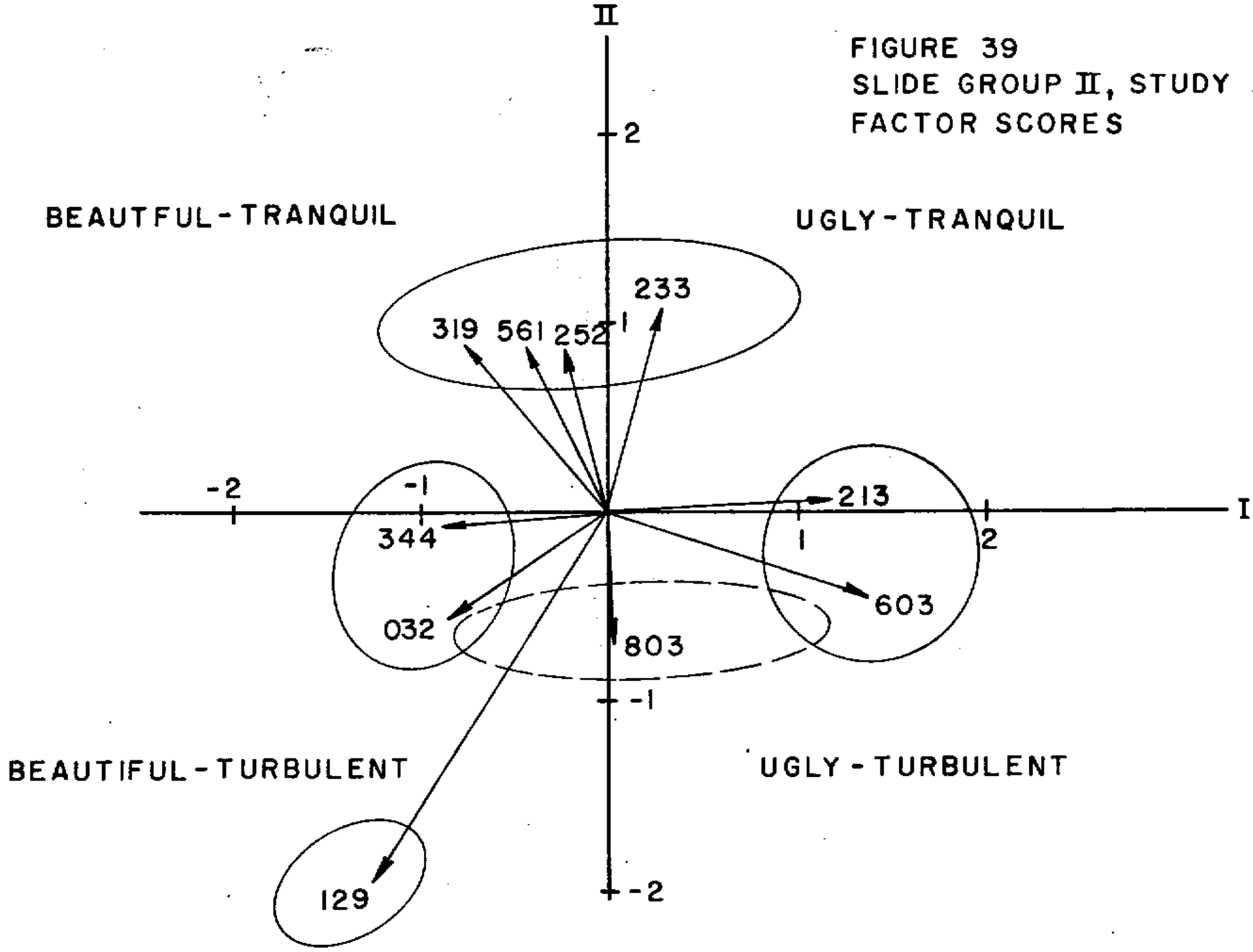


FIGURE 39
SLIDE GROUP II, STUDY 10
FACTOR SCORES

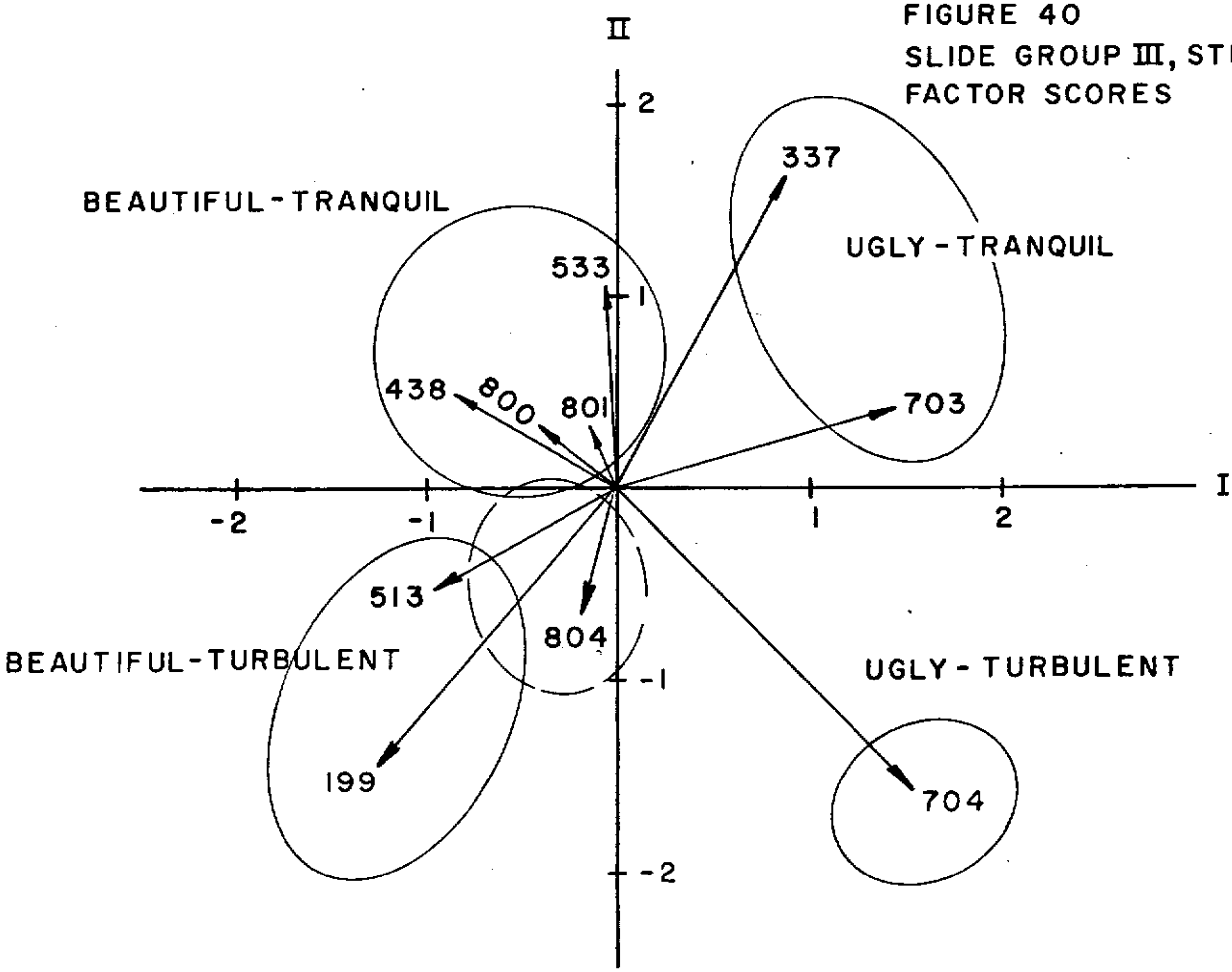


FIGURE 40
SLIDE GROUP III, STUDY 9
FACTOR SCORES

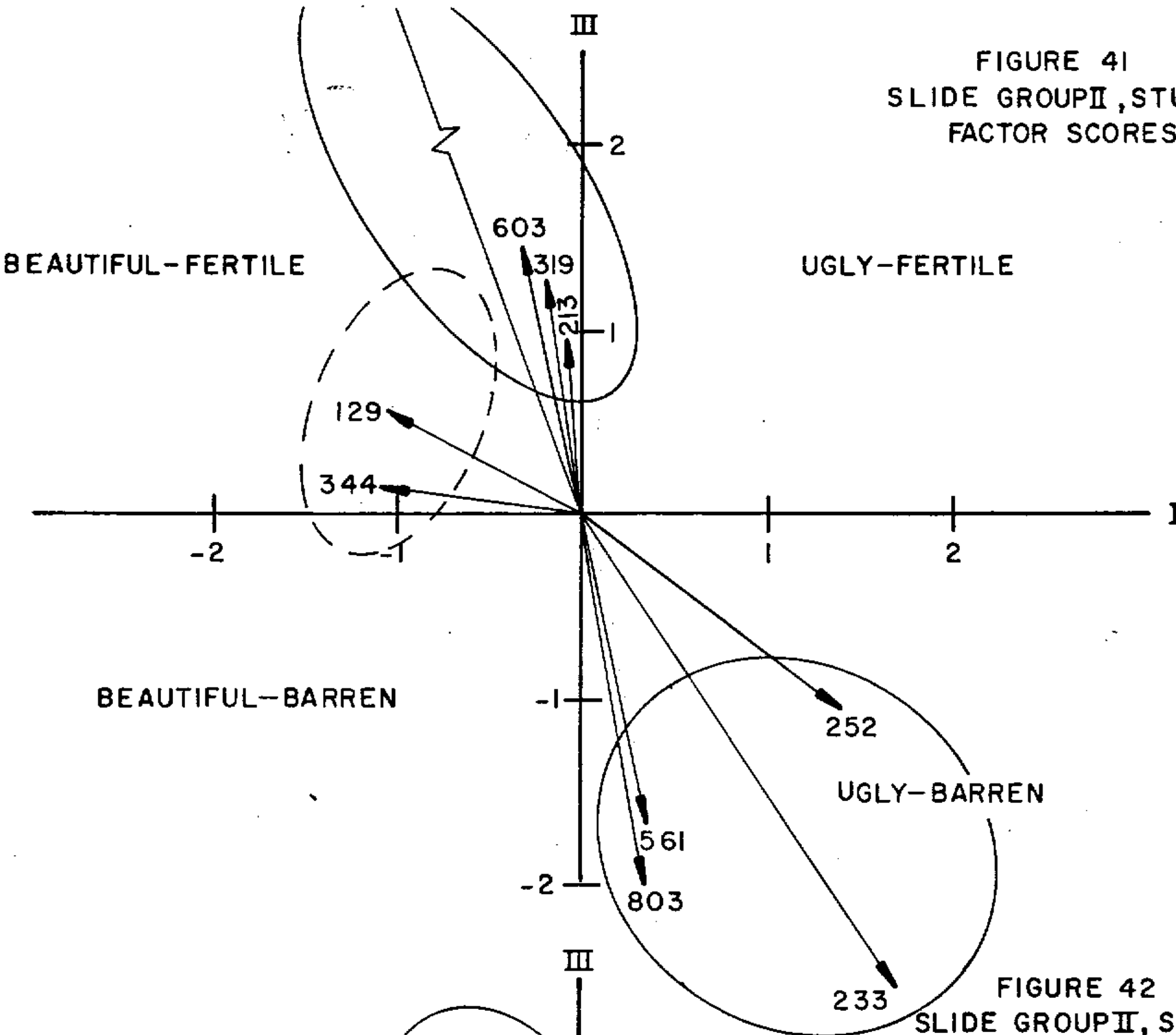


FIGURE 41
SLIDE GROUP II, STUDY 7
FACTOR SCORES

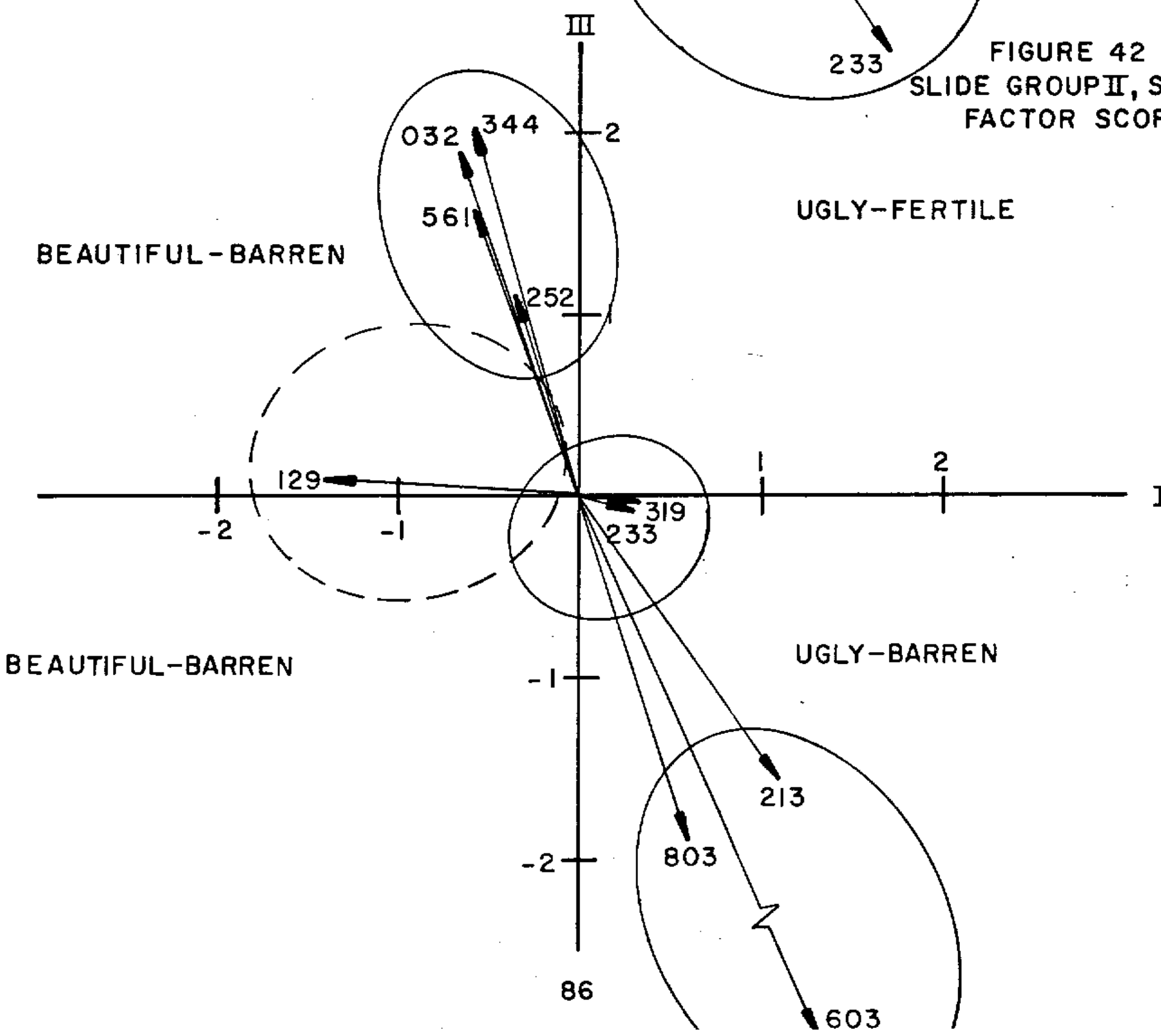


FIGURE 42
SLIDE GROUP II, STUDY 8
FACTOR SCORES

FIGURE 43
SLIDE GROUP II, STUDY 10
FACTOR SCORES

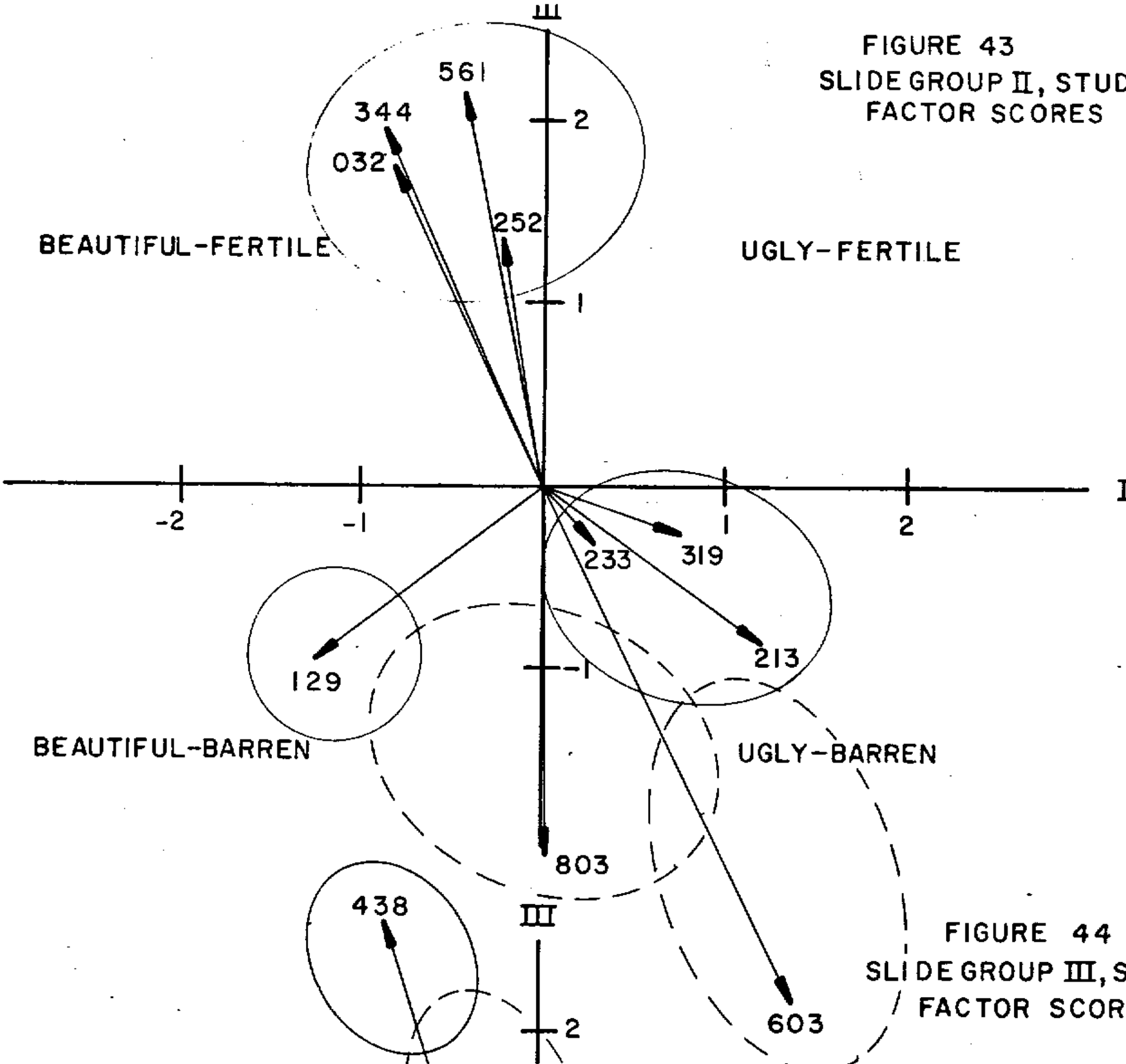
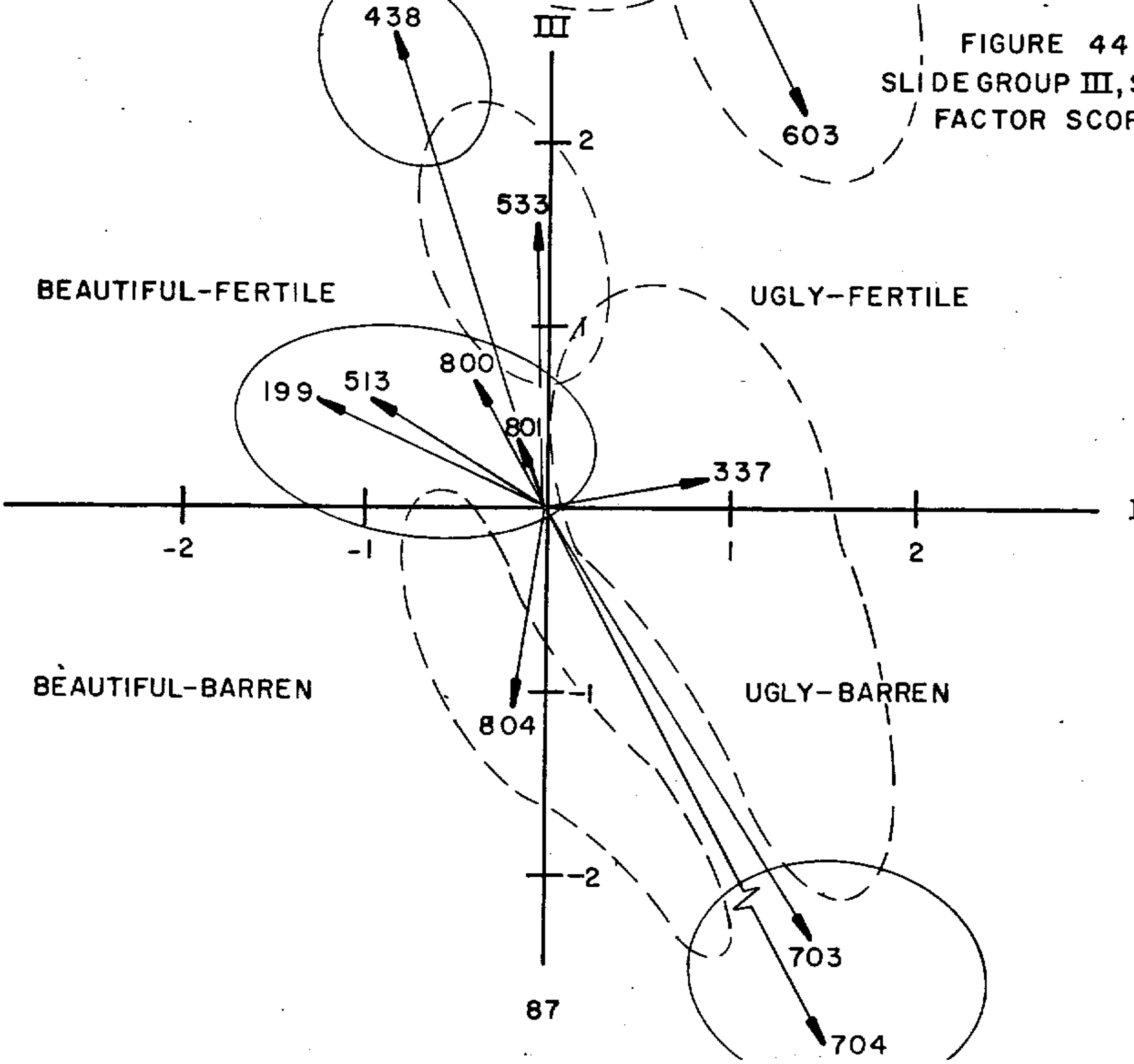


FIGURE 44
SLIDE GROUP III, STUDY 9
FACTOR SCORES



SCENIC CONTENT

A stepwise multiple regression procedure* was utilized to determine the degree of relationship between the factor scores (Appendix G) and the measures of scenic content (Appendix H). The scores for Factors I, II and III were used, successively, as dependent variables. Thus, there were three equations developed for each data set.

Preliminary runs indicated that some of the scenic content measures could be grouped without greatly affecting either the coefficient of multiple correlation (R) or the standard error of the dependent variable (Sy). Consequently, certain variables were combined and/or redesignated as follows (see chapter II for original listing):

$$X_1 = X_\ell, \text{ Landscape Type}$$
$$X_2 = X_p, \text{ Landscape Pattern}$$
$$X_3 = X_c, \text{ Color}$$
$$X_4 = X_s, \text{ Sky}$$
$$(X_5+X_6+X_7) = X_v, \text{ Vegetation}$$
$$(X_8+X_9+X_{10}) = X_{nv}, \text{ Non-vegetation}$$
$$(X_{11}+X_{12}) = X_w, \text{ Water}$$

All subsequent computations were made with these seven variables. Several more complex transformations were tested but since they produced little improvement in the results it was decided to proceed with simple linear relationships.

Tables 11, 12 and 13 are listings of the constant terms (C) and partial regression coefficients for all studies combined and for each individual study except S3.

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*MULTR, "Statistical Program Library for the IBM System /360", University of Kentucky Computing Center, Lexington, Kentucky December 1970, p. p. 156-172.

TABLE 11
REGRESSION EQUATIONS
FACTOR SCORES VS. SCENIC CONTENT

Y = Factor I Score

Study	C	X_ℓ	X_p	X_c	X_s	X_v	X_{nv}	X_w	S_y	R^2
All	-.961	.190	--	--	.020	-.005	.011	--	.70	.420
Sig.	--	<.001	--	--	<.001	<.10	<.05	--	--	<.01
PS II-1	-1.05	.193	--	.124	.016	-.011	--	-.021	.82	.394
Sig.	--	<.40	--	<.20	<.40	<.40	--	<.40	--	<.10
PS II-2	-1.95	.302	--	.062	.038	--	--	.009	.54	.679
Sig.	--	<.01	--	<.40	<.001	--	--	<.40	--	<.01
PS III	-3.62	--	-.473	.180	.025	.043	.073	.031	.47	.877
Sig.	--	--	<.05	<.02	<.02	<.01	<.01	<.20	--	<.01
S1	-3.26	.504	--	--	.032	.022	.026	--	.79	.521
Sig.	--	.01	--	--	<.10	.20	.20	--	--	<.05
S2	2.10	--	.357	-.246	-.043	-.026	-.023	--	.66	.671
Sig.	--	--	.20	<.10	<.10	.05	.20	--	--	<.05
S4	-1.60	.088	--	--	.034	--	--	-.014	.31	.928
Sig.	--	<.20	--	--	<.001	--	--	<.20	--	<.01
S5	-1.38	.212	--	--	.028	--	--	-.012	.43	.869
Sig.	--	<.05	--	--	<.01	--	--	<.40	--	<.01
S6	-1.22	.136	--	--	.033	--	--	-.013	.37	.901
Sig.	--	.10	--	--	<.001	--	--	<.40	--	<.01
S11	-1.34	.206	--	--	.029	--	--	-.016	.51	.830
Sig.	--	<.10	--	--	<.01	--	--	<.40	--	.01
S7	-2.99	-.475	.749	.087	.044	--	.081	--	.45	.904
Sig.	--	<.05	<.40	<.40	<.02	--	<.10	--		<.05
S8	-1.57	.221	-.515	.098	.033	--	--	--	.16	.981
Sig.	--	<.01	<.01	<.01	<.001	--	--	--	--	<.01
S10	-1.24	.288	-.541	--	.038	--	--	.015	.37	.903
Sig.	--	<.02	<.10	--	<.01	--	--	.20	--	<.01
S9	1.28	.344	-.343	-.139	--	-.023	--	-.015	.33	.949
Sig.	--	<.01	<.20	<.02	--	<.05	--	.10	--	<.05

TABLE 12
REGRESSION EQUATIONS
FACTOR SCORES VS. SCENIC CONTENT

Y = Factor II Score

Study	C	X_ℓ	X_p	X_c	X_s	X_v	X_{nv}	X_w	S_y	R^2
All	-1.35	--	--	-.040	.028	.016	.019	.018	.82	.212
Sig.	--	--	--	<.10	<.001	<.001	<.01	<.001	--	<.01
PS II-1	-2.08	--	-.393	--	-.032	.039	.044	--	.75	.468
Sig.	--	--	<.40	--	<.02	<.01	.10	--	--	<.05
PS II-2	.877	-.113	--	-.171	.009	--	.020	--	1.02	.303
Sig.	--	Neg.	--	<.20	Neg.	--	Neg.	--	--	N.S.
PS III	-2.65	--	-.461	.112	.023	.046	--	--	.96	.378
Sig.	--	--	<.40	<.40	<.20	.05	--	--	--	N.S.
S1	.451	-.202	-.432	--	.021	--	.020	.028	.54	.681
Sig.	--	<.40	<.40	--	.05	--	<.40	<.05	--	<.05
S2	1.52	.148	-3.17	--	--	-.024	-.022	--	.73	.296
Sig.	--	.40	Neg.	--	--	<.10	<.40	--	--	N.S.
S4	.548	-.249	-.793	--	.027	.048	--	--	.55	.800
Sig.	--	<.10	<.05	--	<.05	<.01	--	--	--	.05
S5	-.224	--	-.654	--	.025	.034	--	--	.49	.763
Sig.	--	--	<.05	--	<.05	.01	--	--	--	<.05
S6	-.542	--	-.572	--	.025	.039	--	--	.47	.779
Sig.	--	--	<.05	--	<.05	<.01	--	--	--	<.05
S11	.146	-.125	-.833	--	.031	.045	--	--	.53	.817
Sig.	--	<.40	<.05	--	<.05	<.01	--	--	--	<.05
S7	-5.69	--	1.14	--	.050	--	.132	.048	.46	.876
Sig.	--	--	.02	--	<.01	--	<.01	.02	--	<.05
S8	-9.88	-.234	--	--	.156	.117	.141	.064	.74	.799
Sig.	--	<.20	--	--	<.05	<.05	<.05	<.10	--	<.20
S10	-7.21	-.206	--	--	.119	.078	.109	.059	.59	.828
Sig.	--	<.20	--	--	<.05	<.05	<.05	<.05	--	<.10
S9	-.035	--	--	-.260	.016	.030	--	.013	.40	.916
Sig.	--	--	--	<.01	<.20	<.03	--	<.40	--	<.01

TABLE 13
REGRESSION EQUATIONS
FACTOR SCORES VS. SCENIC CONTENT

Y = Factor III Score

Study	C	X_ℓ	X_p	X_c	X_s	X_v	X_{nv}	X_w	S_y	R^2
All	-.237	-.197	--	-.066	--	.034	--	--	1.36	.322
Sig.	--	.001	--	< .10	--	<.001	--	--	--	<.01
PS II-1	-1.41	--	--	-.143	.016	.046	--	--	1.26	.491
Sig.	--	--	--	.20	<.40	<.01	--	--	--	<.05
PS II-2	.216	-.334	.731	-.132	--	--	--	--	1.40	.221
Sig.	--	Neg.	Neg.	Neg.	--	--	--	--	--	N.S.
PS III	.414	--	.466	-.113	--	--	-.090	--	.70	.844
Sig.	--	--	>.05	.20	--	--	<.001	--	--	<.01
S1	3.15	-.605	-.763	.145	--	--	-.049	--	.90	.774
Sig.	--	<.05	<.40	.10	--	--	<.05	--	--	<.01
S2	-5.14	--	--	--	.071	.069	--	.045	1.62	.316
Sig.	--	--	--	--	Neg.	Neg.	--	Neg.	--	N.S.
S4	.364	--	-.577	--	-.032	.050	--	.033	.91	.866
Sig.	--	--	<.40	--	<.20	<.05	--	<.40	--	<.05
S5	-1.06	--	-.557	--	--	.067	--	.046	.99	.805
Sig.	--	--	<.40	--	--	<.01	--	<.20	--	<.05
S6	2.10	-.294	-.856	--	-.034	.057	--	--	.94	.860
Sig.	--	.20	<.20	--	<.20	<.05	--	--	--	<.05
S11	-.766	-.224	--	--	--	.044	--	.045	1.18	.71
Sig.	--	<.40	--	--	--	<.02	--	.20	--	<.05
S7	-.643	.774	--	-.117	-.038	--	--	.052	.85	.870
Sig.	--	<.01	--	<.40	<.10	--	--	<.10	--	<.05
S8	-14.1	-.934	2.80	--	.131	.144	.254	.081	.48	.974
Sig.	--	<.01	<.02	--	.02	<.01	<.02	.02	--	<.05
S10	-19.22	-.971	3.18	--	.205	.187	.327	.092	.60	.960
Sig.	--	<.02	<.05	--	<.02	<.01	<.02	<.05	--	<.05
S9	-.464	-.358	--	-.104	--	.070	--	--	.83	.847
Sig.	--	<.10	--	<.40	--	<.01	--	--	--	<.01

The stepwise multiple regression program (MULTR) first computes the constant terms and coefficients for an equation involving all the independent variables, then successively eliminates variables, in increasing order of significance. At each step, a new equation is produced, along with new values of R^2, Sy, total F ratio and the standard errors of the partial regression coefficients. In choosing the "best" equations for Tables 11, 12 and 13 the criterion used was the optimum combination of R^2 and Sy, i.e.; the highest R^2 and the lowest Sy. For most of the studies an obvious break occurred at one of the other of the steps, where the next variable eliminated would cause R^2 to decrease and Sy to increase. It was the location of this break that determined the final form of the tabulated equations.

Two well-known statistical tests were used to determine, respectively; the significance of each partial regression coefficient and the significance of the multiple regression as a whole. The decimal value entered below each of the coefficients represents the level at or below which the hypothesis that the true coefficient is equal to zero is rejected. Similarly, the decimal value below the R^2 for each equation is the level at or below which the hypothesis that all the true partial regression coefficients are equal to zero is rejected.

The first test was made by computing "student's t" for each coefficient*:

$$t = \left[\frac{\text{partial regression coefficient}}{\text{standard error of the coefficient}}\right]$$

*Both tests are described in: Neville & Kennedy, "Basic Statistical Methods for Engineers and Scientists", International Textbook Co., Scranton, Pa. 1964, p.p. 218, 219 and Table A-10, p.p. 312, 312.

The computed "t" was then compared with a tabulated, theoretical "t"* at various levels of significance and that level accepted at which the computed value exceeded the theoretical.

The second test made use of the total F ratio included in the computer output. This "F" was compared with a theoretical "F" tabulated for the appropriate combination of number of independent variables, degrees of freedom and significance level. The accepted level was that at which the computed "F" exceeded the theoretical.

ANALYSIS

Combined Studies

During the course of this project, three hundred seventy-one persons were involved in rating various subsets of the ninety-five study slides. Including the ratings for those slides that were used in more than one study, a total of one hundred seventy-seven triads of factor scores was generated. The equations of Tables 11-13 for "all" studies (including S3) express, in an aggregated, simplified way, the degree to which the observers' judgements about natural beauty, force and starkness were influenced by the arrangement and content of the scenes depicted in the slides.

Scenic beauty (Factor I) was most closely related to landscape type and the percentage of sky area in the scene. Less relevant but still significant were the areas of vegetation and non-vegetation. These four variables explained about forty-two percent of the toal variation in the Factor I scores. The form of the regression equation suggests that scenic beauty may be embodied in panoramic scenes that contain little sky and non-vegetation but relatively large areas of vegetation. It is noteworthy that the water variable was not significent in this equation.

---

*A wide-ranging (.001-0.50) "t" table was used because of the importance of evaluating the relative significance (or relative insignificance) of the independent variables.

Only twenty-one percent of the variation in Factor II scores was explained by the scenic content measures of color, sky, vegetation, non-vegetation and water. The equation seems to imply that a sense of quietness in a scene is enhanced to some degree by color combinations that include blue and green and to a larger extent by areas of sky, vegetation and water. Neither type nor pattern of landscape were significant.

As might be expected, natural starkness ratings were affected by color triads that included brown, yellow and grey and by the areal extent of vegetation in the scene. Panoramic and feature landscapes tended to be regarded as less stark than canopied landscapes or misfits. The latter were almost invariably rated as "stark" which, no doubt accounts for the high significance level of X_{ℓ} in this equation.

INDIVIDUAL STUDIES

Considering the preference studies as individual data sets introduced the usual biases associated with small samples. The regression equations for these studies are however, useful for evaluating subject and slide group differences and for comparing individual study equations with those of the combined studies.

The most consistent set of equations for Factor I scores were those for Studies 4, 5, 6 and 11 (Slide Group I). The equations are, in fact, nearly identical in defining sky area, landscape type and water area as the significant variables. For Slide Group II, Studies 8 and 10 yielded equations that were much like those for Group I except for the addition of landscape pattern as a significant variable. The equation for the single study (S9) in which Slide Group III was used is more like those for Studies 8 and 10 than for 4, 5, 6 and 11. Study 7 results agree with the others only in the significance of sky area. The two large student groups (PS III and S2) were in general agreement on the relative significance of pattern, color and all the areal variables except water.

The pattern of agreement established among Studies 4, 5, 6 and 11 for Factor I prevailed in the equations for the Factor II scores, with vegetation area being the most significant, followed by sky area and landscape pattern. Equations for Studies 8 and 10 were again nearly identical, with all areal variables being about equally significant. Sky area was a significant variable in eleven of the thirteen equations and vegetation area was significant in ten. Non-vegetation and water areas were included in the equations for S1 and the Slide Group II Studies.

Similar concepts of natural starkness among the tourists of Studies 8 and 10 resulted in very similar Factor III equations for the two groups. All variables except color were significant in these equations. Non-vegetation, seemingly a common sense measure of starkness, was included in the equations for only two other studies, PS III and S1. Vegetation, however was significant in eight of the thirteen equations.

To summarize the findings of this section:

(1) Natural scenic beauty (as perceived in a color slide) is related to the "type" of landscape depicted and the relative areas of sky, vegetation and non-vegetation in the scene.

(2) Apprehension of natural force seems to depend, for the most part, on something other than the combination of scenic measures used in developing the regression equations. However, to the extent that such measures are related to this factor, color and the areas of sky, vegetation and water are the most significant.

(3) Natural starkness is related to the predominance of brown, yellow and gray coloration in the scene, to the area of vegetation, and to the presence or absence of a disturbed landscape or visual pollution. The presence of water tended, in some studies, to mitigate the perceived degree of starkness.

(4) Similar equations resulted when different subject groups were shown the same set of slides. Overall agreement among the thirteen studies was less pronounced but still significant.

STREAM EVALUATION PROCEDURES

In Part I (11) of this project, fifty-eight Kentucky streams were evaluated using a version of Leopold's (20, 21) uniqueness ratio concept. The following section describes a revised uniqueness ratio procedure based on fewer stream characteristics, and an application of factor analysis to stream evaluation.

UNIQUENESS RATIOS-REVISED

The object here was to reduce the number of stream characteristics to the minimum number that would still permit uniqueness to be reliably determined. Since the project's context was that of the small, free-flowing stream, those characteristics having to do with size and artificial controls were eliminated; these included characteristics 1, 2, 7, 8, 11 and 16 (see 11, pp. 49-52). Also eliminated were characterictics that were rated on purely nominal scales (20, 21)*, those that were simply surrogates of other characteristics (38, 43, 48, 49, 50) and those that were found to be statistically irrelevant (27, 28, 31, 34). The revised and re-numbered list of thirty-seven characteristics is in Table 14.

Uniqueness ratios were computed for the fifty-eight streams on each of the thirty-seven characteristics. Sub-total ratios for the five categories of characteristics and total uniqueness ratios were compiled and the streams rank-ordered in six arrays (see Appendix J). Three of these arrays are presented graphically in Figures 45, 46 and 47.

Stream rankings by total uniqueness ratios based on thirty-seven characteristics did not differ greatly from rankings based on fifty-four characteristics. The most pronounced differences were for the larger streams (Russell, North Elkhorn, etc.). Removal of the "size" characteristics reduced the relative uniqueness of these streams.

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*Only two purely nominal (or classificatory) scales were left in the final list: Bed Material (10), and Land Use (14).

Figure 45 emphasizes the uniqueness of the damaged or polluted stream in the Kentucky sample. Isaac's Creek (53) and Pond Run (56) are in the strip-mined areas of West Kentucky; Pond Creek (30) is a channelized stream near Louisville. Most unique in the "good" sense were Harlan County's Martin's Fork (11) and two Bluegrass Creeks, Clear (5) and North Elkhorn (12). The lower range of total uniqueness ratios does not necessarily include just those streams that are mediocre; the low ratios imply, instead an average or a norm. Crooked Creek (7), for example, flows through a typical East Kentucky creekbed community of small farms. It has not yet been greatly damaged by mining or other activities (which would tend to make it more unique) but still is only average when compared with the other streams of the sample.

Figures 46 and 47 show, respectively, stream rankings on two groups of characteristics identified as Water Quality and Esthetic Impression. Of the ten streams ranked most unique on Water Quality, only one, Clear Creek (5), is a "clean" stream, the other nine are polluted in one way or another.

Low rankings of other clean streams like Big Brush (1) and Buckhorn (2) are indicative of the over-all high quality of Kentucky's small streams, circa, 1970.

Of the ten streams rated most unique on the Esthetic Impression characteristics, six are actually streams of high esthetic quality; these are Martin's Fork (11), Upper Devil (24), Red River (13), Greasy Cr. (9), Rock Cr. (14) and N. Elkhorn Cr. (12). Eleven of the original sixteen "Preference Streams" (<u>11</u>) were ranked in the top thirty for this category. Again, however, the most unique stream was the most abused; Isaac's Creek (53).

Analysis of subsequent attempts to further reduce the number of characteristics seem to indicate that thirty-seven measures are near the minimum needed to produce interpretable uniqueness ratios. Such is the case, at least, for this particular sample of small streams.

As concluded in the report for Part I (<u>11</u>), the uniqueness ratio method does provide an objective means of evaluating small streams.

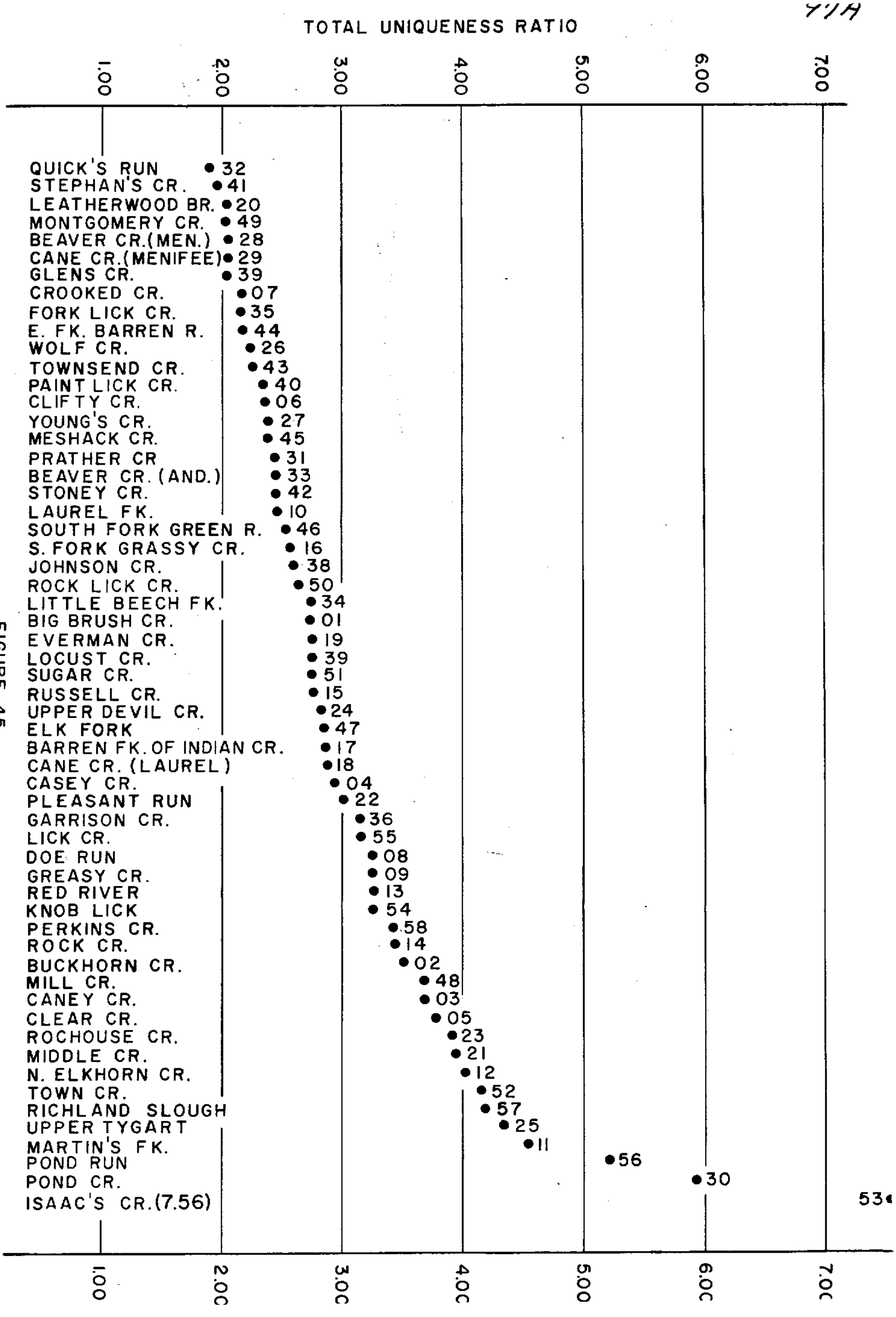


FIGURE 45

TOTAL UNIQUENESS RATIOS, 37 CHARACTERISTICS, 58 STREAMS (1970)

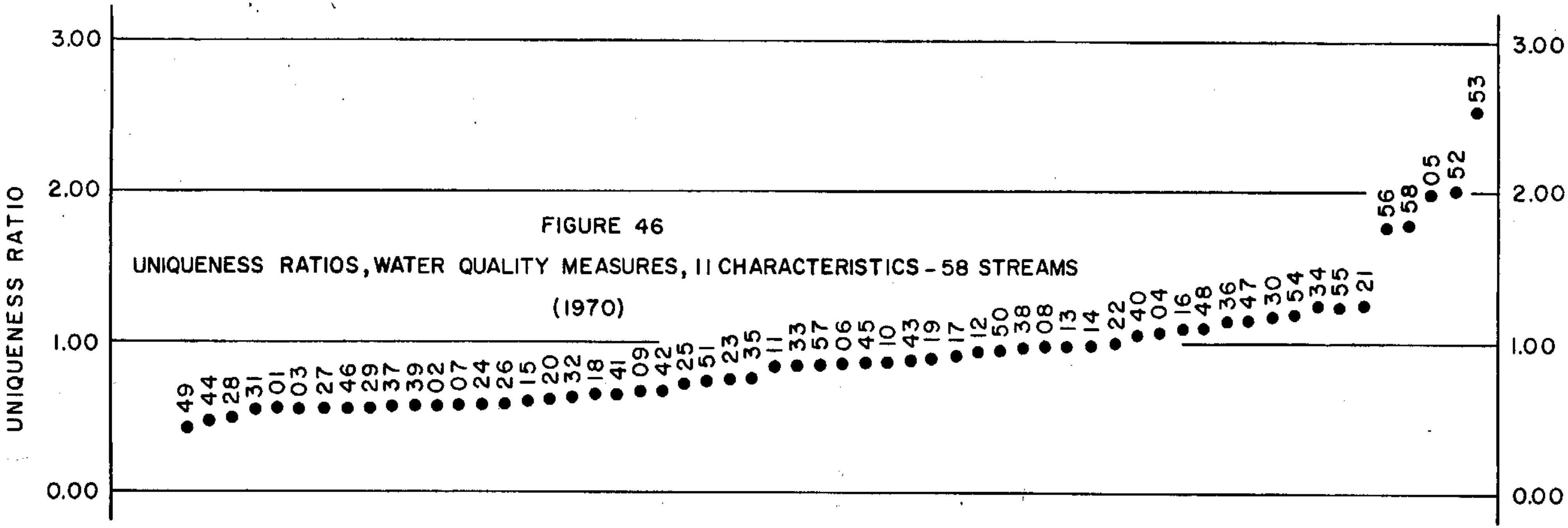


FIGURE 46

UNIQUENESS RATIOS, WATER QUALITY MEASURES, 11 CHARACTERISTICS - 58 STREAMS (1970)

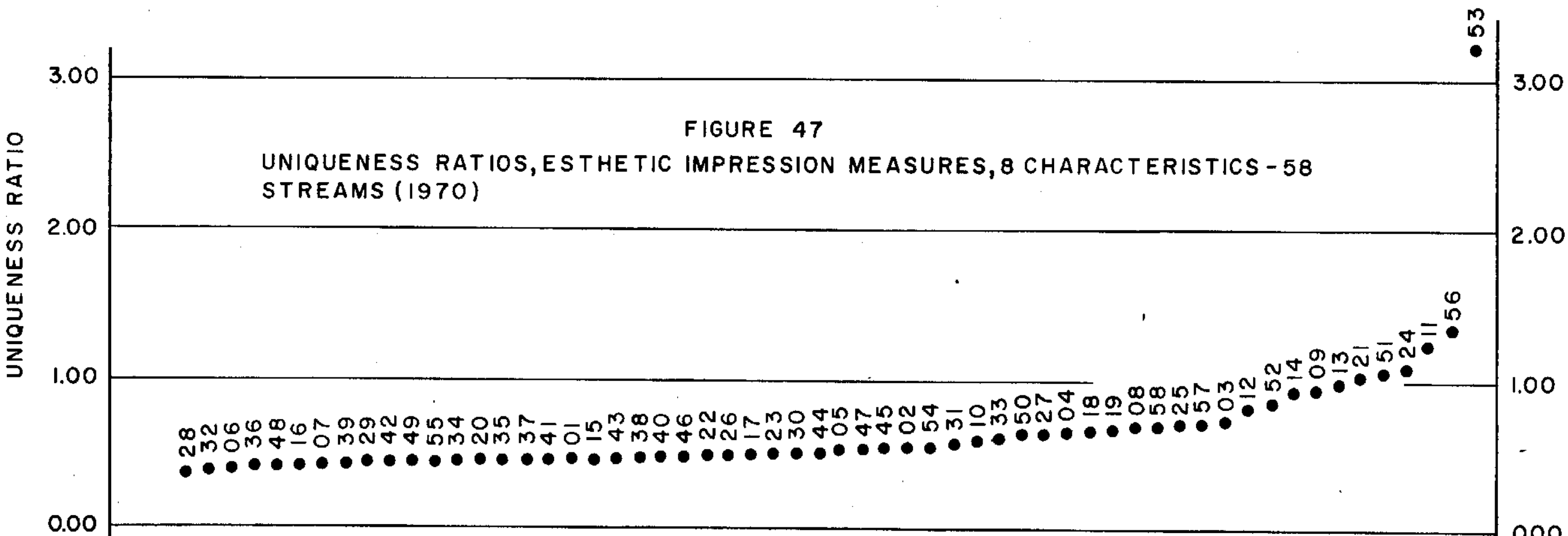


FIGURE 47

UNIQUENESS RATIOS, ESTHETIC IMPRESSION MEASURES, 8 CHARACTERISTICS - 58 STREAMS (1970)

The evaluation is, of course, dependent upon the relative merits or demerits of the other streams in the sample. Extreme cases, good and bad, are isolated by this procedure; the rest are more or less grouped in the middle to low ranges of ratios, i.e.; note the "flat" curves of Figures 46 and 47.

EVALUATION BY FACTOR SCORES

In Part I, the ratings for fifty-eight streams on fifty-four characteristics were factor analyzed. The four factors identified in the analysis were used as a guide in regrouping the stream characteristics into the five categories shown in Table 14.

A similar analysis was performed using the ratings for the revised list of thirty-seven characteristics. Six factors were identified which together accounted for about sixty-four percent of the total variance; these were named:

I.	Scenic Attractiveness	-	18.4%
II.	Topography-Land Use	-	13.9%
III.	Litter	-	9.3%
IV.	Extractive Industry	-	6.5%
V.	Aquatic Habitat	-	7.1%
VI.	Development	-	8.9%

Factor scores were computed for each stream on each of the factors, following the procedures of Appendix C. These scores and the rankings of the fifty-eight streams on each of the six factors are in Appendix K. The same data for all factors except III (Litter) are also presented graphically in Figures 48-52.

As is evident in Figure 48, using factor scores to quantify scenic attractiveness was quite successful in two ways:

(1) The "good", "average" and "bad" streams are effectively identified by their actual positions in the rankings.

(2) Breaks, slope changes and plateaus in the plotted rankings (Figure 48) raises the possibility of identifying clusters of streams with similar scenic attributes.

Figure 48 shows that twelve of the sixteen "Preference Streams"

TABLE 14

REVISED LIST OF STREAM CHARACTERISTICS*

PHYSICAL MEASURES:

1. Average Gradient
2. Total Relief
3. Average Flood Plain Width
4. Avg. Valley Height/Avg. Valley Width
5. Stream Velocity
6. Bed Material

LAND USE MEASURES:

7. Forest Cover
8. Slopes
9. Land Use (Watershed Landscape Unit)
10. Remoteness
11. Water Supply and Sewage Plants
12. Productive Industry
13. Extractive Industry

WATER QUALITY MEASURES:

14. Temperature
15. Sedimentation
16. Turbidity
17. Dissolved Oxygen
18. pH
19. Nitrates
20. Orthophosphates
21. Conductivity
22. Algae (amount)
23. Invertebrates (number)
24. Invertebrates (diversity)

TABLE 14 (cont'd.)

DISVALUES:

25. Misfits
26. Litter-metal
27. Litter-paper
28. Litter-plastic
29. Litter-glass

ESTHETIC IMPRESSION:

30. Visual Pattern Quality
31. Land Husbandry
32. Degree of Change
33. Recovery Potential
34. Naturalness
35. Geological Values
36. Historical Values
37. Diversity of Flora and Fauna

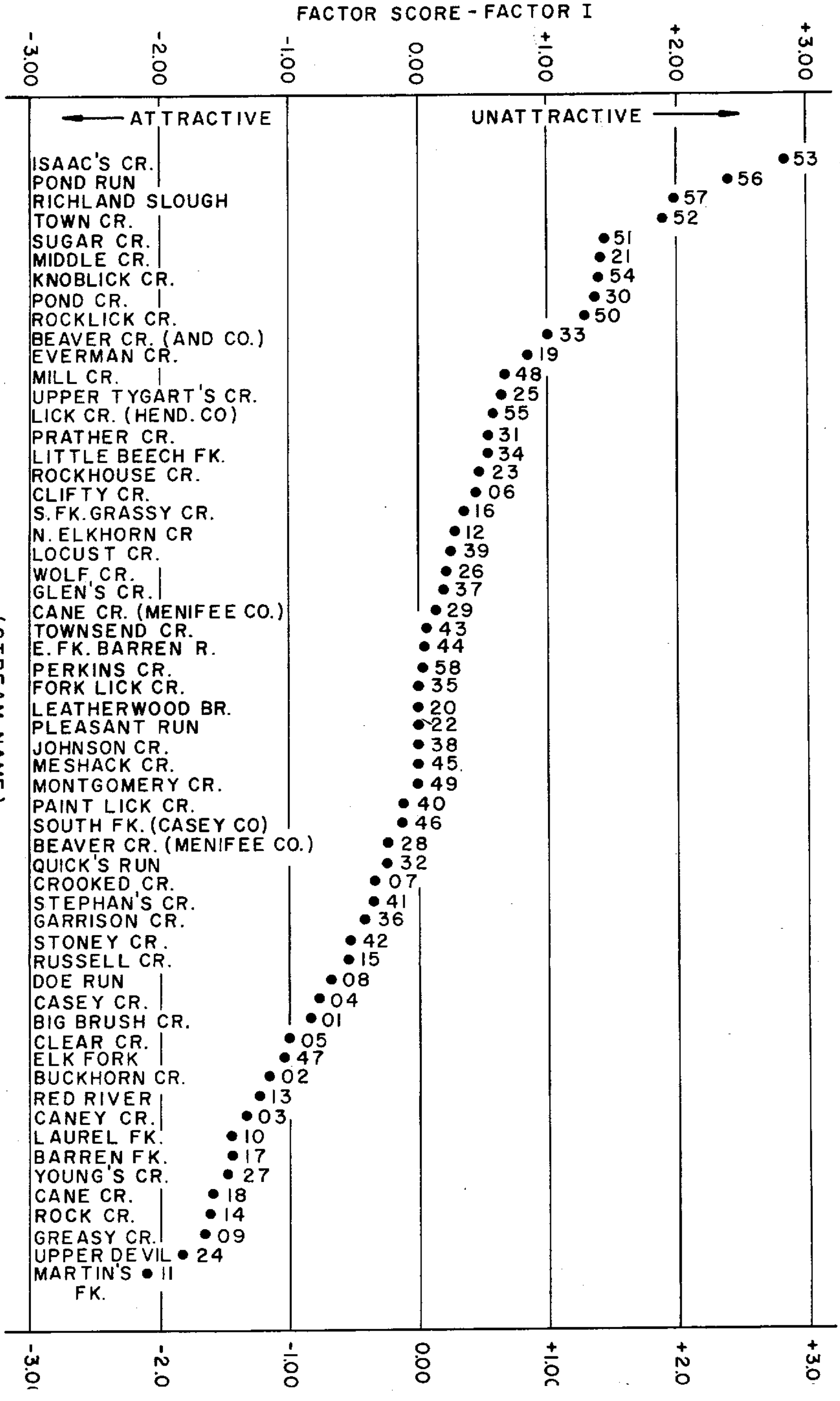
*Rating categories for these characteristics are in Reference (11), pp. 49-52.

are included in the seventeen streams ranked highest on Factor I. This finding is similar to that of the preceding section for uniqueness in the Esthetic Impression category. Four of the other five streams in the first seventeen are in the Eastern Coalfield. All the Western Coalfield streams are at the opposite (unattractive) end of the scale. It is interesting to note that two of the slow moving streams (12 and 16) which were generally low-rated in the preference studies are ranked just below average (factor score = 0) on Factor I.

Rankings on Factor II are also remarkably consistent. Although this factor is based primarily on measurable physical characteristics of the watershed, there is the added implication of land use. All of the first fifteen streams (Figure 49), for example, not only drain rugged, forested watersheds but are also relatively undisturbed by man and his activities. This is true, in the extreme sense, of Martin's Fork (11). The opposite extreme (most flat and urbanized) is represented by Pond Creek, the channelized stream near Louisville.

Interpretations similar to the above can be made for the other factors. By examining Figures 50, 51 and 52, for example, streams that are relatively remote, provide a desirable aquatic habitat and are presently safe from the effects of extractive industry can be identified. Again, however, it appears to be somewhat easier to pick out streams that meet the opposite extremes of these specifications.

To summarize: this section has described two ways of using the same data to evaluate a sample of fifty-eight small streams and their watersheds. Though the uniqueness ratio procedure eliminates the need for making "good-bad" judgements, it was not (in this case) as understandable or definitive as the factor score rankings. Especially for those factors with large eigenvalues, the factor score evaluations were amenable to categorization, easy to comprehend and seemed to meet the canons of common sense.



(STREAM NAME)

FIGURE 48

FACTOR SCORES - SCENIC ATTRACTIVENESS, FIFTY EIGHT KENTUCKY STREAMS (1970)

103

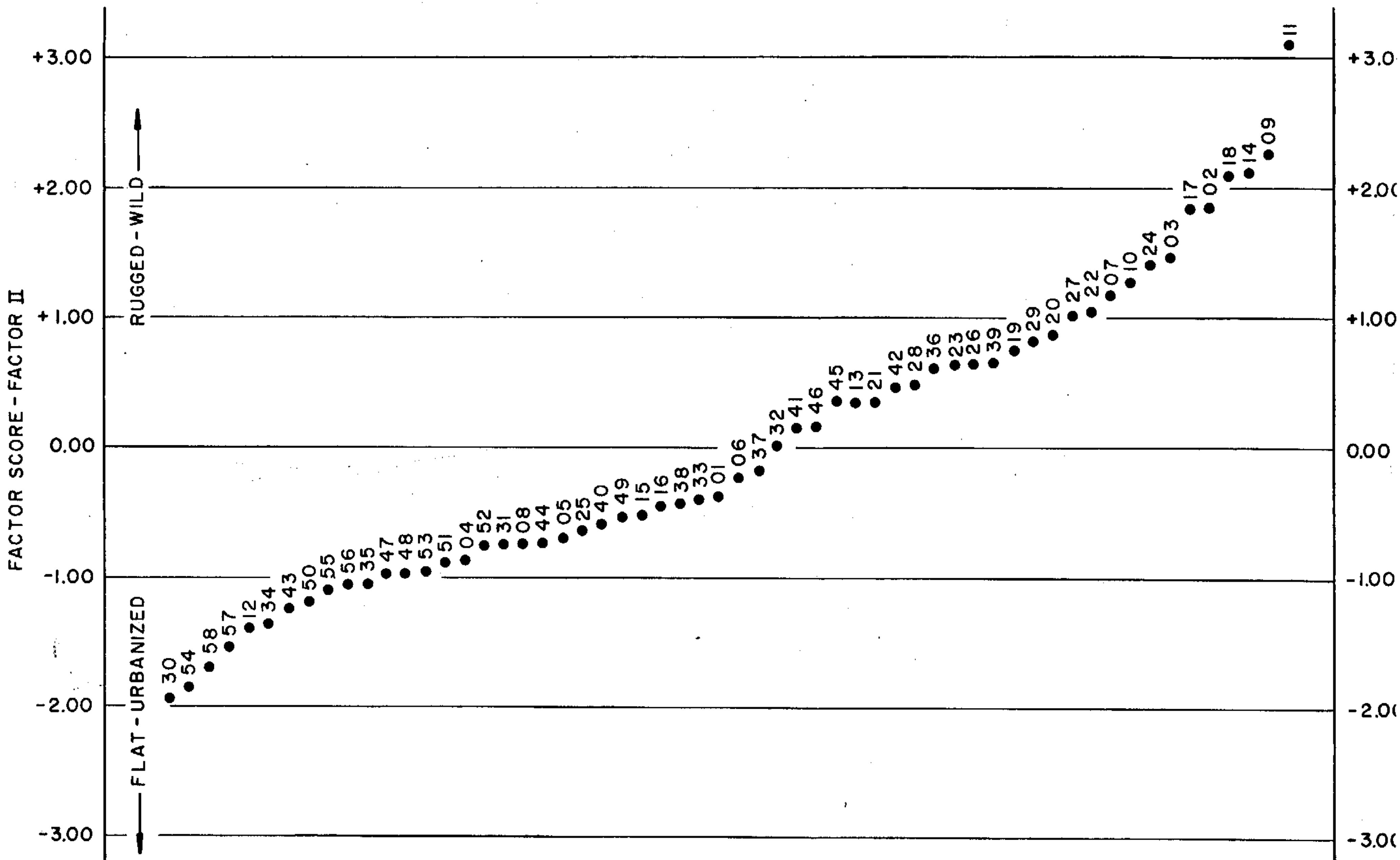


FIGURE 49
FACTOR SCORES - TOPOGRAPHY, LAND USE, FIFTY EIGHT KENTUCKY STREAMS (1970)

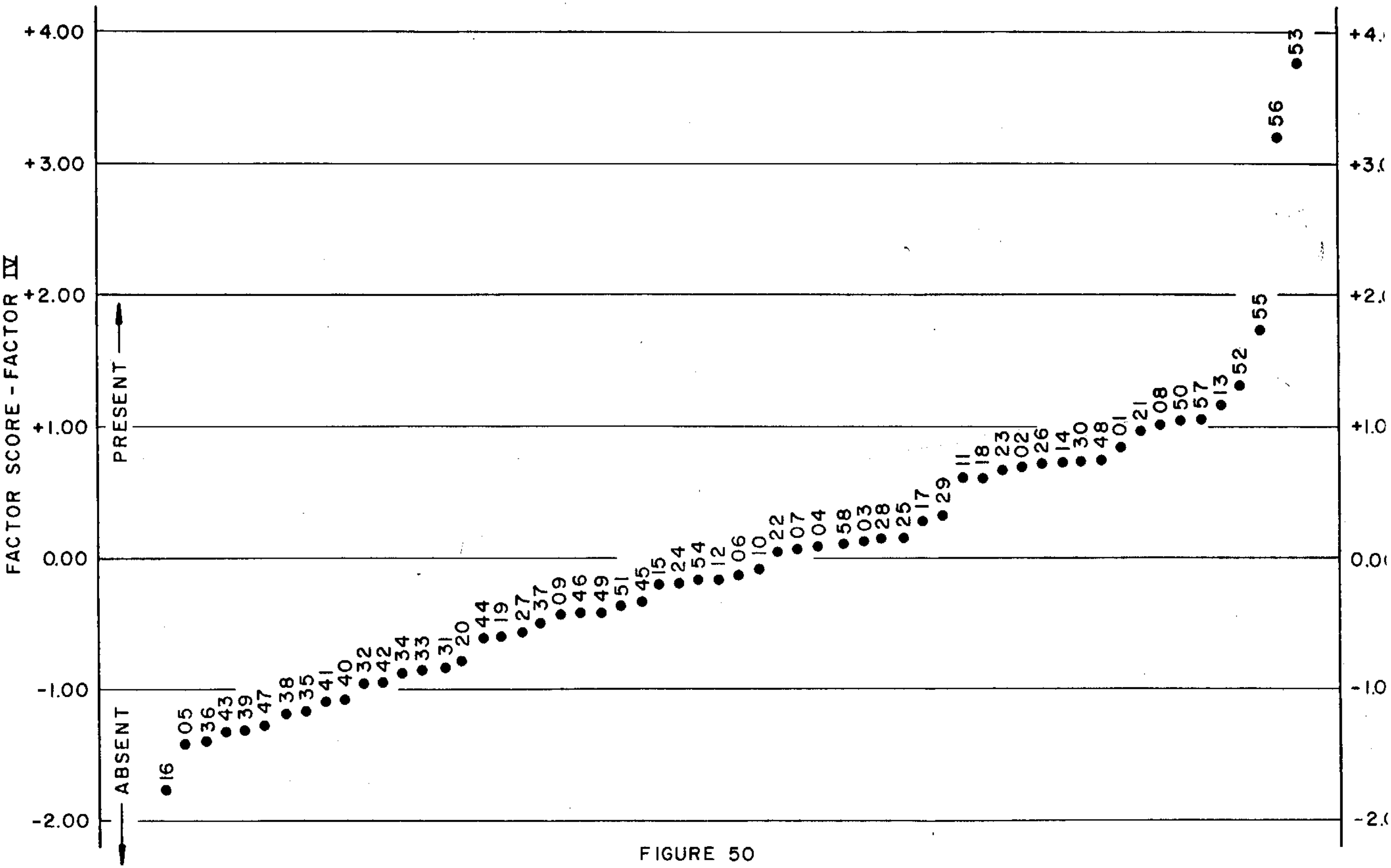


FIGURE 50
FACTOR SCORES-EXTRACTIVE INDUSTRY, FIFTY EIGHT KENTUCKY STREAMS (1970)

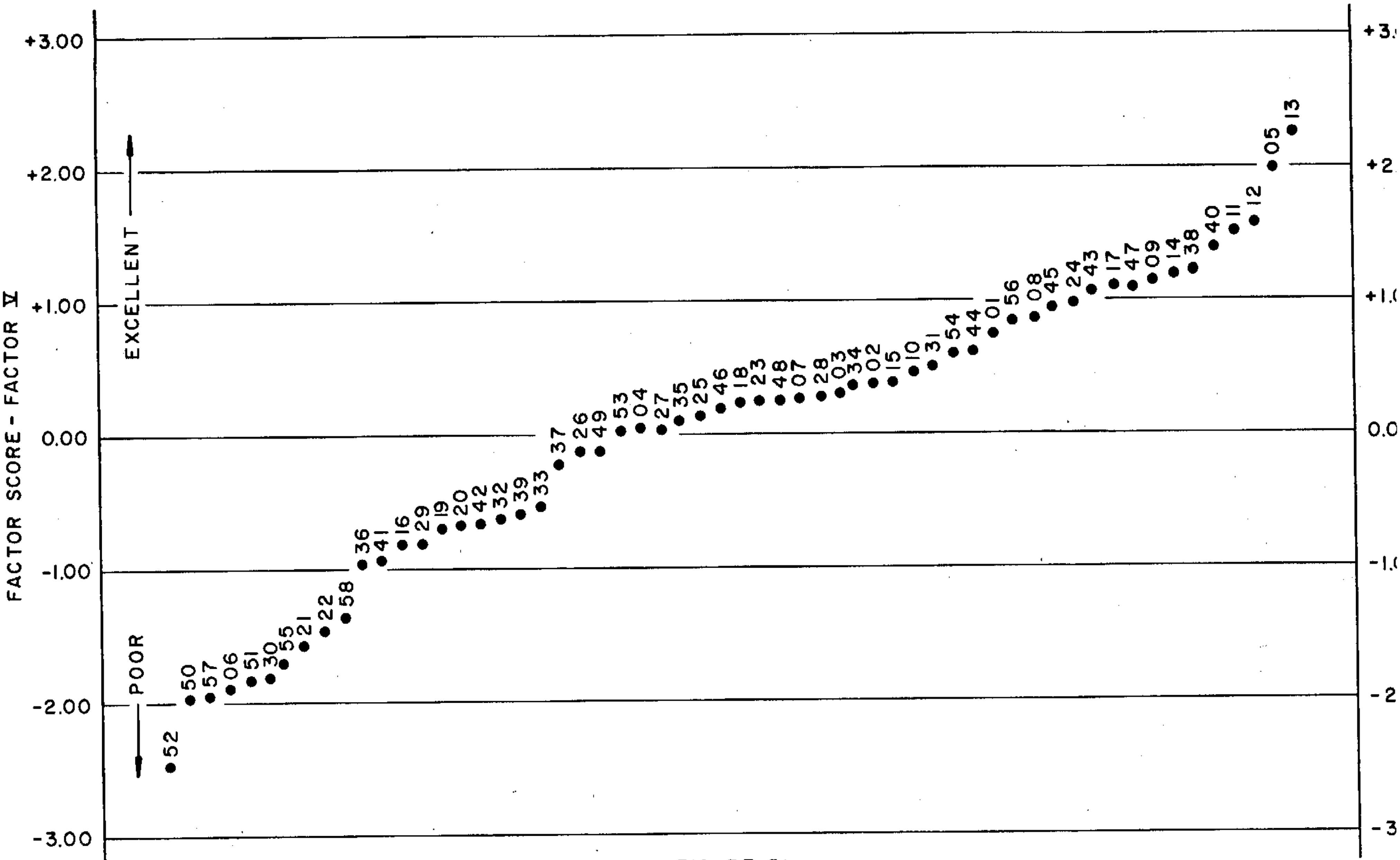


FIGURE 51
FACTOR SCORES-AQUATIC HABITAT, FIFTY EIGHT KENTUCKY STREAMS (1970)

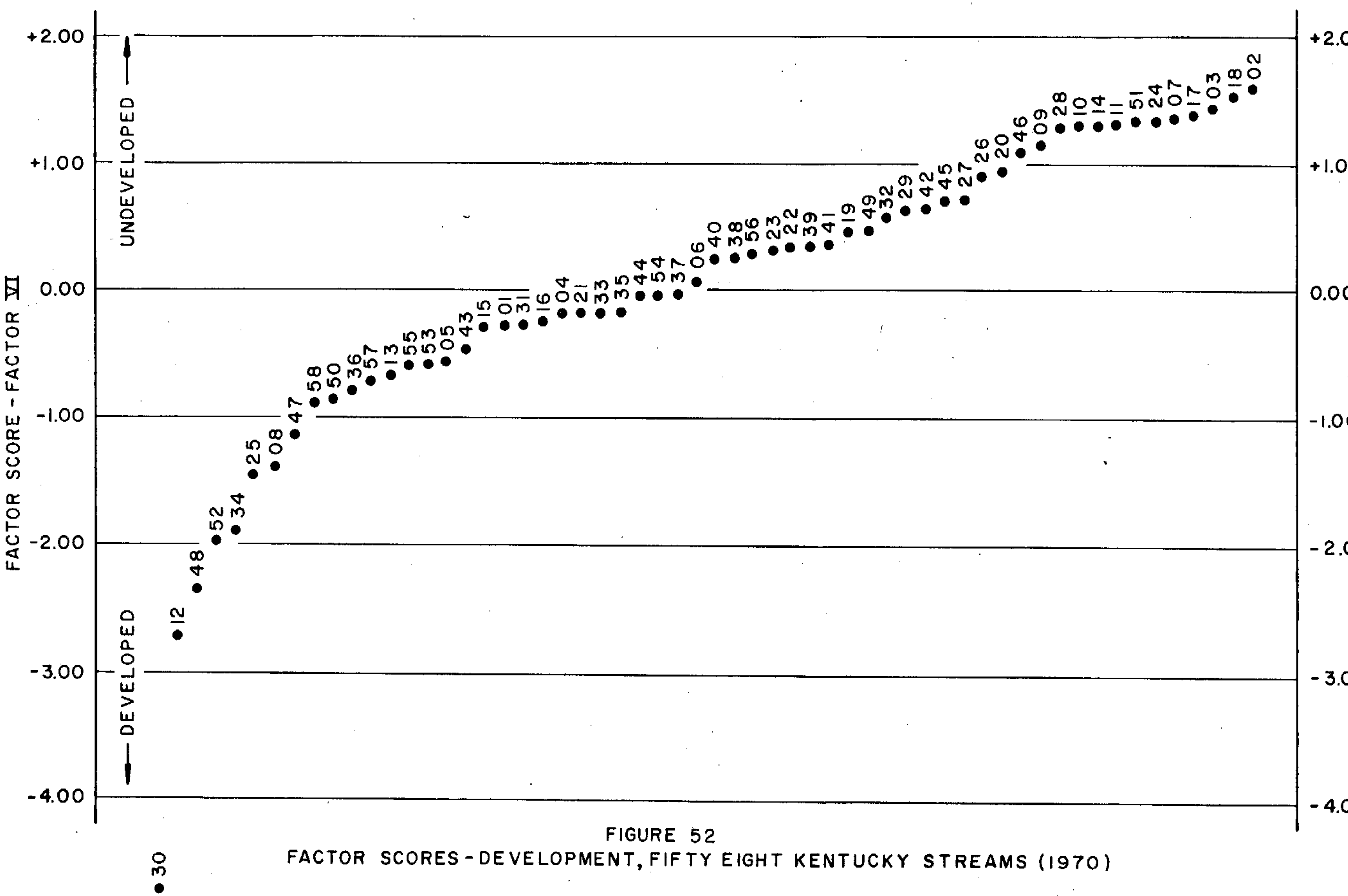


FIGURE 52
FACTOR SCORES - DEVELOPMENT, FIFTY EIGHT KENTUCKY STREAMS (1970)

CORRELATION OF EVALUATION PROCEDURES

Eleven of the fifty-eight streams were evaluated both subjectively, through preference Studies 1 and 2 and objectively, by the uniqueness ratio and factor score procedures. The eleven streams were: Buckhorn, Caney, Clear, Crooked, Doe Run, Martin's Fork, North Elkhorn, Red River, Rock, Russell and South Fork of Grassy. The three factors scores for each of the thirty four-study slides taken along these streams were correlated with corresponding scores for the six evaluative factors derived in the preceding section. Table 15 lists the resulting correlation coefficients with all $/r/ < 0.30$ eliminated.

Logically enough, factor scores for Scenic Attractiveness were well correlated with the Scenic Beauty scores. The significant thing is that the former stem from on-site evaluations of the actual scene while the latter are based on the viewing of color slides by people with little or no first hand knowledge of the eleven streams. This tends to support the case for regarding photographs of scenery as acceptable substitutes for the real thing (5, 31).

Scenic Attractiveness is also correlated with Natural Force, the implication being that turbulent, complex, scenes (rapids, cliffs etc.) are more attractive than quiet, simple ones. The small degree of negative correlation between Scenic Attractiveness and Natural Starkness partially confirms the preference study finding that not many people are impressed with barren or wintry landscapes.

Other high correlations in Table 15 are essentially expressions of common sense; i.e.; rugged land is scenic (2 and 1), turbulent (2 and 3) and usually undeveloped (2 and 6). Lesser degrees of correlation link Aquatic Habitat with Scenic Beauty and Starkness.

The findings of this analysis show that, within the context of the eleven study streams, the on-site rating system and the semantic differential procedure yield very similar results.

TABLE 15
CORRELATION MATRIX
SUBJECTIVE VS. OBJECTIVE FACTOR SCORES
Eleven Kentucky Streams
(Each entry is $r \times 1000$)

	1	2	3	4	5	6	7	8
1. Scenic Attractiveness	--							
2. Topography - Land Use	781	--						
3. Litter		-305	--					
4. Extractive Industry	552	455	-456	--				
5. Aquatic Habitat	436				--			
6. Development	601	880			-323	--		
7. Scenic Beauty	-798	-512		-302	-512	-348	--	
8. Natural Force	-723	-854				-789		--
9. Natural Starkness	337				512		-771	

APPLICATION OF RESULTS

There are several areas of statewide and local decision-making in which the results of this project were, could have been, or could be applied. Some of these are described below.

KENTUCKY WILD RIVERS SYSTEM

The 1970 the Kentucky legislature, under pressure from real estate, agricultural and mining interests failed to pass a well-conceived Wild and Scenic Rivers bill. (1). In 1972, with the governor's blessing, an unpretentious and unfunded bill was passed, affording minimum protection to segments of five rivers. One of these rivers (the Red; see Figure 21) was also one of the study streams in this project. There is still considerable doubt about the fate of the upper Red River. A Corps of Engineer's reservoir is planned for this stream which would, at flood pool, inundate unique plant and animal habitats and which would bring into this relatively wild area the usual melange of misfit recreational developments, power boats, etc. The procedures developed in this project could be specifically applied in the Red River controversy as well as to the upcoming problem of selecting additional streams for Kentucky's system of wild river. A bill concerned with the latter is being drawn up for the 1974 legislature. Under consideration are a number of creeks, including Greasy*, Buckhorn, Martin's Fork and some others studied during this project. Copies of the project reports have been sent to the Ky. Dept. of Natural Resources and Environmental Protection, the agency charged with recommending streams to be included in the proposed legislation.

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* See "Last Creek to Kill" by John Fetterman, Magazine Section, Courier-Journal, Louisville, Ky., July 25, 1971.

KENTUCKY WATER QUALITY STANDARDS

After a two year running fight among an industry dominated State Water Pollution Control Commission (now defunct) various environmental groups and EPA, a stream classification system is on the verge of being adopted which will require that all intrastate streams be capable of supporting aquatic life. At two public hearings on the classification proposal, testimony drawing upon stream quality data collected during this project was presented.

AUDUBON SOCIETY

The regional representative of the Society has requested information on little known wild and scenic areas that could possibly be promoted by the Society as being worthy of preservation. Data and results from this project on Greasy, Cave, Upper Devil, Martin's Fork, Clear Creek and others have been submitted.

MAYOR'S ADVISORY COMMISSION ON WATER, LEXINGTON, KY.

The findings of this project could have significant bearing on the fate of North Elkhorn Creek, a scenic and historic stream on the fringe of the Lexington urban area. A comprehensive metropolitan sewage disposal plan recently presented to the Mayor's Commission raises the possibility of building a treatment plant on North Elkhorn, to its likely detriment. The uniqueness of a quality stream like N. Elkhorn in an urban environment was established conclusively during this project.

Also under the Commission's purview is Boone Creek, a small, scenic stream which supports small mouth bass and put-and-take trout populations. Boone Creek was studied extensively under OWRR project A-010-Ky. and the findings were used in controversies involving the establishment of commercial and industrial developments in the creek's watershed. Evaluation of Boone Creek using the procedures of this project could add further credence to the case for its protection.

CLEAR CREEK

This stream was described in a recent publication of the U. S. D. A. Soil Conservation Service* as "the only unpolluted stream in Woodford County". The findings of this project support the accuracy of this statement. Special protection has been afforded Clear Creek and other Woodford County streams by designating all flood plain areas as restricted-use Conservation Zones. Establishment of this zoning concept in Woodford County was influenced by the results of B-015-Ky.

ATTAINMENT OF PROJECT OBJECTIVES

The primary objective of this project was to develop a procedure that would yield a meaningful quantitative expression of the intangible worth of a small stream area. It was realized at the outset that such an "expression" would have to be a relative one; hence the decision to use a sample of all of Kentucky's small streams as the experimental base. Within the limits of the Kentucky sample, parallel procedures were conceived and tested which yielded relative numerical measures (factor scores) of scenic beauty. One procedure used the on-site evaluations of two judges) the other employed a psychological scaling method to quantify the preference of different subject groups for scenes depicted in color slides of the same or similar small streams areas. The numbers obtained from the two procedures were found to be comparable.

In the course of the work other subsidiary findings were made. These are discussed in the final chapter of this report. It suffices to say, at this point, that within the limits noted above, the primary objective of the project was attained.

* Calvert, Stewart and Huffman R., "Outdoor Recreation Appraisal, Woodford County, Ky." Soil Conservation Service, USDA, 1972.

CHAPTER IV

CONCLUSIONS

Since the work proceeded along several different paths, the conclusions are categorized accordingly.

CONCLUSIONS ABOUT THE PREFERENCE STUDIES

Some of the following tend to confirm the results of previous research, the rest are peculiar to this project.

(1) Preference study subjects react to a color photograph or projected slide of a natural scene in much the same way as they would when viewing the same scene in the field. This agrees with the Coughlin & Goldstein findings (5, pp. 12, 13).

(2) The two principal dimensions for judging landscape scenery, Natural Scenic Beauty and Natural Force are similar to the "Evaluative" and "Potency" factors identified by Osgood and Suci in their original research on the semantic differential (26, 27). The third dimension, Natural Starkness, is apparently valid in the context of this project but its similarity to "Activity", Osgood and Suci's third dimension of meaning, is slight.

(3) In the hierarchy of natural scenery, a scene that includes moving water (as in a riffle, rapids or waterfall) is almost always preferred over one that includes still water (lakes and creek pools) or no water at all; the degree of preference, (as used here) being measured by the score on Factor I, Natural Scenic Beauty.

(4) Landscapes that are naturally barren, like deserts, lava flows, wintry pastures, etc. are usually rated very low on the scenic beauty scale. The presence of running water in a barren rocky gorge or even in a snowy landscape tends to mitigate the low rating.

(5) Familiar or commonplace scenes are often rated neutral or lower even though they may appear quite beautiful to an outsider.

(6) The general public usually recognizes and low-rates such obvious scenic disvalues as roadside dumps or detergent stream

pollution. But more subtle examples like a poorly located sign or motel or even a coal mine gob pile may not be perceived in the same negative sense. Nearly all scenes including a disvalue or misfit are rated as both turbulent (complex?) and stark.

(7) Peoples' impressions of natural landscapes, as measured by factor scores, fall into fairly well-defined clusters on planes formed by the beauty-force and beauty-starkness dimensions.

(8) Similarity of scenic preferences among the individuals of a group seems to be more closely related to occupation or life style than to age or sex.

(9) Different groups of people agree on what constitutes a very beautiful or very ugly scene but disagree about scenes that are neither one or the other. This supports an opinion of Tybout (50).

(10) The semantic differential procedure as outlined in this report can be used to quantify the preferences for natural scenery of groups or individuals. In a practical application, great care would have to be exercised in the collection and presentation of the slides to assure that the attributes and disvalues of the stream or watershed are adequately represented. Obviously, the findings of such a study would have to be compared to some standard. The results of this project provide a gamut of stream types that could possibly be used as a standard, at least for studies conducted in areas of similar geography.

CONCLUSIONS ABOUT SCENIC CONTENT

(1) Predicting preferences (factor scores) from the physical measurements of what's in a picture is, at best, an approximate procedure, but the exercise does provide some insight into the relationships between the two sets of variables.

(2) Landscape type, as defined by Litton (22), and the relative areas of sky, vegetation and non-vegetation are most closely related to scenic beauty.

(3) Natural force is not highly correlated with scenic content. Something other than that which can be measured in a picture is involved.

(4) Muted or drab coloration and relatively small areas of water and vegetation typify scenes that are rated as stark or barren - a finding that is certainly commonsensical. As noted above, the presence of visual pollution may also result in a scene being rated stark or barren.

(5) For the thirteen preference studies for which separate regression equations (relating factor scores to scenic content) were developed, there were some significant areas of agreement among all the various subject groups; i.e.; the regression equations equations were similar in form. This similarity was much more evident among those subject groups which were shown the same set of slides. There seemed to be some sort of "package" effect, that caused diverse groups to respond in similar ways to identical stimuli.

CONCLUSIONS ABOUT THE UNIQUENESS RATIO APPROACH

Several conclusions about this procedure and its application to the Kentucky stream sample are in the report for Part I (11, pp. 80-81); they are reiterated but not repeated here. Modifications introduced in the second phase of this project reduced the number of characteristics to be evaluated for each stream to thirty-seven - apparently near the minimum number. Elimination of the "size" characteristics juggled slightly the uniqueness rankings of the fifty-eight study streams. Otherwise, the basic function of the procedure, unbiased identification of the unique streams, was unimpaired by the changes.

CONCLUSIONS ABOUT THE FACTOR SCORE APPROACH

It may well be that this approach, which utilizes the same data as the uniqueness ratio method, offers the best practical hope for actually quantifying, the relative "value" of a small stream. The field and laboratory procedures are well-known (though somewhat expensive when done on a large scale); the analysis is comparatively simple, and the results are interpretable, in a good-bad sense, over several classifications of intangibles (e. g.; the six factors identified in the present study). Good statistical correlations with the preference study results support this conclusion.

Application of the method in other geographic areas would probably require some additional changes in the list of stream characteristics (Table 14). It is also likely that the less significant factors isolated in the analysis may be interpreted differently than in this study - this would depend on the size and diversity of the stream sample as well as on the characteristics evaluated. Basically, however, the idea is a valid one and should be further tested or, better yet, applied in a real life situation.

RECOMMENDED PROCEDURE FOR EVALUATING SMALL STREAMS

(1) From the total "population" of streams in the study area, select a random sample. In Kentucky, a ten percent sample was representative - this may or may not be the case in other states or regions.

(2) Using a field and laboratory crew of two or more qualified persons, determine the rating of each stream on each of the thirty-seven stream characteristics (Table 14).

(3) Factor analyze the resulting data and compute a factor score for each stream on each factor identified in the analysis (see Appendix C).

(4) Collect a set of color slides depicting typical scenes along an arbitrary sub-sample of the streams. Care should be taken to assure that all stream types are represented and that both good and bad aspects of the streamscapes are included.

(5) Conduct preference studies according to the semantic differential procedure, using as subjects selected segments of the local population, decision-makers and other pertinent personalities. Compute the factor scores for each scene and subject group (Appendix C).

(6) Correlate the comparable factor scores of (3) and (5) to validate the stream scores. Rank order the streams on each factor.

(7) Analyze stream rankings to establish hierarchies within the sample.

(8) Use the results of the above procedure to modify by subjective or objective (numerical weighting) means the benefit-cost ratio or

other measure-of-worth. Or, if the study is not related to a decision on the fate of one specific stream use the results as a guide for future decisions affecting small streams. Extrapolation of the findings to streams not in the original sample could be done by a simple comparison of characteristics.

FINAL COMMENTS

In a world in which everything apparently has its price, the worth of things intangible has always posed some intriguing questions. Some words on the subject by the philosopher, Santayana, have been previously quoted to establish the connection between preference and value (36). A less worldly philosopher, writing in his journal in the Spring of 1853 (2, p. 179), provides a different (and somewhat other-worldly) aspect of the problem:

> "The value of mountains on the horizon-would that not be a good theme for a lecture? The text for a discourse on real values, and permanent, a sermon on the mount. They are stepping stones to heaven - as the rider has a horse - block at his gate - by which to mount when we would commence our pilgrimage to heaven; by which we gradually take our departure from earth, from the time when our youthful eyes first rested on them-from this bare actual earth, which has so little of the hue of heaven. They make it easier to live. They let us off."

In Henry Thoreau's time the "mountains on the horizon" were permanent and things of value. Today, mountains are as impermanent as any other feature of the landscape. In the Appalachians vast areas of these "stepping stones to heaven" are being reduced to plains, plateaus and disordered piles of earth, rock and splintered trees in order to satisfy ("economically") this country's insatiable demand for energy. A similar fate is apparently in store for portions of the Rocky Mountains if present (1973) plans to mine oil bearing shale are implemented.

Well, so what? Do we keep the mountains and "freeze in the dark" as a Coal Association bumper sticker suggests the "bastard ecologists" do? Or do we systematically devastate the mountains and stay warm and brightly lit? Unless there are some drastic changes in the American life-style and a reversal of the general acceptance of continuous "growth" as the only way to go, the latter situation is bound to prevail.

Of what use then is the time and effort that have been put into a project which has as its stated purpose the measurement of "intangible values" - not of majestic mountains, but of that delicate, always expendable landscape, the small watershed? If, of course, this report is filed away with thousands of others like it in that legendary (?) building on the Potomac or winds up on the dusty bookshelves of other academicians, then it's all a waste. The only real good that can come of this work is that the results be used - used to make a case here or there for saving some small stream from pollution, inundation or channelization - used to identify some small watershed as being one of a few or the last of its kind in a given area - used to help people realize that there are good things other than six-packs, snowmobiles and ski boats. If, finally, worse comes to worst, and we do continue to deface and destroy the form and beauty of our natural "home", there surely must sometime, somewhere, be reserved, small remnants of what that home once was: If the ideas and procedures developed during this project can be used to justify the saving of just one such remnant, the whole thing will have been worthwhile.

End.

APPENDIX A

DICTIONARY OF BI-POLAR ADJECTIVES
RATING FORM FOR PILOT STUDY II

DICTIONARY OF
BIPOLAR ADJECTIVES AS SCENERY DESCRIPTORS
PILOT STUDY I

ACTIVE - PASSIVE
ALIVE - DEAD
ATTRACTIVE - REPULSIVE
AUTHENTIC - UNREAL
BEAUTIFUL - UGLY
BRIGHT - DARK
CLEAN - DIRTY
CLEAR - DISTURBED
CLEAR - HAZY
CLUTTERED - ORDERLY
COARSE - FINE
COLD - WARM
COLORFUL - DRAB
COLOSSAL - TINY
COMPLEX - SIMPLE
CONCRETE - ABSTRACT
CONVERGENT - DIVERGENT
CONVEX - CONCAVE
DARK - LIGHT
DEFINITE - AMBIGUOUS
DEVIOUS - DIRECT
DISCONTINUOUS - CONSTANT
DOMINANT - SUBMISSIVE
DULL - INTERESTING
ELEVATED - DEPRESSED
EMPTY - FULL
EPHEMERAL - LASTING (PERMANENT)
EXCITING - BORING
EXPANSIVE - CONSTRICTED
FANCY - PLAIN
FERTILE - BARREN
FLOWING - STILL
FRESH - STALE
GENERAL - SPECIFIC
GENTLE - SAVAGE
GOOD - BAD
GRACEFUL - AWKWARD
HAPPY - MAD
HEAVY - LIGHT
HIDDEN - EXPOSED
HUMID - ARID
HUSHED - LOUD
INSPRING - UNIMPRESSIVE
INTACT - BROKEN

KNOBBY - HONEYCOMBED

LARGE - SMALL

LOFTY - LOWLY

LONELY - CROWDED

LUMINOUS - DULL

LUSH - AUSTERE

MASCULINE - FEMININE

MATERIALISTIC - SPIRITUAL

MEANINGFUL - MEANINGLESS

MESSY - ORDERLY

NAIVE - SOPHISTICATED

NATURAL - ARTIFICIAL

OPEN - CLOSED

ORDERLY - CHAOTIC

PANORAMIC - ENCLOSED

PERFECT - DEFECTIVE

PLEASANT - OFFENSIVE

POSITIVE - NEGATIVE

POWERFUL - WEAK

PRECIOUS - VALUELESS

PRECISE - VAUGUE

PRIMITIVE - CIVILIZED

QUIET - NOISY

RARE - ORDINARY

REAL - EPHEMERAL

RELAXED - TENSE

RESTFUL - DISTURBING

RICH - POOR

ROUGH - SMOOTH

ROUNDED - ANGULAR

RURAL - URBAN

SAFE - DANGEROUS

SECLUDED - SOCIABLE

SIMPLE - COMPLEX

SINUOUS - STRAIGHT

SLEEK - SCRAGGLY

SLOW - FAST

SOFT - HARD

SPACIOUS - RESTRICTED

SPARSE - DENSE

STARK - MUTED

SUBTLE - OBVIOUS

SUPERFICIAL - PROFOUND

TANGIBLE - ETHEREAL

TRITE - MEANINGFUL

TURBULENT - TRANQUIL

UNIFORM - DIVERSIFIED

UNIQUE - COMMONPLACE

UNTRAVELED - ACCESSIBLE

UNTORDDEN - TRAMPLED

USELESS - USEFUL

VALUABLE - WORTHLESS

VARIED - MONOTONOUS

VERDANT - DENUDED

VIGOROUS - PLACID

VIVID - PALE

WEAK - STRONG

WET - DRY

WILD - TAME

WINTRY - SUMMERY

WISE - FOOLISH

Rating Form
Semantic Differential Procedure
Pilot Studies II-1 and II-2

Name ____________ Scene ________________

Graceful								Awkward
Wild								Tame
Inspiring								Unimpressive
Boring								Exciting
Unique								Commonplace
Full								Empty
Disturbing								Restful
Colorful								Drab
Beautiful								Ugly
Heavy								Light
Weak								Powerful
Active								Passive
Artificial								Natural
Hushed								Loud
Good								Bad
Closed								Open
Primitive								Civilized
Peaceful								Ferocious
Pleasant								Unpleasant
Delicate								Rugged
Alive								Dead
Turbulent								Tranquil
Barren								Fertile
Simple								Complex
Cold								Warm

APPENDIX B

INSTRUCTIONS AND RATING FORMS PREFERENCE STUDIES

INSTRUCTIONS

PREFERENCE STUDIES

The purpose of this study is to attempt to find the meanings that various kinds of scenery have for different people by having them judge each scene on a series of descriptive scales. When you do this, please judge the seenes on the basis of what they mean to you.

If, for you, a scene is very closely associated with one end of the scale, you might place your check mark as follows:

Attractive |___|___|___|___|___|___|___| Repulsive

If the scene seems quite closely related to one side of the scale, you might check it as follows:

Lush |___|___|___|___|___|___|___| Austere

If the scene seems only slightly related on one side as opposed to the other, you might check as follows:

Rough |___|___|___|___|___|___|___| Smooth

If you consider the scale completely irrelevant, or both sides equally associated, you would check the middle space on the scale:

Cruel |___|___|___|___|___|___|___| Kind

Here is a slide for practice. How would consider the meaning of this scene, for you, on the scales below?

Sinuous |___|___|___|___|___|___|___| Straight

Plain |___|___|___|___|___|___|___| Fancy

First, consider the scene with regard to the sinuous-straight scale and make a check mark to indicate where you would place it along the scale.

Next, consider the scene with regard to the plain-fancy scale and make a check mark for it position on this scale.

Here is another slide for practice. Please make a check mark on each of these two scales to indicate the meaning of this scene for you.

Pleasant	___|___|___|___|___|___|___	Offensive
Stark	___|___|___|___|___|___|___	Muted

Now we are going to show you several scenes and ask you to make this kind of judgment for each of the scenes. On the next page you will find a listing of 21 scales. Then we will go on to a second scene and you are asked to judge this scene on the same scales. Each slide will be shown for about three minutes and you are asked to make your 21 scale judgments for that scene within the three-minute period. Try to make each of the judgments a separate and independent judgment. Work at fairly high speed, without worrying or puzzling over the individual items for long periods. It is your first impression that we want.

Of course, some of the items may seem irrelevant to you. It was necessary, in the design of this study, to match each scene with every scale, and this is why some items may seem irrelevant. So give the best judgment you can and move along.

This is not a TEST! There are no right or wrong answers. It is your judgment or impression of these scenes, and your reaction to them, that we want.

Rating Form

Pilot Study III and Studies 1-11

Scene ________________

1. Graceful	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	Awkward
2. Wild	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	Tame
3. Boring	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	Exciting
4. Unique	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	Commonplace
5. Full	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	Empty
6. Disturbing	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	Restful
7. Colorful	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	Drab
8. Beautiful	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	Ugly
9. Weak	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	Powerful
10. Active	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	Passive
11. Artificial	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	Natural
12. Hushed	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	Loud
13. Good	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	Bad
14. Primitive	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	Civilized
15. Delicate	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	Rugged
16. Alive	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	Dead
17. Turbulent	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	Tranquil
18. Barren	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	Fertile
19. Simple	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	Complex
20. Cold	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	Warm

HOW MUCH DO YOU LIKE OR DISLIKE THIS SCENE?

21. LIKE IT VERY MUCH	⌊___⌊___⌊___⌊___⌊___⌊___⌊___⌋	DISLIKE IT VERY MUCH

APPENDIX C

COMPUTATIONAL PROCEDURES

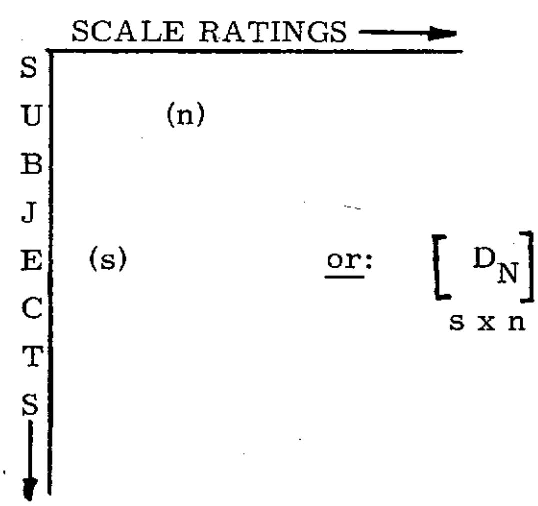
FACTOR SCORES

APPLICATION OF THE SEMANTIC DIFFERENTIAL PROCEDURE TO THE MEASUREMENT OF PEOPLES' PREFERENCES FOR NATURAL LANDSCAPES

N concepts (slides) are shown to s observers or subjects. Each subject is asked to rate each concept (slide), on a scale of 1 thru 7, against a set of n scales, each scale consisting of a pair of antonymous (bi-polar) adjectives.

The result of this process is a three-dimensional raw data matrix of N x s x n cells, each cell containing a digit ranging in value from 1 thru 7 (see Figure 22).

Using XBAR[1], the mean rating ($\overline{X}_{Nn}$) for each slide on each scale is computed along with the corresponding standard deviation (σ_{Nn}) and variance (σ_{Nn}^2). Input to XBAR is a series of raw data matrices of the form:

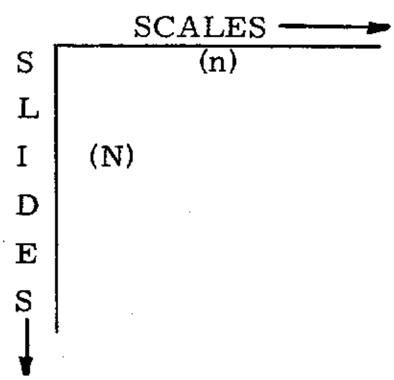


There is one such matrix for each of N slides. The XBAR program recognizes this input as N repetitions of the calculations for n variables and s observations.

The means computed by XBAR are output as N, n x 1 vectors:

$$\underset{n \times 1}{\left[\bar{X}_N\right]}$$

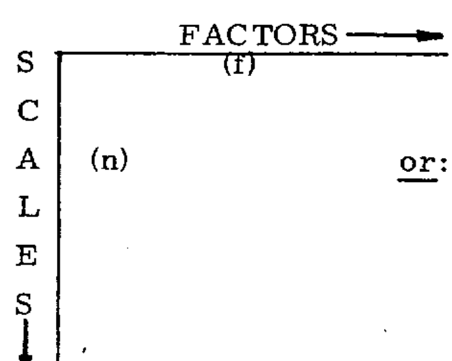
For further analysis, these vectors are combined into an n x N matrix and then transposed:



or: $\underset{N \times n}{\left[\bar{X}\right]}$

The matrix of mean ratings, in this form, provides the input for principal axis factor analysis with varimax rotation (PAFA)[2]. The input for this program is recognized as that for n variables and N observations.

The output of PAFA is a matrix of factor loadings (varimax rotated of the form:



or: $\underset{n \times f}{\left[V\right]}$

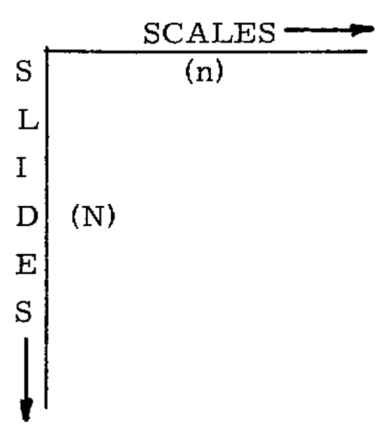
An eigenvalue, E_f is also computed and output for each factor.

The matrix of mean ratings, $\left[\overline{X}\right]_{N \times n}$ also provides the input for STSCOR. In this program, the grand mean, $\overline{\overline{X}}_n$ and standard deviation, $\overline{\overline{\sigma}}_n$ are computed for each of the n columns of the input matrix. A standard score, Z_{Nn} is then computed for each slide on each scale:

$$Z_{Nn} = \frac{\overline{X}_{Nn} - \overline{\overline{X}}_n}{\overline{\overline{\sigma}}_n}$$

The input to STSCOR[3] is recognized by the program as that for n variables and N observations with computations being made for a mean of zero and a standard deviation of one.

The output of STSCOR is of the form:



or: $\left[SS\right]_{N \times n}$

A factor score is computed for each slide on each factor by premultiplying the transpose of the STSCOR matrix by the transpose of the factor loading matrix and diving the result by each of the corresponding eigenvalues. A matrix manipulation package known as MATPAC was used to perform these operations.[4]

Let $[P]$ represent the product matrix; then:

$$\underset{f \times N}{[P]} = \underset{f \times n}{[V]}^{T} \cdot \underset{n \times N}{[SS]}^{T}$$

Each row of the $[P]$ matrix is then divided by the appropriate E_f (as a scalar) to yield the matrix of factor scores, $\underset{f \times N}{[F]}$.

1. Statistical Program Library for the IBM System 360, Computing Center, University of Kentucky, Lexington, Ky. December 1970, pp. 272-276.
2. Ibid; pp. 191-200.
3. Ibid; pp. 236-239.
4. MATPAC, Matrix Package Program, R.H.R. Tide, Lehigh University, 1966. Modifications by R.H.R. Tide, 1967. Adaptation to IBM 360 single precision arithmetic; A. Korn. University of Kentucky, 1967. Unpublished.

APPENDIX D

OCCUPATION AND AGE DATA PREFERENCE STUDY SUBJECTS

OCCUPATION and AGES of SUBJECTS

PREFERENCE STUDIES 1 and 4-11

Study 1

Some Residents of Dry Ridge, Kentucky

Secretary	23
Teacher	50, 59
Service Station Attendant	58
Merchant	55
Beautician	19, 51
Student	11
Housewife	48, 60
Insurance Agent	23, 52
Physician	54
Wildlife Area Manager	45
Fishing Dock Operator	72
Farmer	48
Conservation Officer	51
City Clerk	64
Warehouse Man	35
Salesman	64
Pharmacist	32
Retired	65
Graduate Student	26

Study 4

Planners (Lexington, Kentucky Planning and Zoning Comm.)

Planner (4)	25, 27, 26, 45
Architecture Student	27
Planning Technician	28
Draftsman	22

Study 5*

Civil Engineering Students (C.E. Dept., University of Kentucky)

- Mining Option (2)
- Transportation Option (2)
- Water Resources (1)
- Structural (1)
- General (1)

*Ages of subjects not obtained.

Study 6

Carter Caves State Park	
Medical Receptionist	35
Student (6)	16, 20, 16, 12, 14, 12
Transit Inspector	53
Clerk	27
Housewife (9)	37, 48, 26, 32, 45, 34, 31, 51, 47
Mailman	39
Accountant	49
Fumer & Dust Control Tech.	70
Restaurant Owner	47
Civil Engineer	34
Executive Secretary	29
Air Traffic Controller	37
Minister (2)	35, 40
Physicist	36
Salesman	51
Architect	51
(Blank) (3)	-

Study 7

Pine Mountain State Park	
Technician	28
Production Supervisor	-
Secretary	22
Housewife (2)	23, 31
Park Naturalist	21
Student (2)	15, 16
Retired (2)	71, 66

Study 8*

Natural Bridge State Park

- Minister
- Unemployed
- Legal Secretary
- Housewife (3)
- Accountant (2)
- Railroad Inspector
- School Teacher
- Designer
- Clerk
- Buyer

*Ages of subjects not obtained.

Study 9

Natural Bridge State Park

Orthodontist	42
Housewife (12)	17, 27, 54, 48, 70, 32, 44, 32, 40, 28, 19, 36
Farmer	52
Businessman	48
Contractor	49
Motel Operator	57
Student (2)	23, 16
Railroad Track Foreman	56
Medical Research Technician	32
Fire Chief	59
City Park Maintenance Supervisor	48
Photographer	36
Credit Investigator	34
Tool and Die Maker	44
Company Treasurer	53
Secretary	22
Sheet Metal and Painting Supervisor	49
Dentist	36
Insurance Agent	33
Technical Writer	31

Study 10

Jenny Wiley State Park

Student	28
Housewife (2)	27, 19
Printer	27
Recreation Director	22
Chemical Engineer	28

Study 11

Cumberland Falls State Park

Student (5)	16, 14, 28, 22, 16
Retired (2)	63, 60
Accountant	33
Housewife (3)	38, 34, 33
Salesman (2)	42, 36
Program Analyst	32
Screwmaker	43
Mechanical Engineer	50
Service Manager	33
(Blank)	42

APPENDIX E

INSTRUCTIONS AND RATING FORM
PAIRED COMPARISONS

INSTRUCTIONS

Forty-five pairs of color slides depicting various outdoor scenes will be projected on the screen. Each pair will be displayed for approximately twenty seconds. Study each pair of scenes as critically as you can within the time limit and decide which scene of each pair (left or right) you find to be the most attractive. Indicate your selection on the scoring sheet by placing an "X" in the LEFT or RIGHT column opposite the appropriate PAIR NUMBER. The PAIR NUMBER will be announced by the projectionist prior to the display of each pair.

Try to make each of your judgments separate and independent of what has gone before. Make your decisions fairly rapidly. Do not go back and change any of your previous judgments.

This is not a TEST! There are no right or wrong answers. It is your judgment or your impression of these scenes, and your reaction to them, that we want.

SCORING SHEET - PAIRED COMPARISONS

PAIR NO.	LEFT	RIGHT
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		

PAIR NO.	LEFT	RIGHT
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		

APPENDIX F

FACTOR LOADINGS
STUDIES I-II

FACTOR LOADING MATRICES

STUDY 1

	UNROTATED			VARIMAX ROTATED		
	I	II	III	I	II	III
1	0.968	0.126	0.016	0.954	-0.061	0.198
2	0.449	-0.835	0.097	0.357	-0.830	-0.303
3	-0.979	0.112	-0.022	-0.946	0.268	-0.079
4	0.764	-0.542	0.241	0.660	-0.707	0.011
5	0.982	0.044	-0.003	0.965	-0.123	0.141
6	-0.974	-0.144	-0.092	-0.947	0.085	-0.272
7	0.980	-0.025	-0.040	0.965	-0.162	0.073
8	0.995	0.039	0.003	0.976	-0.132	0.144
9	-0.960	0.116	0.124	-0.954	0.194	0.048
10	0.809	-0.297	-0.387	0.843	-0.189	-0.383
11	-0.942	-0.033	-0.122	-0.902	0.189	-0.235
12	0.155	0.699	0.674	0.078	0.226	0.954
13	0.989	0.076	-0.075	0.988	-0.061	0.097
14	0.466	-0.729	0.272	0.348	-0.832	-0.098
15	0.026	0.889	-0.199	0.132	0.849	0.303
16	0.982	0.037	-0.120	0.987	-0.070	0.039
17	-0.488	-0.625	-0.569	-0.417	-0.161	-0.867
18	-0.840	-0.335	0.277	-0.900	-0.286	-0.045
19	0.056	0.596	-0.494	0.195	0.745	-0.095
20	-0.849	-0.433	-0.009	-0.862	-0.222	-0.339
21	0.991	0.015	-0.059	0.983	-0.121	0.079
Eigenvalues:	13.844	4.011	1.493	13.342	3.639	2.368
% Variance:	65.9	19.1	7.1	63.5	17.3	11.3

FACTOR LOADING MATRICES
STUDY 2

	UNROTATED				VARIMAX ROTATED		
	I	II	III		I	II	III
1	0.910	-0.252	0.237	1	0.906	0.175	-0.309
2	0.408	0.886	0.113	2	-0.047	0.969	-0.153
3	-0.965	-0.160	-0.096	3	-0.690	-0.523	0.465
4	0.855	0.287	0.313	4	0.656	0.655	-0.227
5	0.941	0.058	-0.226	5	0.560	0.337	-0.716
6	-0.936	0.288	-0.137	6	-0.893	-0.125	0.406
7	0.917	-0.204	-0.248	7	0.651	0.089	-0.715
8	0.965	-0.186	0.023	8	0.812	0.196	-0.518
9	-0.951	-0.183	-0.025	9	-0.634	-0.519	0.516
10	0.623	0.330	-0.546	10	0.043	0.375	-0.808
11	-0.831	-0.413	-0.314	11	-0.582	-0.758	0.214
12	0.790	-0.202	0.504	12	0.925	0.248	-0.022
13	0.970	-0.105	0.080	13	0.806	0.286	-0.476
14	0.556	0.731	0.330	14	0.241	0.944	-0.053
15	0.265	-0.743	0.177	15	0.623	-0.515	0.013
16	0.953	-0.089	-0.262	16	0.618	0.201	-0.750
17	-0.543	0.443	-0.350	17	-0.777	0.099	0.006
18	-0.865	0.301	0.359	18	-0.603	0.047	0.776
19	-0.445	-0.460	0.604	19	0.177	-0.409	0.758
20	-0.572	0.305	0.645	20	-0.246	0.236	0.849
21	0.980	-0.071	0.022	21	0.770	0.303	-0.530
Eigenvalues:	13.554	3.175	2.207		8.655	4.500	5.780
% Variance:	64.5	15.1	10.5		41.2	21.4	27.5

FACTOR LOADING MATRICES

STUDY 3

UNROTATED

	I	II	III
1	0.995	0.002	-0.006
2	-0.297	0.872	0.192
3	-0.905	-0.399	0.033
4	0.436	0.628	0.574
5	0.955	0.254	-0.116
6	-0.951	0.181	0.083
7	0.943	0.184	-0.263
8	0.986	0.150	-0.052
9	-0.541	-0.762	-0.013
10	0.116	0.937	-0.300
11	-0.976	-0.078	-0.144
12	0.669	0.660	0.296
13	0.987	0.131	-0.033
14	0.375	0.494	0.727
15	0.779	-0.587	0.063
16	0.934	0.254	-0.150
17	-0.697	0.652	-0.234
18	-0.949	-0.081	0.304
19	0.717	-0.620	0.219
20	-0.844	0.400	0.121
21	0.978	0.130	-0.058
Eigenvalues:	13.637	5.033	1.428
% Variance:	64.9	24.0	6.8

VARIMAX ROTATED

	I	II	III
1	0.883	-0.412	0.203
2	-0.084	0.788	0.508
3	-0.926	0.032	-0.345
4	0.355	0.143	0.876
5	0.961	-0.145	0.216
6	-0.820	0.520	-0.042
7	0.984	-0.147	0.055
8	0.935	-0.268	0.230
9	-0.692	-0.408	-0.477
10	0.481	0.843	0.201
11	-0.833	0.392	-0.363
12	0.294	-0.936	0.088
13	0.923	-0.291	0.237
14	0.205	0.002	0.934
15	0.498	-0.840	-0.056
16	0.954	-0.124	0.183
17	-0.344	0.919	-0.043
18	-0.975	0.221	0.027
19	0.377	-0.896	0.050
20	-0.676	0.644	0.114
21	0.924	-0.279	0.214
Eigenvalues:	11.273	6.098	2.727
% Variance:	53.7	29.0	13.0

FACTOR LOADING MATRICES

STUDY 4

UNROTATED

	I	II	III
1	0.939	0.253	0.124
2	0.850	-0.280	0.403
3	-0.934	0.265	-0.175
4	0.824	-0.312	0.389
5	0.956	-0.115	-0.242
6	-0.930	-0.313	0.157
7	0.925	0.047	-0.247
8	0.993	0.011	0.038
9	-0.502	0.777	0.043
10	0.037	-0.901	-0.387
11	-0.969	0.064	-0.187
12	0.564	0.731	0.243
13	0.991	0.021	0.063
14	0.883	-0.319	0.158
15	0.095	0.970	-0.100
16	0.976	-0.044	-0.129
17	-0.452	-0.833	0.022
18	-0.878	-0.108	0.431
19	-0.130	0.775	0.120
20	-0.755	-0.305	0.510
21	0.992	-0.056	0.066
Eigenvalues:	13.552	4.827	1.272
% Variance:	64.5	23.0	6.1

VARIMAX ROTATED

	I	II	III
1	0.764	0.328	-0.519
2	0.961	-0.121	-0.160
3	-0.893	0.159	0.389
4	0.939	-0.157	-0.148
5	0.638	-0.119	-0.751
6	-0.582	-0.315	0.741
7	0.578	0.034	-0.763
8	0.805	0.076	-0.578
9	-0.525	0.734	0.209
10	-0.017	-0.966	-0.171
11	-0.887	-0.040	0.435
12	0.442	0.799	-0.278
13	0.815	0.091	-0.599
14	0.852	-0.219	-0.362
15	-0.175	0.917	-0.298
16	0.705	-0.020	-0.688
17	-0.180	-0.824	0.433
18	-0.423	-0.044	0.887
19	-0.186	0.772	0.042
20	-0.241	-0.207	0.906
21	0.833	0.018	-0.544
Eigenvalues:	9.091	4.623	5.938
% Variance:	43.3	22.0	28.3

FACTOR LOADING MATRICES

STUDY 5

	UNROTATED I	UNROTATED II	UNROTATED III	VARIMAX ROTATED I	VARIMAX ROTATED II	VARIMAX ROTATED III
1	0.917	-0.100	0.272	0.879	-0.387	-0.045
2	0.856	0.425	0.046	0.939	0.184	-0.015
3	-0.987	-0.122	-0.032	-0.973	0.098	0.183
4	0.747	0.497	0.238	0.885	0.179	0.212
5	0.951	-0.147	-0.182	0.829	-0.227	-0.470
6	-0.817	0.446	-0.245	-0.681	0.656	0.181
7	0.926	-0.120	-0.065	0.831	-0.251	-0.350
8	0.988	-0.049	0.109	0.936	-0.282	-0.185
9	-0.750	-0.644	-0.128	-0.914	-0.356	-0.174
10	0.704	0.563	-0.347	0.775	0.512	-0.262
11	-0.976	0.042	-0.158	-0.934	0.296	0.136
12	0.333	-0.787	0.317	0.135	-0.892	-0.129
13	0.972	-0.094	-0.010	0.890	-0.263	-0.304
14	0.923	0.130	0.011	0.911	-0.069	-0.181
15	-0.332	-0.799	-0.230	-0.579	-0.525	-0.437
16	0.876	-0.043	-0.437	0.749	-0.005	-0.632
17	-0.169	0.803	-0.529	-0.008	0.972	-0.094
18	-0.641	0.540	0.476	-0.377	0.373	0.804
19	-0.139	0.223	0.701	0.039	-0.101	0.740
20	-0.560	0.717	0.198	-0.292	0.639	0.611
21	0.974	-0.027	0.046	0.920	-0.232	-0.228
Eigenvalues:	13.027	4.209	1.788	12.027	4.027	2.969
% Variance:	62.0	20.0	8.5	57.3	19.2	14.1

FACTOR LOADING MATRICES

STUDY 6

UNROTATED

	I	II	III
1	0.973	-0.140	0.022
2	0.100	0.953	0.075
3	-0.994	-0.056	0.032
4	0.848	0.343	0.112
5	0.998	0.011	-0.050
6	-0.883	0.419	-0.140
7	0.983	-0.037	-0.160
8	0.996	-0.026	-0.029
9	-0.914	-0.332	-0.108
10	0.772	0.297	-0.527
11	-0.954	-0.147	-0.203
12	0.493	-0.664	0.534
13	0.994	0.011	0.028
14	0.588	0.539	0.571
15	0.246	-0.864	-0.426
16	0.957	0.047	-0.225
17	-0.385	0.811	-0.406
18	-0.929	0.212	0.178
19	-0.770	-0.481	-0.142
20	-0.896	0.315	0.095
21	0.955	0.024	0.011
Eigenvalues:	14.688	3.959	1.468
% Variance:	69.9	18.9	7.0

VARIMAX ROTATED

	I	II	III
1	0.907	-0.371	0.077
2	0.147	0.604	0.733
3	-0.959	0.202	-0.179
4	0.799	-0.052	0.456
5	0.964	-0.223	0.136
6	0.764	0.623	0.050
7	0.979	-0.182	0.023
8	0.954	-0.262	0.125
9	-0.927	-0.065	-0.306
10	0.915	0.350	-0.035
11	-0.857	0.279	-0.400
12	0.256	-0.950	-0.010
13	0.937	-0.273	0.189
14	0.429	-0.143	0.870
15	0.295	-0.403	-0.859
16	0.981	-0.073	0.033
17	-0.181	0.943	0.219
18	-0.920	0.281	0.120
19	-0.727	-0.047	-0.560
20	-0.856	0.400	0.139
21	0.944	-0.253	0.187
Eigenvalues:	13.426	3.649	3.039
% Variance:	63.9	17.4	14.5

FACTOR LOADING MATRICES
STUDY 7

	UNROTATED I	UNROTATED II	UNROTATED III		VARIMAX ROTATED I	VARIMAX ROTATED II	VARIMAX ROTATED III
1	0.938	-0.248	0.021	1	0.879	0.166	0.375
2	0.639	0.567	0.276	2	0.126	0.545	0.703
3	-0.974	-0.151	0.058	3	-0.703	-0.527	-0.451
4	0.824	0.403	0.244	4	0.372	0.507	0.710
5	0.986	-0.091	-0.075	5	0.852	0.354	0.367
6	-0.817	0.524	-0.002	6	-0.942	0.084	-0.217
7	0.942	-0.217	-0.026	7	0.877	0.216	0.348
8	0.973	-0.169	0.030	8	0.861	0.236	0.424
9	-0.824	-0.417	-0.057	9	-0.408	-0.614	-0.559
10	0.695	0.629	-0.289	10	0.268	0.901	0.279
11	-0.882	0.006	-0.453	11	-0.599	-0.110	-0.782
12	-0.420	-0.813	0.307	12	0.050	-0.944	-0.195
13	0.969	-0.206	0.061	13	0.872	0.190	0.435
14	0.730	0.224	0.614	14	0.311	0.145	0.917
15	0.187	-0.878	-0.353	15	0.723	-0.421	-0.480
16	0.956	-0.113	-0.170	16	0.863	0.373	0.267
17	0.242	0.902	-0.288	17	-0.245	0.933	0.155
18	-0.829	0.495	0.112	18	-0.962	-0.002	-0.137
19	-0.660	-0.414	0.558	19	-0.424	-0.860	0.027
20	-0.676	0.612	0.232	20	-0.934	0.088	0.070
21	0.968	-0.219	0.021	21	0.887	0.200	0.398
Eigenvalues:	13.505	4.685	1.528		10.096	5.216	4.405
%Variance:	64.3	22.3	7.3		48.0	24.8	21.0

FACTOR LOADING MATRICES

STUDY 8

	UNROTATED				VARIMAX ROTATED		
	I	II	III		I	II	III
1	0.901	-0.289	0.201	1	0.896	-0.307	0.200
2	-0.226	0.899	-0.023	2	-0.225	0.898	0.045
3	-0.908	-0.341	-0.131	3	-0.904	-0.327	-0.183
4	0.476	0.647	0.519	4	0.462	0.601	0.583
5	0.859	0.354	-0.209	5	0.864	0.368	-0.156
6	-0.628	0.709	0.112	6	-0.684	0.699	0.152
7	0.939	0.069	-0.103	7	0.941	0.076	-0.072
8	0.990	-0.038	0.093	8	0.987	-0.047	0.115
9	-0.735	-0.591	-0.105	9	-0.732	-0.578	-0.172
10	0.631	0.677	-0.261	10	0.637	0.695	-0.187
11	-0.881	0.115	-0.229	11	-0.875	0.136	-0.242
12	-0.027	-0.869	0.414	12	-0.038	-0.900	0.340
13	-0.987	-0.053	0.042	13	0.985	-0.058	0.063
14	0.079	0.918	0.136	14	0.076	0.903	0.214
15	0.438	-0.868	-0.172	15	0.442	-0.852	-0.232
16	0.966	0.017	-0.231	16	0.972	0.034	-0.203
17	-0.205	0.925	-0.045	17	-0.203	0.926	0.026
18	-0.957	0.142	0.082	18	-0.959	0.137	0.069
19	-0.295	-0.874	0.101	19	-0.298	-0.879	0.020
20	-0.872	0.446	0.121	20	-0.875	0.437	0.134
21	0.993	-0.013	0.054	21	0.991	-0.202	0.079
Eigenvalues:	11.590	7.075	0.845		11.583	7.033	0.895
% Variance:	55.2	33.7	4.0		55.2	33.5	4.3

FACTOR LOADING MATRICES

STUDY 9

	UNROTATED			VARIMAX ROTATED		
	I	II	III	I	II	III
1	0.971	0.171	- 0.021	0.984	0.032	- 0.069
2	0.775	- 0.498	0.181	0.714	- 0.525	0.312
3	- 0.979	0.187	0.007	- 0.947	0.307	- 0.043
4	0.726	- 0.569	0.274	0.660	- 0.560	0.421
5	0.988	- 0.060	- 0.091	0.969	- 0.210	- 0.072
6	- 0.863	- 0.480	0.037	- 0.913	- 0.335	0.171
7	0.977	0.168	- 0.086	0.986	0.010	- 0.131
8	0.976	0.136	0.080	0.988	0.025	0.037
9	- 0.523	0.815	0.017	- 0.417	0.848	- 0.210
10	0.656	- 0.638	- 0.299	0.561	- 0.775	- 0.111
11	- 0.950	- 0.204	- 0.163	- 0.974	- 0.116	- 0.098
12	0.133	0.890	0.365	0.256	0.931	0.102
13	0.979	0.143	0.018	0.989	0.015	- 0.024
14	0.913	- 0.130	0.357	0.903	- 0.143	0.377
15	- 0.057	0.937	- 0.279	0.049	0.822	- 0.529
16	0.984	- 0.085	- 0.100	0.961	- 0.236	- 0.074
17	- 0.142	- 0.890	- 0.364	- 0.264	- 0.930	- 0.100
18	- 0.824	- 0.445	0.297	- 0.861	- 0.235	- 0.411
19	- 0.084	0.855	0.060	0.025	0.841	- 0.181
20	- 0.686	- 0.494	- 0.494	- 0.723	- 0.245	- 0.614
21	0.984	0.072	0.092	0.988	- 0.033	0.066
Eigenvalues:	13.194	5.712	1.074	13.066	5.482	1.432
%Variance:	62.8	27.2	5.1	62.2	26.1	6.8

FACTOR LOADING MATRICES

STUDY 10

UNROTATED

	I	II	III
1.	0.690	0.391	0.579
2	0.457	-0.804	0.139
3	-0.930	0.184	-0.259
4	0.655	-0.502	0.423
5	0.921	-0.136	-0.210
6	-0.780	-0.475	-0.216
7	0.946	-0.035	-0.064
8	0.948	0.166	0.254
9	-0.962	0.066	-0.134
10	0.778	-0.416	-0.348
11	-0.868	-0.151	0.113
12	-0.248	0.773	0.265
13	0.958	0.166	0.090
14	0.373	-0.698	0.348
15	0.252	0.943	-0.016
16	0.863	0.159	-0.375
17	0.283	-0.883	-0.188
18	-0.611	-0.733	0.188
19	-0.725	0.077	0.605
20	-0.476	-0.783	0.159
21	0.966	-0.087	-0.038
Eigenvalues:	11.575	5.526	1.716
% Variance:	55.1	26.3	8.2

VARIMAX ROTATED

	I	II	III
1	0.939	0.285	-0.048
2	0.332	-0.845	-0.224
3	-0.827	0.276	0.454
4	0.703	-0.586	-0.149
5	0.506	-0.186	-0.787
6	-0.765	-0.393	0.373
7	0.635	-0.101	-0.697
8	0.877	0.070	-0.465
9	-0.779	0.150	0.565
10	0.276	-0.441	-0.793
11	-0.567	-0.094	0.677
12	0.090	0.763	0.373
13	0.772	0.085	-0.591
14	0.426	-0.753	-0.013
15	0.281	0.919	-0.173
16	0.386	0.126	-0.863
17	-0.026	-0.881	-0.342
18	-0.398	-0.698	0.547
19	-0.102	0.078	0.938
20	-0.326	-0.756	0.433
21	0.662	-0.156	-0.693
Eigenvalues:	6.916	5.525	6.375
% Variance:	32.9	26.3	30.3

FACTOR LOADING MATRICES

STUDY 11

UNROTATED

	I	II	III
1	0.937	-0.271	-0.045
2	0.625	0.691	-0.297
3	-0.977	-0.157	0.076
4	0.903	0.189	-0.305
5	0.980	0.042	0.147
6	-0.872	0.482	0.058
7	0.976	-0.105	0.101
8	0.992	-0.072	-0.050
9	-0.929	-0.313	0.104
10	0.676	0.539	0.469
11	-0.968	0.042	0.227
12	0.273	-0.814	-0.485
13	0.991	-0.083	-0.038
14	0.917	0.109	-0.366
15	-0.023	-0.849	0.488
16	0.953	-0.002	0.263
17	-0.173	0.912	0.335
18	-0.818	0.243	-0.479
19	-0.614	-0.680	-0.127
20	-0.719	0.533	-0.385
21	0.993	-0.062	0.010
Eigenvalues	14. 338	4.294	1.693
% Variance:	68.3	20.4	8.1

VARIMAX ROTATED

	I	II	III
1	0.890	-0.202	0.345
2	0.741	0.448	-0.455
3	-0.977	-0.141	-0.100
4	0.963	0.038	-0.120
5	0.916	0.167	0.342
6	-0.811	0.389	-0.433
7	0.909	0.018	0.383
8	0.964	-0.035	0.248
9	-0.953	-0.253	0.020
10	0.593	0.742	0.255
11	-0.985	0.108	-0.083
12	0.302	-0.932	0.119
13	0.959	-0.038	0.264
14	0.984	-0.061	-0.122
15	-0.219	-0.444	0.845
16	0.858	0.193	0.451
17	-0.160	0.936	-0.268
18	-0.654	-0.101	-0.721
19	-0.627	-0.670	0.111
20	-0.553	0.197	-0.777
21	0.951	0.006	0.291
Eigenvalues	13.528	3.552	3.245
% Variance:	64.4	16.9	15.5

APPENDIX G

FACTOR SCORES
ALL STUDIES

FACTOR SCORES
PILOT STUDY II-1

STUDY	SEQ.	SLIDE	I	II	III
PSII-1	01	072	-1.05	0.20	1.77
PSII-1	02	000	0.84	0.75	-1.39
PSII-1	03	902	0.26	0.70	1.88
PSII-1	04	233	1.15	0.94	-1.96
PSII-1	05	241	-0.75	-1.29	-0.36
PSII-1	06	242	1.86	-0.49	-2.33
PSII-1	07	001	-0.85	-0.36	1.61
PSII-1	08	196	-1.02	-0.03	1.81
PSII-1	09	900	1.39	0.07	-2.47
PSII-1	10	901	-0.07	0.58	1.05
PSII-1	11	023	-1.17	0.65	2.03
PSII-1	12	243	0.67	0.29	-1.14
PSII-1	13	174	0.69	0.05	0.08
PSII-1	14	244	-0.41	-0.05	0.80
PSII-1	15	245	0.60	0.40	0.19
PSII-1	16	025	-0.64	-0.78	-1.77
PSII-1	17	202	0.41	0.39	-0.12
PSII-1	18	046	-0.93	-3.01	-2.45
PSII-1	19	094	-0.60	0.95	1.60
PSII-1	20	109	-0.38	0.05	1.18

SORTED ON FACTOR 1

STUDY	SEQ.	SLIDE	I	II	III
PSII-1	11	023	-1.17	0.65	2.03
PSII-1	01	072	-1.05	0.20	1.77
PSII-1	08	196	-1.02	-0.03	1.81
PSII-1	18	046	-0.93	-3.01	-2.45
PSII-1	07	001	-0.85	-0.36	1.61
PSII-1	05	241	-0.75	-1.29	-0.36
PSII-1	16	025	-0.64	-0.78	-1.77
PSII-1	19	094	-0.60	0.95	1.60
PSII-1	14	244	-0.41	-0.05	0.80
PSII-1	20	109	-0.38	0.05	1.18
PSII-1	10	901	-0.07	0.58	1.05
PSII-1	03	902	0.26	0.70	1.88
PSII-1	17	202	0.41	0.39	-0.12
PSII-1	15	245	0.60	0.40	0.19
PSII-1	12	243	0.67	0.29	-1.14
PSII-1	13	174	0.69	0.05	0.08
PSII-1	02	000	0.84	0.75	-1.39
PSII-1	04	233	1.15	0.94	-1.96
PSII-1	09	900	1.39	0.07	-2.47
PSII-1	06	242	1.86	-0.49	-2.33

SORTED ON FACTOR 2

STUDY	SEQ.	SLIDE	I	II	III
PSII-1	18	046	-0.93	-3.01	-2.45
PSII-1	05	241	-0.75	-1.29	-0.36
PSII-1	16	025	-0.64	-0.78	-1.77
PSII-1	06	242	1.86	-0.49	-2.33
PSII-1	07	001	-0.85	-0.36	1.61
PSII-1	14	244	-0.41	-0.05	0.80
PSII-1	08	196	-1.02	-0.03	1.81
PSII-1	13	174	0.69	0.05	0.08
PSII-1	20	109	-0.38	0.05	1.18
PSII-1	09	900	1.39	0.07	-2.47
PSII-1	01	072	-1.05	0.20	1.77
PSII-1	12	243	0.67	0.29	-1.14
PSII-1	17	202	0.41	0.39	-0.12
PSII-1	15	245	0.60	0.40	0.19
PSII-1	10	901	-0.07	0.58	1.05
PSII-1	11	023	-1.17	0.65	2.03
PSII-1	03	902	0.26	0.70	1.88
PSII-1	02	000	0.84	0.75	-1.39
PSII-1	04	233	1.15	0.94	-1.96
PSII-1	19	094	-0.60	0.95	1.60

SORTED ON FACTOR 3

STUDY	SEQ.	SLIDE	I	II	III
PSII-1	09	900	1.39	0.07	-2.47
PSII-1	18	046	-0.93	-3.01	-2.45
PSII-1	06	242	1.86	-0.49	-2.33
PSII-1	04	233	1.15	0.94	-1.96
PSII-1	16	025	-0.64	-0.78	-1.77
PSII-1	02	000	0.84	0.75	-1.39
PSII-1	12	243	0.67	0.29	-1.14
PSII-1	05	241	-0.75	-1.29	-0.36
PSII-1	17	202	0.41	0.39	-0.12
PSII-1	13	174	0.69	0.05	0.08
PSII-1	15	245	0.60	0.40	0.19
PSII-1	14	244	-0.41	-0.05	0.80
PSII-1	10	901	-0.07	0.58	1.05
PSII-1	20	109	-0.38	0.05	1.18
PSII-1	19	094	-0.60	0.95	1.60
PSII-1	07	001	-0.85	-0.36	1.61
PSII-1	01	072	-1.05	0.20	1.77
PSII-1	08	196	-1.02	-0.03	1.81
PSII-1	03	902	0.26	0.70	1.88
PSII-1	11	023	-1.17	0.65	2.03

FACTOR SCORES
PILOT STUDY II-2

STUDY	SEQ.	SLIDE	I	II	III
PSII-2	01	246	0.43	0.55	-0.02
PSII-2	02	061	-1.06	0.16	0.92
PSII-2	03	097	-0.38	0.26	1.37
PSII-2	04	235	0.11	1.37	1.55
PSII-2	05	130	0.07	1.03	0.37
PSII-2	06	106	-0.17	-0.82	-2.26
PSII-2	07	111	-0.23	0.70	0.40
PSII-2	08	247	1.10	0.39	-1.65
PSII-2	09	248	-0.13	-0.77	0.23
PSII-2	10	249	-0.52	-1.61	-1.15
PSII-2	11	901	0.63	0.70	0.47
PSII-2	12	036	-0.27	-0.73	0.55
PSII-2	13	176	-0.13	0.91	1.46
PSII-2	14	016	-0.33	-0.06	0.93
PSII-2	15	250	2.66	-0.41	-2.62
PSII-2	16	251	-0.94	-1.77	-0.94
PSII-2	17	032	-0.83	0.75	2.36
PSII-2	18	252	0.10	1.51	1.46
PSII-2	19	129	-0.88	-2.55	-1.26
PSII-2	20	206	0.77	0.38	-2.19

SORTED ON FACTOR 1

STUDY	SEQ.	SLIDE	I	II	III
PSII-2	02	061	-1.06	0.16	0.92
PSII-2	16	251	-0.94	-1.77	-0.94
PSII-2	19	129	-0.88	-2.55	-1.26
PSII-2	17	032	-0.83	0.75	2.36
PSII-2	10	249	-0.52	-1.61	-1.15
PSII-2	03	097	-0.38	0.26	1.37
PSII-2	14	016	-0.33	-0.06	0.93
PSII-2	12	036	-0.27	-0.73	0.55
PSII-2	07	111	-0.23	0.70	0.40
PSII-2	06	106	-0.17	-0.82	-2.26
PSII-2	09	248	-0.13	-0.77	0.23
PSII-2	13	176	-0.13	0.91	1.46
PSII-2	05	130	0.07	1.03	0.37
PSII-2	18	252	0.10	1.51	1.46
PSII-2	04	235	0.11	1.37	1.55
PSII-2	01	246	0.43	0.55	-0.02
PSII-2	11	901	0.63	0.70	0.47
PSII-2	20	206	0.77	0.38	-2.19
PSII-2	08	247	1.10	0.39	-1.65
PSII-2	15	250	2.66	-0.41	-2.62

SORTED ON FACTOR 2

STUDY	SEQ.	SLIDE	I	II	III
PSII-2	19	129	-0.88	-2.55	-1.26
PSII-2	16	251	-0.94	-1.77	-0.94
PSII-2	10	249	-0.52	-1.61	-1.15
PSII-2	06	106	-0.17	-0.82	-2.26
PSII-2	09	248	-0.13	-0.77	0.23
PSII-2	12	036	-0.27	-0.73	0.55
PSII-2	15	250	2.66	-0.41	-2.62
PSII-2	14	016	-0.33	-0.06	0.93
PSII-2	02	061	-1.06	0.16	0.92
PSII-2	03	097	-0.38	0.26	1.37
PSII-2	20	206	0.77	0.38	-2.19
PSII-2	08	247	1.10	0.39	-1.65
PSII-2	01	246	0.43	0.55	-0.02
PSII-2	07	111	-0.23	0.70	0.40
PSII-2	11	901	0.63	0.70	0.47
PSII-2	17	032	-0.83	0.75	2.36
PSII-2	13	176	-0.13	0.91	1.46
PSII-2	05	130	0.07	1.03	0.37
PSII-2	04	235	0.11	1.37	1.55
PSII-2	18	252	0.10	1.51	1.46

SORTED ON FACTOR 3

STUDY	SEQ.	SLIDE	I	II	III
PSII-2	15	250	2.66	-0.41	-2.62
PSII-2	06	106	-0.17	-0.82	-2.26
PSII-2	20	206	0.77	0.38	-2.19
PSII-2	08	247	1.10	0.39	-1.65
PSII-2	19	129	-0.88	-2.55	-1.26
PSII-2	10	249	-0.52	-1.61	-1.15
PSII-2	16	251	-0.94	-1.77	-0.94
PSII-2	01	246	0.43	0.55	-0.02
PSII-2	09	248	-0.13	-0.77	0.23
PSII-2	05	130	0.07	1.03	0.37
PSII-2	07	111	-0.23	0.70	0.40
PSII-2	11	901	0.63	0.70	0.47
PSII-2	12	036	-0.27	-0.73	0.55
PSII-2	02	061	-1.06	0.16	0.92
PSII-2	14	016	-0.33	-0.06	0.93
PSII-2	03	097	-0.38	0.26	1.37
PSII-2	13	176	-0.13	0.91	1.46
PSII-2	18	252	0.10	1.51	1.46
PSII-2	04	235	0.11	1.37	1.55
PSII-2	17	032	-0.83	0.75	2.36

FACTOR SCORES
PILOT STUDY III

STUDY	SEQ.	SLIDE	I	II	III
PS3	01	199	-1.17	-0.96	0.24
PS3	02	031	-0.21	1.91	0.75
PS3	03	605	-0.46	-0.22	0.11
PS3	04	025	-0.40	-0.02	-1.31
PS3	05	603	1.82	-0.36	-2.84
PS3	06	216	-0.41	-0.52	-0.14
PS3	07	196	-0.73	0.74	2.10
PS3	08	061	-0.70	-0.48	0.32
PS3	09	033	-0.18	0.07	1.30
PS3	10	336	0.87	0.53	0.30
PS3	11	129	-1.04	-2.57	-1.06
PS3	12	109	-0.16	1.04	1.81
PS3	13	001	-0.38	0.47	2.01
PS3	14	604	2.39	-0.44	-3.08
PS3	15	000	0.36	0.86	-0.27

SORTED ON FACTOR 1

STUDY	SEQ.	SLIDE	I	II	III
PS3	01	199	-1.17	-0.96	0.24
PS3	11	129	-1.04	-2.57	-1.06
PS3	07	196	-0.73	0.74	2.10
PS3	08	061	-0.70	-0.48	0.32
PS3	03	605	-0.46	-0.22	0.11
PS3	06	216	-0.41	-0.52	-0.14
PS3	04	025	-0.40	-0.02	-1.31
PS3	13	001	-0.38	0.47	2.01
PS3	02	031	-0.21	1.91	0.75
PS3	09	033	-0.18	0.07	1.30
PS3	12	109	-0.16	1.04	1.81
PS3	15	000	0.36	0.86	-0.27
PS3	10	336	0.87	0.53	0.30
PS3	05	603	1.82	-0.36	-2.84
PS3	14	604	2.39	-0.44	-3.08

SORTED ON FACTOR 2

STUDY	SEQ.	SLIDE	I	II	III
PS3	11	129	-1.04	-2.57	-1.06
PS3	01	199	-1.17	-0.96	0.24
PS3	06	216	-0.41	-0.52	-0.14
PS3	08	061	-0.70	-0.48	0.32
PS3	14	604	2.39	-0.44	-3.08
PS3	05	603	1.82	-0.36	-2.84
PS3	03	605	-0.46	-0.22	0.11
PS3	04	025	-0.40	-0.02	-1.31
PS3	09	033	-0.18	0.07	1.30
PS3	13	001	-0.38	0.47	2.01
PS3	10	336	0.87	0.53	0.30
PS3	07	196	-0.73	0.74	2.10
PS3	15	000	0.36	0.86	-0.27
PS3	12	109	-0.16	1.04	1.81
PS3	02	031	-0.21	1.91	0.75

SORTED ON FACTOR 3

STUDY	SEQ.	SLIDE	I	II	III
PS3	14	604	2.39	-0.44	-3.08
PS3	05	603	1.82	-0.36	-2.84
PS3	04	025	-0.40	-0.02	-1.31
PS3	11	129	-1.04	-2.57	-1.06
PS3	15	000	0.36	0.86	-0.27
PS3	06	216	-0.41	-0.52	-0.14
PS3	03	605	-0.46	-0.22	0.11
PS3	01	199	-1.17	-0.96	0.24
PS3	10	336	0.87	0.53	0.30
PS3	08	061	-0.70	-0.48	0.32
PS3	02	031	-0.21	1.91	0.75
PS3	09	033	-0.18	0.07	1.30
PS3	12	109	-0.16	1.04	1.81
PS3	13	001	-0.38	0.47	2.01
PS3	07	196	-0.73	0.74	2.10

FACTOR SCORES
STUDY 1

STUDY	SEQ.	SLIDE	I	II	III
S1	01	533	-0.43	1.39	1.45
S1	02	498	0.53	-0.37	-0.68
S1	03	273	-0.80	-0.68	0.01
S1	04	545	0.76	0.45	-0.80
S1	05	514	-1.04	-1.38	-0.13
S1	06	275	0.50	0.82	-0.65
S1	07	561	0.15	1.15	1.20
S1	08	319	-0.39	0.67	1.32
S1	09	271	-0.49	0.87	2.02
S1	10	495	-0.80	-0.24	1.15
S1	11	521	-0.83	-0.44	1.64
S1	12	314	2.78	-0.87	-5.08
S1	13	548	0.70	0.23	-0.46
S1	14	516	-0.67	-0.97	-0.23
S1	15	559	-0.82	-0.35	0.51
S1	16	414	-0.19	-0.44	-0.28
S1	17	567	1.17	0.22	-1.30

SORTED ON FACTOR 1

STUDY	SEQ.	SLIDE	I	II	III
S1	05	514	-1.04	-1.38	-0.13
S1	11	521	-0.83	-0.44	1.64
S1	15	559	-0.82	-0.35	0.51
S1	03	273	-0.80	-0.68	0.01
S1	10	495	-0.80	-0.24	1.15
S1	14	516	-0.67	-0.97	-0.23
S1	09	271	-0.49	0.87	2.02
S1	01	533	-0.43	1.39	1.45
S1	08	319	-0.39	0.67	1.32
S1	16	414	-0.19	-0.44	-0.28
S1	07	561	0.15	1.15	1.20
S1	06	275	0.50	0.82	-0.65
S1	02	498	0.53	-0.37	-0.68
S1	13	548	0.70	0.23	-0.46
S1	04	545	0.76	0.45	-0.80
S1	17	567	1.17	0.22	-1.30
S1	12	314	2.78	-0.87	-5.08

SORTED ON FACTOR 2

STUDY	SEQ.	SLIDE	I	II	III
S1	05	514	-1.04	-1.38	-0.13
S1	14	516	-0.67	-0.97	-0.23
S1	12	314	2.78	-0.87	-5.08
S1	03	273	-0.80	-0.68	0.01
S1	11	521	-0.83	-0.44	1.64
S1	16	414	-0.19	-0.44	-0.28
S1	02	498	0.53	-0.37	-0.68
S1	15	559	-0.82	-0.35	0.51
S1	10	495	-0.80	-0.24	1.15
S1	17	567	1.17	0.22	-1.30
S1	13	548	0.70	0.23	-0.46
S1	04	545	0.76	0.45	-0.80
S1	08	319	-0.39	0.67	1.32
S1	06	275	0.50	0.82	-0.65
S1	09	271	-0.49	0.87	2.02
S1	07	561	0.15	1.15	1.20
S1	01	533	-0.43	1.39	1.45

SORTED ON FACTOR 3

STUDY	SEQ.	SLIDE	I	II	III
S1	12	314	2.78	-0.87	-5.08
S1	17	567	1.17	0.22	-1.30
S1	04	545	0.76	0.45	-0.80
S1	02	498	0.53	-0.37	-0.68
S1	06	275	0.50	0.82	-0.65
S1	13	548	0.70	0.23	-0.46
S1	16	414	-0.19	-0.44	-0.28
S1	14	516	-0.67	-0.97	-0.23
S1	05	514	-1.04	-1.38	-0.13
S1	03	273	-0.80	-0.68	0.01
S1	15	559	-0.82	-0.35	0.51
S1	10	495	-0.80	-0.24	1.15
S1	07	561	0.15	1.15	1.20
S1	08	319	-0.39	0.67	1.32
S1	01	533	-0.43	1.39	1.45
S1	11	521	-0.83	-0.44	1.64
S1	09	271	-0.49	0.87	2.02

FACTOR SCORES
STUDY 2

STUDY	SEQ.	SLIDE	I	II	III
S2	01	344	-0.97	1.28	2.39
S2	02	464	-0.77	-0.07	0.55
S2	03	380	-0.42	-0.04	0.62
S2	04	359	0.41	-0.05	-0.56
S2	05	438	-1.30	-1.03	1.80
S2	06	623	-0.39	-0.19	-1.53
S2	07	337	0.57	1.29	0.37
S2	08	441	-0.15	-0.91	0.84
S2	09	450	2.52	-0.30	-3.84
S2	10	395	-0.71	-1.03	0.41
S2	11	425	-0.62	0.17	1.35
S2	12	622	0.75	0.04	-2.95
S2	13	343	-0.55	1.20	1.57
S2	14	458	0.60	-0.11	-0.67
S2	15	398	-0.22	0.04	1.29
S2	16	445	1.43	-0.45	-2.46
S2	17	333	-0.18	0.08	0.82

SORTED ON FACTOR 1

STUDY	SEQ.	SLIDE	I	II	III
S2	05	438	-1.30	-1.03	1.80
S2	01	344	-0.97	1.28	2.39
S2	02	464	-0.77	-0.07	0.55
S2	10	395	-0.71	-1.03	0.41
S2	11	425	-0.62	0.17	1.35
S2	13	343	-0.55	1.20	1.57
S2	03	380	-0.42	-0.04	0.62
S2	06	623	-0.39	-0.19	-1.53
S2	15	398	-0.22	0.04	1.29
S2	17	333	-0.18	0.08	0.82
S2	08	441	-0.15	-0.91	0.84
S2	04	359	0.41	-0.05	-0.56
S2	07	337	0.57	1.29	0.37
S2	14	458	0.60	-0.11	-0.67
S2	12	622	0.75	0.04	-2.95
S2	16	445	1.43	-0.45	-2.46
S2	09	450	2.52	-0.30	-3.84

SORTED ON FACTOR 2

STUDY	SEQ.	SLIDE	I	II	III
S2	05	438	-1.30	-1.03	1.80
S2	10	395	-0.71	-1.03	0.41
S2	08	441	-0.15	-0.91	0.84
S2	16	445	1.43	-0.45	-2.46
S2	09	450	2.52	-0.30	-3.84
S2	06	623	-0.39	-0.19	-1.53
S2	14	458	0.60	-0.11	-0.67
S2	02	464	-0.77	-0.07	0.55
S2	04	359	0.41	-0.05	-0.56
S2	03	380	-0.42	-0.04	0.62
S2	12	622	0.75	0.04	-2.95
S2	15	398	-0.22	0.04	1.29
S2	17	333	-0.18	0.08	0.82
S2	11	425	-0.62	0.17	1.35
S2	13	343	-0.55	1.20	1.57
S2	01	344	-0.97	1.28	2.39
S2	07	337	0.57	1.29	0.37

SORTED ON FACTOR 3

STUDY	SEQ.	SLIDE	I	II	III
S2	09	450	2.52	-0.30	-3.84
S2	12	622	0.75	0.04	-2.95
S2	16	445	1.43	-0.45	-2.46
S2	06	623	-0.39	-0.19	-1.53
S2	14	458	0.60	-0.11	-0.67
S2	04	359	0.41	-0.05	-0.56
S2	07	337	0.57	1.29	0.37
S2	10	395	-0.71	-1.03	0.41
S2	02	464	-0.77	-0.07	0.55
S2	03	380	-0.42	-0.04	0.62
S2	17	333	-0.18	0.08	0.82
S2	08	441	-0.15	-0.91	0.84
S2	15	398	-0.22	0.04	1.29
S2	11	425	-0.62	0.17	1.35
S2	13	343	-0.55	1.20	1.57
S2	05	438	-1.30	-1.03	1.80
S2	01	344	-0.97	1.28	2.39

FACTOR SCORES
STUDY 3

STUDY	SEQ.	SLIDE	I	II	III
S3	01	252	-0.37	1.75	2.40
S3	02	603	0.90	-0.91	-2.18
S3	03	129	-0.92	-1.22	0.14
S3	04	799	-0.63	0.57	0.87
S3	05	023	-0.43	1.26	1.75
S3	06	700	1.41	-0.63	-2.03
S3	07	199	-0.80	-0.65	0.61
S3	08	802	0.95	-0.18	-1.60

SORTED ON FACTOR 1

STUDY	SEQ.	SLIDE	I	II	III
S3	03	129	-0.92	-1.22	0.14
S3	07	199	-0.80	-0.65	0.61
S3	04	799	-0.63	0.57	0.87
S3	05	023	-0.43	1.26	1.75
S3	01	252	-0.37	1.75	2.40
S3	02	603	0.90	-0.91	-2.18
S3	08	802	0.95	-0.18	-1.60
S3	06	700	1.41	-0.63	-2.03

SORTED ON FACTOR 2

STUDY	SEQ.	SLIDE	I	II	III
S3	03	129	-0.92	-1.22	0.14
S3	02	603	0.90	-0.91	-2.18
S3	07	199	-0.80	-0.65	0.61
S3	06	700	1.41	-0.63	-2.03
S3	08	802	0.95	-0.18	-1.60
S3	04	799	-0.63	0.57	0.87
S3	05	023	-0.43	1.26	1.75
S3	01	252	-0.37	1.75	2.40

SORTED ON FACTOR 3

STUDY	SEQ.	SLIDE	I	II	III
S3	02	603	0.90	-0.91	-2.18
S3	06	700	1.41	-0.63	-2.03
S3	08	802	0.95	-0.18	-1.60
S3	03	129	-0.92	-1.22	0.14
S3	07	199	-0.80	-0.65	0.61
S3	04	799	-0.63	0.57	0.87
S3	05	023	-0.43	1.26	1.75
S3	01	252	-0.37	1.75	2.40

FACTOR SCORES
SLIDE GROUP I
STUDIES 4, 5, 6, 11

STUDY	SEQ.	SLIDE	I	II	III
S4	01	248	-0.54	0.16	1.97
S4	02	802	0.33	0.08	-1.59
S4	03	109	-0.35	1.07	1.65
S4	04	700	1.47	-0.52	-2.35
S4	05	023	-0.93	0.61	2.46
S4	06	250	1.52	-0.18	-2.23
S4	07	221	-0.84	-1.10	0.19
S4	08	806	-1.18	-1.38	0.58
S4	09	310	-0.04	1.58	1.18
S4	10	810	0.55	-0.32	-1.86
S5	01	248	-0.26	0.15	2.02
S5	02	802	-0.11	0.13	-1.48
S5	03	109	-0.61	0.12	1.67
S5	04	700	1.89	-0.13	-2.68
S5	05	023	-0.81	0.62	2.46
S5	C6	250	1.53	0.63	-1.27
S5	C7	221	-0.81	-1.10	0.21
S5	C8	806	-0.80	-1.40	-1.08
S5	09	310	-0.11	1.36	1.65
S5	10	810	0.09	-0.38	-1.50
S6	01	248	-0.45	0.20	1.36
S6	02	802	0.39	0.01	-1.22
S6	03	109	-0.68	0.61	2.24
S6	04	700	1.53	-0.31	-2.39
S6	05	023	-1.02	1.07	2.77
S6	06	250	1.71	0.59	-2.81
S6	07	221	-0.72	-1.14	0.13
S6	08	806	-0.98	-1.43	0.47
S6	09	310	-0.17	0.78	0.97
S6	10	810	0.41	-0.38	-1.51
S11	01	248	-0.31	-0.13	0.71
S11	C2	802	0.29	0.27	-1.48
S11	03	109	-0.48	0.55	1.98
S11	04	700	1.92	-0.30	-3.32
S11	05	023	-0.85	0.99	2.45
S11	C6	250	1.63	0.71	-1.70
S11	07	221	-0.83	-1.21	0.26
S11	08	806	-0.95	-1.64	0.34
S11	09	310	-0.21	1.19	1.29
S11	10	810	-0.21	-0.43	-0.52

SORTED ON FACTOR I

STUDY	SEQ.	SLIDE	I	II	III
S4	08	806	-1.18	-1.38	0.58
S6	05	023	-1.02	1.07	2.77
S6	08	806	-0.98	-1.43	0.47
S11	08	806	-0.95	-1.64	0.34
S4	05	023	-0.93	0.61	2.46
S11	05	023	-0.85	0.99	2.45
S4	07	221	-0.84	-1.10	0.19
S11	07	221	-0.83	-1.21	0.26
S5	05	023	-0.81	0.62	2.46
S5	07	221	-0.81	-1.10	0.21
S5	08	806	-0.80	-1.40	-1.08
S6	07	221	-0.72	-1.14	0.13
S6	03	109	-0.68	0.61	2.24
S5	03	109	-0.61	0.12	1.67
S4	01	248	-0.54	0.16	1.97
S11	03	109	-0.48	0.55	1.98
S6	01	248	-0.45	0.20	1.36
S4	03	109	-0.35	1.07	1.65
S11	01	248	-0.31	-0.13	0.71
S5	01	248	-0.26	0.15	2.02
S11	09	310	-0.21	1.19	1.29
S11	10	810	-0.21	-0.43	-0.52
S6	09	310	-0.17	0.78	0.97
S5	02	802	-0.11	0.13	-1.48
S5	09	310	-0.11	1.36	1.65
S4	09	310	-0.04	1.58	1.18
S5	10	810	0.09	-0.38	-1.50
S11	02	802	0.29	0.27	-1.48
S4	02	802	0.33	0.08	-1.59
S6	02	802	0.39	0.01	-1.22
S6	10	810	0.41	-0.38	-1.51
S4	10	810	0.55	-0.32	-1.86
S4	04	700	1.47	-0.52	-2.35
S4	06	250	1.52	-0.18	-2.23
S5	06	250	1.53	0.63	-1.27
S6	04	700	1.53	-0.31	-2.39
S11	06	250	1.63	0.71	-1.70
S6	06	250	1.71	0.59	-2.81
S5	04	700	1.89	-0.13	-2.68
S11	04	700	1.92	-0.30	-3.32

SORTED ON FACTOR 2

STUDY	SEQ.	SLIDE	I	II	III
S11	08	806	-0.95	-1.64	0.34
S6	08	806	-0.98	-1.43	0.47
S5	08	806	-0.80	-1.40	-1.08
S4	08	806	-1.18	-1.38	0.58
S11	07	221	-0.83	-1.21	0.26
S6	07	221	-0.72	-1.14	0.13
S4	07	221	-0.84	-1.10	0.19
S5	07	221	-0.81	-1.10	0.21
S4	04	700	1.47	-0.52	-2.35
S11	10	810	-0.21	-0.43	-0.52
S5	10	810	0.09	-0.38	-1.50
S6	10	810	0.41	-0.38	-1.51
S4	10	810	0.55	-0.32	-1.86
S6	04	700	1.53	-0.31	-2.39
S11	04	700	1.92	-0.30	-3.32
S4	06	250	1.52	-0.18	-2.23
S5	04	700	1.89	-0.13	-2.68
S11	01	248	-0.31	-0.13	0.71
S6	02	802	0.39	0.01	-1.22
S4	02	802	0.33	0.08	-1.59
S5	03	109	-0.61	0.12	1.67
S5	02	802	-0.11	0.13	-1.48
S5	01	248	-0.26	0.15	2.02
S4	01	248	-0.54	0.16	1.97
S6	01	248	-0.45	0.20	1.36
S11	02	802	0.29	0.27	-1.48
S11	03	109	-0.48	0.55	1.98
S6	06	250	1.71	0.59	-2.81
S4	05	023	-0.93	0.61	2.46
S6	03	109	-0.68	0.61	2.24
S5	05	023	-0.81	0.62	2.46
S5	06	250	1.53	0.63	-1.27
S11	06	250	1.63	0.71	-1.70
S6	09	310	-0.17	0.78	0.97
S11	05	023	-0.85	0.99	2.45
S4	03	109	-0.35	1.07	1.65
S6	05	023	-1.02	1.07	2.77
S11	09	310	-0.21	1.19	1.29
S5	09	310	-0.11	1.36	1.65
S4	09	310	-0.04	1.58	1.18

SORTED ON FACTOR 3

STUDY	SEQ.	SLIDE	I	II	III
S11	04	700	1.92	-0.30	-3.32
S6	06	250	1.71	0.59	-2.81
S5	04	700	1.89	-0.13	-2.68
S6	04	700	1.53	-0.31	-2.39
S4	04	700	1.47	-0.52	-2.35
S4	06	250	1.52	-0.18	-2.23
S4	10	810	0.55	-0.32	-1.86
S11	06	250	1.63	0.71	-1.70
S4	02	802	0.33	0.08	-1.59
S6	10	810	0.41	-0.38	-1.51
S5	10	810	0.09	-0.38	-1.50
S5	02	802	-0.11	0.13	-1.48
S11	02	802	0.29	0.27	-1.48
S5	06	250	1.53	0.63	-1.27
S6	02	802	0.39	0.01	-1.22
S5	08	806	-0.80	-1.40	-1.08
S11	10	810	-0.21	-0.43	-0.52
S6	07	221	-0.72	-1.14	0.13
S4	07	221	-0.84	-1.10	0.19
S5	07	221	-0.81	-1.10	0.21
S11	07	221	-0.83	-1.21	0.26
S11	08	806	-0.95	-1.64	0.34
S6	08	806	-0.98	-1.43	0.47
S4	08	806	-1.18	-1.38	0.58
S11	01	248	-0.31	-0.13	0.71
S6	09	310	-0.17	0.78	0.97
S4	09	310	-0.04	1.58	1.18
S11	09	310	-0.21	1.19	1.29
S6	01	248	-0.45	0.20	1.36
S4	03	109	-0.35	1.07	1.65
S5	09	310	-0.11	1.36	1.65
S5	03	109	-0.61	0.12	1.67
S4	01	248	-0.54	0.16	1.97
S11	03	109	-0.48	0.55	1.98
S5	01	248	-0.26	0.15	2.02
S6	03	109	-0.68	0.61	2.24
S11	05	023	-0.85	0.99	2.45
S4	05	023	-0.93	0.61	2.46
S5	05	023	-0.81	0.62	2.46
S6	05	023	-1.02	1.07	2.77

FACTOR SCORES
SLIDE GROUP II
STUDIES 7, 8, 10

STUDY	SEQ.	SLIDE	I	II	III
S7	01	213	-0.08	0.80	0.92
S7	02	561	0.35	-0.11	-1.66
S7	03	603	-0.31	0.68	1.42
S7	04	233	1.70	-0.02	-2.54
S7	05	032	-1.08	0.75	2.98
S7	06	252	1.39	0.69	-1.03
S7	07	129	-1.05	-1.49	0.55
S7	08	344	-1.07	-1.76	0.13
S7	09	319	-0.19	0.90	1.24
S7	10	803	0.34	-0.44	-2.00
S8	01	213	1.09	-0.04	-1.56
S8	02	561	-0.59	1.09	1.57
S8	03	603	1.37	-0.98	-3.05
S8	04	233	0.29	1.11	-0.09
S8	05	032	-0.76	0.23	1.88
S8	06	252	-0.35	0.70	1.09
S8	07	129	-1.38	-2.54	0.08
S8	08	344	-0.58	0.46	2.00
S8	09	319	0.32	0.44	-0.03
S8	10	803	0.60	-0.46	-1.88
S10	01	213	1.18	0.06	-0.83
S10	02	561	-0.44	0.87	2.14
S10	03	603	1.37	-0.43	-2.81
S10	04	233	0.27	1.06	-0.31
S10	05	032	-0.83	-0.55	1.75
S10	06	252	-0.22	0.86	1.36
S10	07	129	-1.23	-1.96	-0.96
S10	08	344	-0.89	-0.08	1.97
S10	09	319	0.76	0.87	-0.28
S10	10	803	0.02	-0.70	-2.02

SORTED ON FACTOR 1

STUDY	SEQ.	SLIDE	I	II	III
S8	07	129	-1.38	-2.54	0.08
S10	07	129	-1.23	-1.96	-0.96
S7	05	032	-1.08	0.75	2.98
S7	08	344	-1.07	-1.76	0.13
S7	07	129	-1.05	-1.49	0.55
S10	08	344	-0.89	-0.08	1.97
S10	05	032	-0.83	-0.55	1.75
S8	05	032	-0.76	0.23	1.88
S8	02	561	-0.59	1.09	1.57
S8	08	344	-0.58	0.46	2.00
S10	02	561	-0.44	0.87	2.14
S8	06	252	-0.35	0.70	1.09
S7	03	603	-0.31	0.68	1.42
S10	06	252	-0.22	0.86	1.36
S7	09	319	-0.19	0.90	1.24
S7	01	213	-0.08	0.80	0.92
S10	10	803	0.02	-0.70	-2.02
S10	04	233	0.27	1.06	-0.31
S8	04	233	0.29	1.11	-0.09
S8	09	319	0.32	0.44	-0.03
S7	10	803	0.34	-0.44	-2.00
S7	02	561	0.35	-0.11	-1.66
S8	10	803	0.60	-0.46	-1.88
S10	09	319	0.76	0.87	-0.28
S8	01	213	1.09	-0.04	-1.56
S10	01	213	1.18	0.06	-0.83
S8	03	603	1.37	-0.98	-3.05
S10	03	603	1.37	-0.43	-2.81
S7	06	252	1.39	0.69	-1.03
S7	04	233	1.70	-0.02	-2.54

SORTED ON FACTOR 2

STUDY	SEQ.	SLIDE	I	II	III
S8	07	129	-1.38	-2.54	0.08
S10	07	129	-1.23	-1.96	-0.96
S7	08	344	-1.07	-1.76	0.13
S7	07	129	-1.05	-1.49	0.55
S8	03	603	1.37	-0.98	-3.05
S10	10	803	0.02	-0.70	-2.02
S10	05	032	-0.83	-0.55	1.75
S8	10	803	0.60	-0.46	-1.88
S7	10	803	0.34	-0.44	-2.00
S10	03	603	1.37	-0.43	-2.81
S7	02	561	0.35	-0.11	-1.66
S10	08	344	-0.89	-0.08	1.97
S8	01	213	1.09	-0.04	-1.56
S7	04	233	1.70	-0.02	-2.54
S10	01	213	1.18	0.06	-0.83
S8	05	032	-0.76	0.23	1.88
S8	09	319	0.32	0.44	-0.03
S8	08	344	-0.58	0.46	2.00
S7	03	603	-0.31	0.68	1.42
S7	06	252	1.39	0.69	-1.03
S8	06	252	-0.35	0.70	1.09
S7	05	032	-1.08	0.75	2.98
S7	01	213	-0.08	0.80	0.92
S10	06	252	-0.22	0.86	1.36
S10	02	561	-0.44	0.87	2.14
S10	09	319	0.76	0.87	-0.28
S7	09	319	-0.19	0.90	1.24
S10	04	233	0.27	1.06	-0.31
S8	02	561	-0.59	1.09	1.57
S8	04	233	0.29	1.11	-0.09

SORTED ON FACTOR 3

STUDY	SEQ.	SLIDE	I	II	III
S8	03	603	1.37	-0.98	-3.05
S10	03	603	1.37	-0.43	-2.81
S7	04	233	1.70	-0.02	-2.54
S10	10	803	0.02	-0.70	-2.02
S7	10	803	0.34	-0.44	-2.00
S8	10	803	0.60	-0.46	-1.88
S7	02	561	0.35	-0.11	-1.66
S8	01	213	1.09	-0.04	-1.56
S7	06	252	1.39	0.69	-1.03
S10	07	129	-1.23	-1.96	-0.96
S10	01	213	1.18	0.06	-0.83
S10	04	233	0.27	1.06	-0.31
S10	09	319	0.76	0.87	-0.28
S8	04	233	0.29	1.11	-0.09
S8	09	319	0.32	0.44	-0.03
S8	07	129	-1.38	-2.54	0.08
S7	08	344	-1.07	-1.76	0.13
S7	07	129	-1.05	-1.49	0.55
S7	01	213	-0.08	0.80	0.92
S8	06	252	-0.35	0.70	1.09
S7	09	319	-0.19	0.90	1.24
S10	06	252	-0.22	0.86	1.36
S7	03	603	-0.31	0.68	1.42
S8	02	561	-0.59	1.09	1.57
S10	05	032	-0.83	-0.55	1.75
S8	05	032	-0.76	0.23	1.88
S10	08	344	-0.89	-0.08	1.97
S8	08	344	-0.58	0.46	2.00
S10	02	561	-0.44	0.87	2.14
S7	05	032	-1.08	0.75	2.98

FACTOR SCORES
SLIDE GROUP III
STUDY 9

STUDY	SEQ.	SLIDE	I	II	III
S9	01	804	-0.19	-0.64	-1.08
S9	02	513	-0.97	-0.52	0.59
S9	03	337	0.88	1.61	0.15
S9	04	801	-0.14	0.32	0.36
S9	05	704	1.52	-1.56	-3.12
S9	06	703	1.45	0.41	-2.33
S9	07	438	-0.86	0.49	2.61
S9	08	199	-1.25	-1.46	0.58
S9	09	533	-0.05	1.05	1.55
S9	10	800	-0.40	0.31	0.69

SORTED ON FACTOR 1

STUDY	SEQ.	SLIDE	I	II	III
S9	08	199	-1.25	-1.46	0.58
S9	02	513	-0.97	-0.52	0.59
S9	07	438	-0.86	0.49	2.61
S9	10	800	-0.40	0.31	0.69
S9	01	804	-0.19	-0.64	-1.08
S9	04	801	-0.14	0.32	0.36
S9	09	533	-0.05	1.05	1.55
S9	03	337	0.88	1.61	0.15
S9	06	703	1.45	0.41	-2.33
S9	05	704	1.52	-1.56	-3.12

SORTED ON FACTOR 2

STUDY	SEQ.	SLIDE	I	II	III
S9	05	704	1.52	-1.56	-3.12
S9	08	199	-1.25	-1.46	0.58
S9	01	804	-0.19	-0.64	-1.08
S9	02	513	-0.97	-0.52	0.59
S9	10	800	-0.40	0.31	0.69
S9	04	801	-0.14	0.32	0.36
S9	06	703	1.45	0.41	-2.33
S9	07	438	-0.86	0.49	2.61
S9	09	533	-0.05	1.05	1.55
S9	03	337	0.88	1.61	0.15

SORTED ON FACTOR 3

STUDY	SEQ.	SLIDE	I	II	III
S9	05	704	1.52	-1.56	-3.12
S9	06	703	1.45	0.41	-2.33
S9	01	804	-0.19	-0.64	-1.08
S9	03	337	0.88	1.61	0.15
S9	04	801	-0.14	0.32	0.36
S9	08	199	-1.25	-1.46	0.58
S9	02	513	-0.97	-0.52	0.59
S9	10	800	-0.40	0.31	0.69
S9	09	533	-0.05	1.05	1.55
S9	07	438	-0.86	0.49	2.61

APPENDIX H

SCENIC CONTENT DATA

SCENIC CONTENT

95 SLIDES

Slide No.	Nominal Scales			Percent of total area of slide in each category								
	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}
072	3	2	7	4.0	5.8	42.2	0.0	14.4	10.7	0.0	23.3	0.0
902	3	2	9	8.6	35.3	30.4	0.0	23.8	1.8	0.0	0.0	0.0
233	1	1	10	32.7	0.0	21.0	1.0	19.6	18.1	6.9	0.0	0.0
241	4	2	7	3.3	8.6	48.3	0.0	0.0	2.6	0.0	36.3	0.0
242	6	2	9	0.0	16.2	11.3	0.0	26.2	31.9	0.0	14.4	0.0
900	1	1	9	60.2	0.0	4.6	0.0	10.6	10.3	13.3	0.0	0.0
901	5	3	1	6.8	18.3	52.7	0.0	7.2	13.8	0.0	1.0	0.0
023	5	2	8	1.0	0.0	27.0	0.0	15.4	16.6	0.0	40.0	0.0
243	3	2	4	12.1	26.4	22.2	0.0	17.9	20.0	0.0	0.0	0.0
174	3	1	3	19.1	0.0	42.3	0.0	11.0	27.7	0.0	0.0	0.0

Slide No.	Nominal Scales			Percent of total area of slide in each category								
	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}
244	3	2	8	4.5	9.8	49.3	0.0	2.4	20.5	0.0	14.0	0.0
245	1	1	3	50.9	0.0	0.0	3.1	23.6	15.4	6.6	0.0	0.0
202	1	2	8	52.3	0.0	9.7	4.0	6.7	16.5	9.9	0.0	0.0
046	2	2	5	0.0	0.0	4.2	0.0	22.2	55.0	0.0	0.0	18.5
094	4	2	4	1.7	3.8	40.3	0.0	9.4	24.7	0.0	18.9	0.0
246	1	1	4	47.3	5.4	39.9	0.0	0.0	1.6	5.7	0.0	0.0
097	1	3	7	37.3	12.1	35.6	8.7	0.0	0.0	4.9	1.3	0.0
235	1	2	1	48.5	0.0	5.9	0.0	16.4	11.9	17.4	0.0	0.0
106	5	2	5	7.3	10.6	38.9	0.0	18.5	22.7	0.0	2.1	0.0
111	4	2	2	34.5	0.00	0.0	19.8	0.0	0.0	4.5	40.5	0.0
247	1	1	8	44.5	0.0	11.9	8.7	10.6	17.1	6.1	0.0	0.0
248	5	3	8	0.0	60.2	0.0	0.0	22.9	14.1	0.0	2.3	0.0
249	4	2	8	2.1	0.0	59.9	0.0	0.0	0.0	0.0	39.9	0.0
036	3	3	4	16.5	0.0	73.9	9.3	0.0	0.0	0.0	0.0	0.0

Slide No.	Nominal Scales			Percent of total area of slide in each category								
	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}
176	3	2	4	17.1	0.0	18.0	21.6	0.0	39.1	2.7	0.0	0.0
016	5	2	8	0.0	23.0	30.1	0.0	0.0	13.6	0.0	33.3	0.0
250	6	1	1	64.9	0.0	1.2	2.7	0.0	28.1	3.1	0.0	0.0
251	2	2	9	0.0	6.8	42.6	0.0	0.0	19.7	0.0	30.8	0.0
032	5	3	4	6.5	12.0	41.2	0.0	20.9	16.8	0.0	2.6	0.0
252	1	1	4	32.1	0.0	12.1	2.1	28.4	16.4	9.0	0.0	0.0
206	4	3	5	3.8	0.0	43.0	0.9	14.9	15.9	2.8	19.4	0.0
199	2	2	9	0.0	15.9	24.2	0.0	0.0	36.2	0.0	11.0	12.7
031	3	1	6	12.6	29.4	32.9	0.0	0.0	25.1	0.0	0.0	0.0
605	1	1	2	54.4	0.0	10.7	34.9	0.0	0.0	0.0	0.0	0.0
025	4	2	5	0.0	0.0	36.3	0.0	26.9	29.2	0.0	7.5	0.0
603	6	1	10	33.0	0.0	13.5	0.0	29.8	22.0	1.7	0.0	0.0
216	2	2	4	39.3	0.0	27.9	19.3	0.0	0.0	13.6	0.0	0.0

Slide No.	Nominal Scales			Percent of total area of slide in each category								
	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}
196	1	1	2	60.4	18.7	11.6	9.3	0.0	0.0	0.0	0.0	0.0
061	3	2	4	4.1	52.7	0.0	2.1	0.0	6.4	34.7	0.0	0.0
033	3	4	8	6.8	0.0	66.1	21.0	0.0	6.2	0.0	0.0	0.0
336	3	2	7	3.2	24.8	38.6	0.0	2.8	0.7	0.0	29.9	0.0
129	2	2	5	9.1	41.1	3.8	0.0	10.5	2.6	0.0	0.0	33.0
109	1	4	6	12.1	52.8	10.6	22.2	0.0	2.2	0.0	0.0	0.0
001	5	4	6	6.4	37.8	54.0	0.0	1.9	0.0	0.0	0.0	0.0
604	6	1	9	0.0	0.0	57.2	0.0	31.8	0.0	10.9	0.0	0.0
000	1	2	10	40.8	41.0	0.0	5.3	6.1	0.0	5.7	1.1	0.0
533	1	1	3	42.0	14.2	16.0	3.4	12.0	9.6	2.7	0.0	0.0
498	6	3	9	0.0	36.0	0.0	0.0	14.2	0.0	0.0	49.8	0.0
273	3	2	7	0.0	14.5	34.4	0.0	33.5	3.6	0.0	1.0	13.0
545	4	2	3	22.0	16.2	33.5	3.5	0.0	0.0	0.0	24.7	0.0

Slide No.	Nominal Scales			Percent of total area of slide in each category								
	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}
514	4	2	3	3.1	13.5	29.1	3.2	5.8	11.1	0.0	0.0	34.2
275	3	2	8	0.0	11.2	36.2	0.0	13.6	5.3	0.0	33.6	0.0
561	1	1	1	38.3	2.4	13.4	3.4	15.8	16.7	0.0	0.0	0.0
319	3	2	9	42.3	7.0	3.5	3.8	1.4	2.1	0.0	39.9	0.0
271	1	1	1	48.5	3.5	11.2	10.9	8.3	10.9	6.7	0.0	0.0
495	3	2	6	0.0	14.7	35.5	12.0	0.0	12.1	0.0	25.6	0.0
521	1	2	1	33.0	47.7	8.3	11.7	0.0	0.0	0.0	0.0	0.0
314	6	3	3	21.7	0.0	36.2	0.0	35.2	5.2	1.7	0.0	0.0
548	3	2	7	0.0	8.3	62.5	0.0	0.0	0.0	0.0	29.2	0.0
516	3	2	8	0.0	17.7	27.2	0.0	7.1	15.5	0.0	30.9	1.7
559	4	2	3	4.1	15.9	34.4	0.0	0.0	0.0	0.0	45.7	0.0
414	3	3	8	0.0	6.4	24.2	0.0	8.1	49.1	0.0	12.0	0.0
567	4	2	1	3.5	0.0	57.2	0.0	0.0	0.0	0.0	39.3	0.0

Slide No.	Nominal Scales			Percent of total area of slide in each category								
	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}
344	4	2	6	10.4	37.9	30.9	0.0	11.5	3.1	2.2	4.1	0.0
464	1	1	3	40.8	10.8	12.2	13.0	1.6	20.1	1.6	0.0	0.0
380	3	2	8	0.0	31.0	26.8	0.0	7.4	10.7	0.0	24.0	0.0
359	1	1	3	30.4	12.1	14.0	0.0	33.3	10.2	0.0	0.0	0.0
438	5	3	8	0.0	29.8	48.0	0.0	15.1	7.1	0.0	0.0	0.0
623	3	2	5	18.7	18.7	30.1	0.0	3.8	10.1	0.0	18.7	0.0
337	4	2	1	15.6	5.2	19.0	2.4	0.0	16.4	0.0	41.3	0.0
441	4	3	1	31.3	41.7	19.6	7.3	0.0	0.0	0.0	0.0	0.0
450	6	3	3	16.3	0.0	20.4	0.0	34.0	23.8	0.0	5.5	0.0
395	3	2	7	0.0	28.9	48.7	0.0	0.0	8.6	0.0	13.8	0.0
425	3	2	8	2.2	6.1	46.1	0.7	0.0	2.0	0.0	42.9	0.0
622	3	3	5	18.2	0.0	52.5	0.0	0.0	29.3	0.0	0.0	0.0

Slide No.	Nominal Scales			Percent of total area of slide in each category								
	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}
343	3	3	4	31.4	0.0	20.8	3.4	13.6	27.1	3.8	0.0	0.0
458	1	2	3	15.1	15.4	29.8	4.8	4.8	18.7	3.0	8.3	0.0
398	1	2	1	42.5	29.8	16.9	2.5	0.0	6.1	2.2	0.0	0.0
445	6	3	8	0.0	22.6	17.4	0.0	16.7	7.1	0.0	36.3	0.0
333	5	3	7	0.0	5.0	41.4	0.0	0.0	8.5	0.0	45.1	0.0
802	2	1	10	32.0	0.0	0.0	0.0	0.0	45.8	22.2	0.0	0.0
700	6	1	10	47.5	0.0	4.6	1.6	39.2	7.1	0.0	0.0	0.0
799	2	1	2	47.1	--	14.6	8.90	--	4.30	--	25.1	--
221	4	3	9	0.0	9.1	27.9	0.0	0.0	34.9	3.8	24,3	0.0
806	2.	2	2	0.0	0.0	2.1	10.4	0.0	39.0	0.0	10.2	38.3
310	3	1	3	39.9	0.0	5.0	13.0	0.0	7.3	0.0	34.8	0.0
810	2	3	10	47.8	0.0	5.4	0.0	18.3	16.8	11.7	0.0	0.0
213	6	3	9	60.2	0.0	1.7	10.8	0.0	23.5	3.8	0.0	0.0

Slide No.	Nominal Scales			Percent of total area of slide in each category								
	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	X_{11}	X_{12}
803	2	1	10	42.3	0.0	0.0	10.6	16.1	14.6	16.4	0.0	0.0
804	2	2	9	45.2	0.0	15.9	14,8	17.2	0.0	6.9	0.0	0.0
513	4	2	9	0.0	2.0	40.6	0.0	7.9	12.6	0.0	36.9	0.0
801	3	3	3	20.5	0.0	36.8	0.9	17.1	23.8	0.9	0.0	0.0
704	6	1	10	50.5	0.0	0.0	0.9	0.0	42.7	6.0	0.0	0.0
703	6	2	3	10.0	0.0	23.2	0.0	0.0	51.6	0.0	15.2	0.0
800	3	3	4	46.1	0.0	21.9	2.2	0.0	1.7	0.0	28.1	0.0

APPENDIX J

LISTING - KENTUCKY SMALL STREAM SAMPLE
UNIQUENESS RATIOS
FIFTY EIGHT STREAMS - THIRTY SEVEN CHARACTERISTICS

Ratio I - Physical
Ratio II - Land Use
Ratio III - Water Quality
Ratio IV - Disvalues
Ratio V - Esthetic Impression

STUDY STREAMS

No.	Name of Stream	Location (County)	Drainage Area (Sq. Miles)
	Preference Streams		
1	Big Brush Creek	Green, Taylor	83
2	Buckhorn Creek	Breathitt, Knott	45
3	Caney Creek	Rowan	17
4	Casey Creek	Trigg	30
5	Clear Creek	Jessamine, Woodford	65
6	Clifty Creek	Todd, Logan	41
7	Crooked Creek	Rockcastle	21
8	Doe Run	Meade	12
9	Greasy Creek	Leslie, Harlan	93
10	Laurel Fork	Jackson	33
11	Martin's Fork	Harlan, Bell	10
12	North Elkhorn Creek	Fayette, Scott	160
13	Red River	Menifee, Wolfe	141
14	Rock Creek	McCreary	48
15	Russell Creek	Green, Taylor, Adair, Russell	287
16	South Fork Grassy Creek	Grant, Pendleton	48
	Random Streams: Eastern Coalfield		
17	Barren Fork Indian Creek	McCreary	41
18	Cane Creek (Laurel County)	Laurel	20
19	Everman Creek	Carter	14
20	Leatherwood Branch	Greenup	13
21	Middle Creek (Floyd County)	Floyd	65

No.	Name of Stream	Location (County)	Drainage Area (Sq. Miles)
		Random Streams: Eastern Coalfield (Con't)	
22	Pleasant Run	Morgan	7
23	Rockhouse Creek	Letcher	60
24	Upper Devil Creek	Wolfe	22
25	Upper Tygarts Creek	Carter	68
26	Wolf Creek	Whitley	16
27	Young's Creek	Whitley	10
		Random Streams: Knobs and Escarpment	
28	Beaver Creek	Menifee	74
29	Cane Creek	Menifee, Powell, Montgomery	16
30	Pond Creek	Jefferson	91
31	Prather Creek	Marion	22
32	Quicks Run	Lewis	26
		Random Streams: Outer Blue Grass	
33	Beaver Creek	Anderson	31
34	Little Beech Fork	Marion, Washington	159
35	Fork Lick Creek	Grant, Pendleton	56
36	Garrison Creek	Boone	6
37	Glens Creek	Washington, Mercer	36
38	Johnson Creek	Robertson, Mason, Fleming	76
39	Locust Creek	Trimble, Carroll	15
40	Paint Lick Creek	Garrard, Madison	107
41	Stephans Creek	Carroll, Gallatin	10

No.	Name of Stream	Location (County)	Drainage Area (Sq. Miles)
	Random Streams: Inner Blue Grass		
42	Stoney Creek	Franklin	8
43	Townsend Creek	Harrison, Bourbon	39
	Random Streams: Mississippian Eastern Plateau		
44	East Fork Barren River	Monroe	79
45	Meshack Creek	Monroe, Cumberland	25
46	South Fork	Casey	73
	Random Streams: Mississippian Western Plateau		
47	Elk Fork	Todd, Logan	67
48	Mill Creek	Hardin	47
49	Montgomery Creek	Caldwell	13
50	Rock Lick Creek	Breckinridge	44
51	Sugar Creek	Livingston	14
52	Town Creek	Breckinridge	6
	Random Streams: Western Coal Field		
53	Isaacs Creek	Muhlenberg	13
54	Knoblick Creek	McLean, Daviess	25
55	Lick Creek	Henderson	31
56	Pond Run	Ohio	12
57	Richland Slough	Henderson	14
	Random Streams: Jackson Purchase		
58	Perkins Creek	McCracken	15

UNIQUENESS RATIOS

STREAM	I	II	III	IV	V	TOTAL
01	0.62	0.84	0.54	0.27	0.47	2.74
02	1.38	0.77	0.58	0.22	0.56	3.51
03	0.34	0.44	0.54	1.44	0.74	3.70
04	0.39	0.39	1.08	0.42	0.67	2.95
05	0.29	0.45	2.00	0.51	0.54	3.79
06	0.31	0.42	0.86	0.37	0.40	2.36
07	0.54	0.43	0.58	0.20	0.43	2.18
08	0.53	0.87	0.98	0.18	0.70	3.26
09	0.73	0.66	0.67	0.25	0.95	3.26
10	0.42	0.37	0.88	0.18	0.61	2.46
11	1.27	0.92	0.82	0.29	1.25	4.55
12	0.26	1.41	0.94	0.60	0.82	4.03
13	0.41	0.50	0.98	0.38	0.99	3.26
14	0.67	0.64	0.99	0.23	0.93	3.46
15	0.75	0.62	0.60	0.33	0.47	2.77
16	0.34	0.47	1.10	0.24	0.42	2.57
17	0.52	0.55	0.91	0.40	0.51	2.87
18	0.52	0.87	0.64	0.18	0.68	2.89
19	0.32	0.33	0.90	0.51	0.69	2.75
20	0.32	0.33	0.61	0.30	0.46	2.02
21	0.28	0.84	1.24	0.57	1.04	3.97
22	0.38	0.44	1.00	0.69	0.50	3.01
23	0.56	0.35	0.73	1.77	0.51	3.92
24	0.42	0.55	0.58	0.19	1.09	2.83
25	0.25	1.53	0.71	1.16	0.71	4.36
26	0.36	0.54	0.59	0.23	0.50	2.22
27	0.35	0.44	0.54	0.40	0.66	2.39
28	0.31	0.42	0.49	0.43	0.38	2.03
29	0.31	0.47	0.56	0.26	0.44	2.04
30	0.52	2.17	1.18	1.56	0.51	5.94
31	0.42	0.29	0.53	0.60	0.59	2.43
32	0.30	0.33	0.63	0.25	0.39	1.90
33	0.32	0.36	0.83	0.31	0.61	2.43
34	0.57	0.29	1.23	0.19	0.45	2.73
35	0.76	0.31	0.75	0.40	0.46	2.18
36	0.93	0.35	1.16	0.29	0.41	3.14
37	0.26	0.38	0.57	0.37	0.46	2.04
38	0.29	0.32	0.97	0.53	0.49	2.60
39	0.59	0.39	0.57	0.77	0.43	2.75
40	0.29	0.32	1.05	0.19	0.49	2.34
41	0.32	0.32	0.64	0.24	0.46	1.98
42	0.36	0.37	0.67	0.59	0.44	2.43
43	0.27	0.45	0.69	0.18	0.48	2.27
44	0.25	0.68	0.48	0.26	0.51	2.18
45	0.28	0.41	0.87	0.28	0.55	2.39
46	0.89	0.40	0.55	0.19	0.49	2.52
47	0.25	0.50	1.16	0.40	0.54	2.85
48	0.62	1.16	1.10	0.40	0.41	3.69
49	0.26	0.68	0.41	0.23	0.44	2.02
50	0.44	0.33	0.95	0.25	0.65	2.62
51	0.45	0.34	0.72	0.18	1.06	2.75
52	0.52	0.49	2.01	0.29	0.86	4.17
53	0.51	0.64	2.54	0.65	3.22	7.56
54	1.00	0.31	1.19	0.19	0.57	3.26
55	0.80	0.37	1.23	0.32	0.44	3.16
56	0.69	1.06	1.79	0.32	1.36	5.22
57	1.53	0.30	0.84	0.81	0.72	4.20
58	0.51	0.71	1.80	0.23	0.70	3.45

RANKED ON RATIO 1

STREAM	I	II	III	IV	V	TOTAL
25	0.25	1.53	0.71	1.16	0.71	4.36
44	0.25	0.68	0.48	0.26	0.51	2.18
47	0.25	0.50	1.16	0.40	0.54	2.85
12	0.26	1.41	0.94	0.60	0.82	4.03
35	0.26	0.31	0.75	0.40	0.46	2.18
37	0.26	0.38	0.57	0.37	0.46	2.04
49	0.26	0.68	0.41	0.23	0.44	2.02
43	0.27	0.45	0.89	0.18	0.48	2.27
21	0.28	0.84	1.24	0.57	1.04	3.97
45	0.28	0.41	0.87	0.28	0.55	2.39
05	0.29	0.45	2.00	0.51	0.54	3.79
38	0.29	0.32	0.97	0.53	0.49	2.60
40	0.29	0.32	1.05	0.19	0.49	2.34
32	0.30	0.33	0.63	0.25	0.39	1.90
06	0.31	0.42	0.86	0.37	0.40	2.36
28	0.31	0.42	0.49	0.43	0.38	2.03
29	0.31	0.47	0.56	0.26	0.44	2.04
19	0.32	0.33	0.90	0.51	0.69	2.75
20	0.32	0.33	0.61	0.30	0.46	2.02
33	0.32	0.36	0.83	0.31	0.61	2.43
41	0.32	0.32	0.64	0.24	0.46	1.98
16	0.34	0.47	1.10	0.24	0.42	2.57
27	0.35	0.44	0.54	0.40	0.66	2.39
26	0.36	0.54	0.59	0.23	0.50	2.22
42	0.36	0.37	0.67	0.59	0.44	2.43
22	0.38	0.44	1.00	0.69	0.50	3.01
04	0.39	0.39	1.08	0.42	0.67	2.95
13	0.41	0.50	0.98	0.38	0.99	3.26
10	0.42	0.37	0.88	0.18	0.61	2.46
24	0.42	0.55	0.58	0.19	1.09	2.83
31	0.42	0.29	0.53	0.60	0.59	2.43
50	0.44	0.33	0.95	0.25	0.65	2.62
51	0.45	0.34	0.72	0.18	1.06	2.75
53	0.51	0.64	2.54	0.65	3.22	7.56
58	0.51	0.71	1.80	0.23	0.70	3.45
17	0.52	0.53	0.91	0.40	0.51	2.87
18	0.52	0.87	0.64	0.18	0.68	2.89
30	0.52	2.17	1.18	1.56	0.51	5.94
52	0.52	0.49	2.01	0.29	0.86	4.17
08	0.53	0.87	0.98	0.18	0.70	3.26
03	0.54	0.44	0.54	1.44	0.74	3.70
07	0.54	0.43	0.58	0.20	0.43	2.18
23	0.56	0.35	0.73	1.77	0.51	3.92
34	0.57	0.29	1.23	0.19	0.45	2.73
39	0.59	0.39	0.57	0.77	0.43	2.75
01	0.62	0.84	0.54	0.27	0.47	2.74
48	0.62	1.16	1.10	0.40	0.41	3.69
14	0.67	0.64	0.99	0.23	0.93	3.46
56	0.69	1.06	1.79	0.32	1.36	5.22
09	0.73	0.66	0.67	0.25	0.95	3.26
15	0.75	0.62	0.60	0.33	0.47	2.77
55	0.80	0.37	1.23	0.32	0.44	3.16
46	0.89	0.40	0.55	0.19	0.49	2.52
36	0.93	0.35	1.16	0.29	0.41	3.14
54	1.00	0.31	1.19	0.19	0.57	3.26
11	1.27	0.92	0.82	0.29	1.25	4.55
02	1.38	0.77	0.58	0.22	0.56	3.51
57	1.53	0.30	0.84	0.81	0.72	4.20

RANKED ON RATIO 2

STREAM	I	II	III	IV	V	TOTAL
31	0.42	0.29	0.53	0.60	0.59	2.43
34	0.57	0.29	1.23	0.19	0.45	2.73
57	1.53	0.30	0.84	0.81	0.72	4.20
35	0.26	0.31	0.75	0.40	0.46	2.18
54	1.00	0.31	1.19	0.19	0.57	3.26
38	0.29	0.32	0.97	0.53	0.49	2.60
40	0.29	0.32	1.05	0.19	0.49	2.34
41	0.32	0.32	0.64	0.24	0.46	1.98
19	0.32	0.33	0.90	0.51	0.69	2.75
20	0.32	0.33	0.61	0.30	0.46	2.02
32	0.30	0.33	0.63	0.25	0.39	1.90
50	0.44	0.33	0.95	0.25	0.65	2.62
51	0.45	0.34	0.72	0.18	1.06	2.75
23	0.56	0.35	0.73	1.77	0.51	3.92
36	0.93	0.35	1.16	0.29	0.41	3.14
33	0.32	0.36	0.83	0.31	0.61	2.43
10	0.42	0.37	0.88	0.18	0.61	2.46
42	0.36	0.37	0.67	0.59	0.44	2.43
55	0.80	0.37	1.23	0.32	0.44	3.16
37	0.26	0.38	0.57	0.37	0.46	2.04
04	0.39	0.39	1.08	0.42	0.67	2.95
39	0.59	0.39	0.57	0.77	0.43	2.75
46	0.89	0.40	0.55	0.19	0.49	2.52
45	0.28	0.41	0.87	0.28	0.55	2.39
06	0.31	0.42	0.86	0.37	0.40	2.36
28	0.31	0.42	0.49	0.43	0.38	2.03
07	0.54	0.43	0.58	0.20	0.43	2.18
03	0.54	0.44	0.54	1.44	0.74	3.70
22	0.38	0.44	1.00	0.69	0.50	3.01
27	0.35	0.44	0.54	0.40	0.66	2.39
05	0.29	0.45	2.00	0.51	0.54	3.79
43	0.27	0.45	0.89	0.18	0.48	2.27
16	0.34	0.47	1.10	0.24	0.42	2.57
29	0.31	0.47	0.56	0.26	0.44	2.04
52	0.52	0.49	2.01	0.29	0.86	4.17
13	0.41	0.50	0.98	0.38	0.99	3.26
47	0.25	0.50	1.16	0.40	0.54	2.85
17	0.52	0.53	0.91	0.40	0.51	2.87
26	0.36	0.54	0.59	0.23	0.50	2.22
24	0.42	0.55	0.58	0.19	1.09	2.83
15	0.75	0.62	0.60	0.33	0.47	2.77
14	0.67	0.64	0.99	0.23	0.93	3.46
53	0.51	0.64	2.54	0.65	3.22	7.56
09	0.73	0.66	0.67	0.25	0.95	3.26
44	0.25	0.68	0.48	0.26	0.51	2.18
49	0.26	0.68	0.41	0.23	0.44	2.02
58	0.51	0.71	1.80	0.23	0.70	3.45
02	1.38	0.77	0.58	0.22	0.56	3.51
01	0.62	0.84	0.54	0.27	0.47	2.74
21	0.28	0.84	1.24	0.57	1.04	3.97
08	0.53	0.87	0.98	0.18	0.70	3.26
18	0.52	0.87	0.64	0.18	0.68	2.89
11	1.27	0.92	0.82	0.29	1.25	4.55
56	0.69	1.06	1.79	0.32	1.36	5.22
48	0.62	1.16	1.10	0.40	0.41	3.69
12	0.26	1.41	0.94	0.60	0.82	4.03
25	0.25	1.53	0.71	1.16	0.71	4.36
30	0.52	2.17	1.18	1.56	0.51	5.94

RANKED ON RATIO 3

STREAM	I	II	III	IV	V	TOTAL
49	0.26	0.68	0.41	0.23	0.44	2.02
44	0.25	0.68	0.48	0.26	0.51	2.18
28	0.31	0.42	0.49	0.43	0.38	2.03
31	0.42	0.29	0.53	0.60	0.59	2.43
01	0.62	0.84	0.54	0.27	0.47	2.74
03	0.54	0.44	0.54	1.44	0.74	3.70
27	0.35	0.44	0.54	0.40	0.66	2.39
46	0.89	0.40	0.55	0.19	0.49	2.52
29	0.31	0.47	0.56	0.26	0.44	2.04
37	0.26	0.38	0.57	0.37	0.46	2.04
39	0.59	0.39	0.57	0.77	0.43	2.75
02	1.38	0.77	0.58	0.22	0.56	3.51
07	0.54	0.43	0.58	0.20	0.43	2.18
24	0.42	0.55	0.58	0.19	1.09	2.83
26	0.36	0.54	0.59	0.23	0.50	2.22
15	0.75	0.62	0.60	0.33	0.47	2.77
20	0.32	0.33	0.61	0.30	0.46	2.02
32	0.30	0.33	0.63	0.25	0.39	1.90
18	0.52	0.87	0.64	0.18	0.68	2.89
41	0.32	0.32	0.64	0.24	0.46	1.98
09	0.73	0.66	0.67	0.25	0.95	3.26
42	0.36	0.37	0.67	0.59	0.44	2.43
25	0.25	1.53	0.71	1.16	0.71	4.36
51	0.45	0.34	0.72	0.18	1.06	2.75
23	0.56	0.35	0.73	1.77	0.51	3.92
35	0.26	0.31	0.75	0.40	0.46	2.18
11	1.27	0.92	0.82	0.29	1.25	4.55
33	0.32	0.36	0.83	0.31	0.61	2.43
57	1.53	0.30	0.84	0.81	0.72	4.20
06	0.31	0.42	0.86	0.37	0.40	2.36
45	0.28	0.41	0.87	0.28	0.55	2.39
10	0.42	0.37	0.88	0.18	0.61	2.46
43	0.27	0.45	0.89	0.18	0.48	2.27
19	0.32	0.33	0.90	0.51	0.69	2.75
17	0.52	0.53	0.91	0.40	0.51	2.87
12	0.26	1.41	0.94	0.60	0.82	4.03
50	0.44	0.33	0.95	0.25	0.65	2.62
38	0.29	0.32	0.97	0.53	0.49	2.60
08	0.53	0.87	0.98	0.18	0.70	3.26
13	0.41	0.50	0.98	0.38	0.99	3.26
14	0.67	0.64	0.99	0.23	0.93	3.46
22	0.38	0.44	1.00	0.69	0.50	3.01
40	0.29	0.32	1.05	0.19	0.49	2.34
04	0.39	0.39	1.08	0.42	0.67	2.95
16	0.34	0.47	1.10	0.24	0.42	2.57
48	0.62	1.16	1.10	0.40	0.41	3.69
36	0.93	0.35	1.16	0.29	0.41	3.14
47	0.25	0.50	1.16	0.40	0.54	2.85
30	0.52	2.17	1.18	1.56	0.51	5.94
54	1.00	0.31	1.19	0.19	0.57	3.26
34	0.57	0.29	1.23	0.19	0.45	2.73
55	0.80	0.37	1.23	0.32	0.44	3.16
21	0.28	0.84	1.24	0.57	1.04	3.97
56	0.69	1.06	1.79	0.32	1.36	5.22
58	0.51	0.71	1.80	0.23	0.70	3.45
05	0.29	0.45	2.00	0.51	0.54	3.79
52	0.52	0.49	2.01	0.29	0.86	4.17
53	0.51	0.64	2.54	0.65	3.22	7.56

RANKED ON RATIO 4

STREAM	I	II	III	IV	V	TOTAL
08	0.63	0.87	0.98	0.18	0.70	3.26
10	0.42	0.37	0.88	0.18	0.61	2.46
18	0.52	0.87	0.64	0.18	0.68	2.89
43	0.27	0.45	0.89	0.18	0.48	2.27
51	0.45	0.34	0.72	0.18	1.06	2.75
24	0.42	0.55	0.58	0.19	1.09	2.83
34	0.57	0.29	1.23	0.19	0.45	2.73
40	0.29	0.32	1.05	0.19	0.49	2.34
46	0.89	0.40	0.55	0.19	0.49	2.52
54	1.00	0.31	1.19	0.19	0.57	3.26
07	0.54	0.43	0.58	0.20	0.43	2.18
02	1.38	0.77	0.58	0.22	0.56	3.51
14	0.67	0.64	0.99	0.23	0.93	3.46
26	0.36	0.54	0.59	0.23	0.50	2.22
49	0.26	0.68	0.41	0.23	0.44	2.02
58	0.51	0.71	1.80	0.23	0.70	3.45
16	0.34	0.47	1.10	0.24	0.42	2.57
41	0.32	0.32	0.64	0.24	0.46	1.98
09	0.73	0.66	0.67	0.25	0.95	3.26
32	0.30	0.33	0.63	0.25	0.39	1.90
50	0.44	0.33	0.95	0.25	0.65	2.62
29	0.31	0.47	0.56	0.26	0.44	2.04
44	0.25	0.68	0.48	0.26	0.51	2.18
01	0.62	0.84	0.54	0.27	0.47	2.74
45	0.28	0.41	0.87	0.28	0.55	2.39
11	1.27	0.92	0.82	0.29	1.25	4.55
36	0.93	0.35	1.16	0.29	0.41	3.14
52	0.52	0.49	2.01	0.29	0.86	4.17
20	0.32	0.33	0.61	0.30	0.46	2.02
33	0.32	0.36	0.83	0.31	0.61	2.43
55	0.80	0.37	1.23	0.32	0.44	3.16
56	0.69	1.06	1.79	0.32	1.36	5.22
15	0.75	0.62	0.60	0.33	0.47	2.77
06	0.31	0.42	0.86	0.37	0.40	2.36
37	0.26	0.38	0.57	0.37	0.46	2.04
13	0.41	0.50	0.98	0.38	0.99	3.26
17	0.52	0.53	0.91	0.40	0.51	2.87
27	0.35	0.44	0.54	0.40	0.66	2.39
35	0.26	0.31	0.75	0.40	0.46	2.18
47	0.25	0.50	1.16	0.40	0.54	2.85
48	0.62	1.16	1.10	0.40	0.41	3.69
04	0.39	0.39	1.08	0.42	0.67	2.95
28	0.31	0.42	0.49	0.43	0.38	2.03
05	0.29	0.45	2.00	0.51	0.54	3.79
19	0.32	0.33	0.90	0.51	0.69	2.75
38	0.29	0.32	0.97	0.53	0.49	2.60
21	0.28	0.84	1.24	0.57	1.04	3.97
42	0.36	0.37	0.67	0.59	0.44	2.43
12	0.26	1.41	0.94	0.60	0.82	4.03
31	0.42	0.29	0.53	0.60	0.59	2.43
53	0.51	0.64	2.54	0.65	3.22	7.56
22	0.38	0.44	1.00	0.69	0.50	3.01
39	0.59	0.39	0.57	0.77	0.43	2.75
57	1.53	0.30	0.84	0.81	0.72	4.20
25	0.25	1.53	0.71	1.16	0.71	4.36
03	0.54	0.44	0.54	1.44	0.74	3.70
30	0.52	2.17	1.18	1.56	0.51	5.94
23	0.56	0.35	0.73	1.77	0.51	3.92

RANKED ON RATIO 5

STREAM	I	II	III	IV	V	TOTAL
28	0.31	0.42	0.49	0.43	0.38	2.03
32	0.30	0.33	0.63	0.25	0.39	1.90
06	0.31	0.42	0.86	0.37	0.40	2.36
36	0.93	0.35	1.16	0.29	0.41	3.14
48	0.62	1.16	1.10	0.40	0.41	3.69
16	0.34	0.47	1.10	0.24	0.42	2.57
07	0.54	0.43	0.58	0.20	0.43	2.18
39	0.59	0.39	0.57	0.77	0.43	2.75
29	0.31	0.47	0.56	0.26	0.44	2.04
42	0.36	0.37	0.67	0.59	0.44	2.43
49	0.26	0.68	0.41	0.23	0.44	2.02
55	0.80	0.37	1.23	0.32	0.44	3.16
34	0.57	0.29	1.23	0.19	0.45	2.73
20	0.32	0.33	0.61	0.30	0.46	2.02
35	0.26	0.31	0.75	0.40	0.46	2.18
37	0.26	0.38	0.57	0.37	0.46	2.04
41	0.32	0.32	0.64	0.24	0.46	1.98
01	0.62	0.84	0.54	0.27	0.47	2.74
15	0.75	0.62	0.60	0.33	0.47	2.77
43	0.27	0.45	0.89	0.18	0.48	2.27
38	0.29	0.32	0.97	0.53	0.49	2.60
40	0.29	0.32	1.05	0.19	0.49	2.34
46	0.89	0.40	0.55	0.19	0.49	2.52
22	0.38	0.44	1.00	0.69	0.50	3.01
26	0.36	0.54	0.59	0.23	0.50	2.22
17	0.52	0.53	0.91	0.40	0.51	2.87
23	0.56	0.35	0.73	1.77	0.51	3.92
30	0.52	2.17	1.18	1.56	0.51	5.94
44	0.25	0.68	0.48	0.26	0.51	2.18
05	0.29	0.45	2.00	0.51	0.54	3.79
47	0.25	0.50	1.16	0.40	0.54	2.85
45	0.28	0.41	0.87	0.28	0.55	2.39
02	1.38	0.77	0.58	0.22	0.56	3.51
54	1.00	0.31	1.19	0.19	0.57	3.26
31	0.42	0.29	0.53	0.60	0.59	2.43
10	0.42	0.37	0.88	0.18	0.61	2.46
33	0.32	0.36	0.83	0.31	0.61	2.43
50	0.44	0.33	0.95	0.25	0.65	2.62
27	0.35	0.44	0.54	0.40	0.66	2.39
04	0.39	0.39	1.08	0.42	0.67	2.95
18	0.52	0.87	0.64	0.18	0.68	2.89
19	0.32	0.33	0.90	0.51	0.69	2.75
08	0.53	0.87	0.98	0.18	0.70	3.26
58	0.51	0.71	1.80	0.23	0.70	3.45
25	0.25	1.53	0.71	1.16	0.71	4.36
57	1.53	0.30	0.84	0.81	0.72	4.20
03	0.54	0.44	0.54	1.44	0.74	3.70
12	0.26	1.41	0.94	0.60	0.82	4.03
52	0.52	0.49	2.01	0.29	0.86	4.17
14	0.67	0.64	0.99	0.23	0.93	3.46
09	0.73	0.66	0.67	0.25	0.95	3.26
13	0.41	0.50	0.98	0.38	0.99	3.26
21	0.28	0.84	1.24	0.57	1.04	3.97
51	0.45	0.34	0.72	0.18	1.06	2.75
24	0.42	0.55	0.58	0.19	1.09	2.83
11	1.27	0.92	0.82	0.29	1.25	4.55
56	0.69	1.06	1.79	0.32	1.36	5.22
53	0.51	0.64	2.54	0.65	3.22	7.56

RANKED ON RATIO 6

STREAM	I	II	III	IV	V	TOTAL
32	0.30	0.33	0.63	0.25	0.39	1.90
41	0.32	0.32	0.64	0.24	0.46	1.98
20	0.32	0.33	0.61	0.30	0.46	2.02
49	0.26	0.68	0.41	0.23	0.44	2.02
28	0.31	0.42	0.49	0.43	0.38	2.03
29	0.31	0.47	0.56	0.26	0.44	2.04
37	0.26	0.38	0.57	0.37	0.46	2.04
07	0.54	0.43	0.58	0.20	0.43	2.18
35	0.26	0.31	0.75	0.40	0.46	2.18
44	0.25	0.68	0.48	0.26	0.51	2.18
26	0.36	0.54	0.59	0.23	0.50	2.22
43	0.27	0.45	0.89	0.18	0.48	2.27
40	0.29	0.32	1.05	0.19	0.49	2.34
06	0.31	0.42	0.86	0.37	0.40	2.36
27	0.35	0.44	0.54	0.40	0.66	2.39
45	0.28	0.41	0.87	0.28	0.55	2.39
31	0.42	0.29	0.53	0.60	0.59	2.43
33	0.32	0.36	0.83	0.31	0.61	2.43
42	0.36	0.37	0.67	0.59	0.44	2.43
10	0.42	0.37	0.88	0.18	0.61	2.46
46	0.89	0.40	0.55	0.19	0.49	2.52
16	0.34	0.47	1.10	0.24	0.42	2.57
38	0.29	0.32	0.97	0.53	0.49	2.60
50	0.44	0.33	0.95	0.25	0.65	2.62
34	0.57	0.29	1.23	0.19	0.45	2.73
01	0.62	0.84	0.54	0.27	0.47	2.74
19	0.32	0.33	0.90	0.51	0.69	2.75
39	0.59	0.39	0.57	0.77	0.43	2.75
51	0.45	0.34	0.72	0.18	1.06	2.75
15	0.75	0.62	0.60	0.33	0.47	2.77
24	0.42	0.55	0.58	0.19	1.09	2.83
47	0.25	0.50	1.16	0.40	0.54	2.85
17	0.52	0.53	0.91	0.40	0.51	2.87
18	0.52	0.87	0.64	0.18	0.68	2.89
04	0.39	0.39	1.08	0.42	0.67	2.95
22	0.38	0.44	1.00	0.69	0.50	3.01
36	0.93	0.35	1.16	0.29	0.41	3.14
55	0.80	0.37	1.23	0.32	0.44	3.16
08	0.53	0.87	0.98	0.18	0.70	3.26
09	0.73	0.66	0.67	0.25	0.95	3.26
13	0.41	0.50	0.98	0.38	0.99	3.26
54	1.00	0.31	1.19	0.19	0.57	3.26
58	0.51	0.71	1.80	0.23	0.70	3.45
14	0.67	0.64	0.99	0.23	0.93	3.46
02	1.38	0.77	0.58	0.22	0.56	3.51
48	0.62	1.16	1.10	0.40	0.41	3.69
03	0.54	0.44	0.54	1.44	0.74	3.70
05	0.29	0.45	2.00	0.51	0.54	3.79
23	0.56	0.35	0.73	1.77	0.51	3.92
21	0.28	0.84	1.24	0.57	1.04	3.97
12	0.26	1.41	0.94	0.60	0.82	4.03
52	0.52	0.49	2.01	0.29	0.86	4.17
57	1.53	0.30	0.84	0.81	0.72	4.20
25	0.25	1.53	0.71	1.16	0.71	4.36
11	1.27	0.92	0.82	0.29	1.25	4.55
56	0.69	1.06	1.79	0.32	1.36	5.22
30	0.52	2.17	1.18	1.56	0.51	5.94
53	0.51	0.64	2.54	0.65	3.22	7.56

APPENDIX K

FACTOR SCORES
FIFTY EIGHT STREAMS - THIRTY SEVEN CHARACTERISTICS

Factor I - Scenic Attractiveness
Factor II - Topography Land Use
Factor III - Litter
Factor IV - Extractive Industry
Factor V - Aquatic Habitat
Factor VI - Development

		FACTOR SCORES				
STREAM	I	II	III	IV	V	VI
01	0.85	-0.38	0.76	0.86	0.75	-0.25
02	1.16	1.85	-0.65	0.70	0.38	1.60
03	1.33	1.47	2.00	0.13	0.30	1.44
04	0.78	-0.86	0.22	0.10	0.05	-0.17
05	1.01	-0.70	1.45	-1.41	2.00	-0.54
06	-0.47	-0.22	-0.16	-0.12	-1.88	0.09
07	0.34	1.17	0.18	0.06	0.28	1.37
08	0.69	-0.73	-1.10	1.02	0.87	-1.39
09	1.66	2.27	0.02	-0.43	1.15	1.16
10	1.44	1.29	-1.13	-0.08	0.46	1.30
11	2.12	3.11	-0.08	0.61	1.52	1.32
12	-0.28	-1.40	2.07	-0.15	1.58	-2.71
13	1.23	0.36	-0.14	1.17	2.28	-0.65
14	1.62	2.11	-0.72	0.73	1.19	1.31
15	0.55	-0.51	0.10	-0.19	0.39	-0.27
16	-0.35	-0.44	-0.01	-1.76	-0.80	-0.22
17	1.44	1.84	-1.35	0.29	1.10	1.40
18	1.60	2.10	-1.11	0.61	0.23	1.54
19	-0.83	0.76	0.79	-0.59	-0.68	0.48
20	0.0	0.88	-0.16	-0.78	-0.66	0.96
21	-1.41	0.36	0.82	0.99	-1.54	-0.17
22	0.0	1.04	1.47	0.06	-1.44	0.35
23	-0.48	0.63	3.01	0.68	0.24	0.33
24	1.83	1.41	-0.41	-0.19	0.99	1.36
25	-0.66	-0.62	2.08	0.16	0.13	-1.45
26	-0.22	0.65	-0.85	0.72	-0.11	0.92
27	1.49	1.01	-1.24	-0.56	0.05	0.83
28	0.24	0.49	0.35	0.15	0.29	1.29
29	-0.12	0.82	0.23	0.32	-0.80	0.74
30	-1.37	-1.92	2.31	0.73	-1.80	-4.71
31	-0.55	-0.74	1.34	-0.83	0.50	-0.25
32	0.24	0.01	-0.22	-0.95	-0.61	0.59
33	-1.01	-0.40	0.02	-0.85	-0.42	-0.17
34	-0.54	-1.38	-0.91	-0.86	0.37	-1.89
35	-0.01	-1.05	-1.01	-1.17	0.11	-0.14
36	0.43	0.61	-0.62	-1.39	-0.96	-0.77
37	-0.20	-0.18	0.83	-0.48	-0.21	-0.02
38	0.0	-0.42	0.93	-1.19	1.22	0.28
39	-0.25	0.65	0.60	-1.30	-0.58	0.35
40	0.11	-0.59	-0.70	-1.08	1.40	0.26
41	0.36	0.15	-0.23	-1.09	-0.92	0.38
42	0.53	0.47	0.88	-0.94	-0.65	0.75
43	-0.05	-1.23	-0.76	-1.31	1.06	-0.44
44	-0.03	-0.72	-0.46	-0.60	0.62	-0.03
45	0.0	0.35	-0.31	-0.32	0.95	0.81
46	0.12	0.16	-0.91	-0.41	0.19	1.10
47	1.03	-0.98	-0.91	-1.27	1.10	-1.13
48	-0.68	-0.98	0.28	0.76	0.26	-2.34
49	0.0	-0.52	-0.35	-0.41	-0.11	0.49
50	-1.29	-1.20	-0.77	1.05	-1.97	-0.84
51	-1.44	-0.88	-1.07	-0.36	-1.82	1.35
52	-1.90	-0.75	-0.96	1.31	-2.56	-1.98
53	-2.81	-0.96	-1.36	3.79	0.03	-0.57
54	-1.39	-1.85	-0.54	-0.16	0.60	-0.03
55	-0.58	-1.10	-0.81	1.73	-1.69	-0.58
56	-2.40	-1.06	0.02	3.21	0.84	0.30
57	-1.99	-1.63	0.64	1.06	-1.95	-0.70
58	-0.02	-1.70	-0.82	0.12	-1.34	-0.87

RANKED ON FACTOR I

STREAM	I	II	III	IV	V	VI
53	-2.81	-0.96	-1.36	3.79	0.03	-0.57
56	-2.40	-1.06	0.02	3.21	0.84	0.30
57	-1.99	-1.63	0.64	1.06	-1.95	-0.70
52	-1.90	-0.75	-0.96	1.31	-2.56	-1.98
51	-1.44	-0.88	-1.07	-0.36	-1.82	1.35
21	-1.41	0.36	0.82	0.99	-1.54	-0.17
54	-1.39	-1.85	-0.54	-0.16	0.60	-0.03
30	-1.37	-1.92	2.31	0.73	-1.80	-4.71
50	-1.29	-1.20	-0.77	1.05	-1.97	-0.84
33	-1.01	-0.40	0.02	-0.85	-0.42	-0.17
19	-0.83	0.76	0.79	-0.59	-0.68	0.48
48	-0.68	-0.98	0.28	0.76	0.26	-2.34
25	-0.66	-0.62	2.08	0.16	0.13	-1.45
55	-0.58	-1.10	-0.81	1.73	-1.69	-0.58
31	-0.55	-0.74	1.34	-0.83	0.50	-0.25
34	-0.54	-1.38	-0.91	-0.86	0.37	-1.89
23	-0.48	0.63	3.01	0.68	0.24	0.33
06	-0.47	-0.22	-0.16	-0.12	-1.88	0.09
16	-0.35	-0.44	-0.01	-1.76	-0.80	-0.22
12	-0.28	-1.40	2.07	-0.15	1.58	-2.71
39	-0.25	0.65	0.60	-1.30	-0.58	0.35
26	-0.22	0.65	-0.85	0.72	-0.11	0.92
37	-0.20	-0.18	0.83	-0.48	-0.21	-0.02
29	-0.12	0.82	0.23	0.32	-0.80	0.74
43	-0.05	-1.23	-0.76	-1.31	1.06	-0.44
44	-0.03	-0.72	-0.46	-0.60	0.62	-0.03
58	-0.02	-1.70	-0.82	0.12	-1.34	-0.87
35	-0.01	-1.05	-1.01	-1.17	0.11	-0.14
20	0.0	0.88	-0.16	-0.78	-0.66	0.96
22	0.0	1.04	1.47	0.06	-1.44	0.35
38	0.0	-0.42	0.93	-1.19	1.22	0.28
45	0.0	0.35	-0.31	-0.32	0.95	0.81
49	0.0	-0.52	-0.35	-0.41	-0.11	0.49
40	0.11	-0.59	-0.70	-1.08	1.40	0.26
46	0.12	0.16	-0.91	-0.41	0.19	1.10
28	0.24	0.49	0.35	0.15	0.29	1.29
32	0.24	0.01	-0.22	-0.95	-0.61	0.59
07	0.34	1.17	0.18	0.08	0.28	1.37
41	0.36	0.15	-0.23	-1.09	-0.92	0.38
36	0.43	0.61	-0.62	-1.39	-0.96	-0.77
42	0.53	0.47	0.88	-0.94	-0.65	0.75
15	0.55	-0.51	0.10	-0.19	0.39	-0.27
08	0.69	-0.73	-1.10	1.02	0.87	-1.39
04	0.78	-0.86	0.22	0.10	0.05	-0.17
01	0.85	-0.38	0.26	0.86	0.75	-0.25
05	1.01	-0.70	1.45	-1.41	2.00	-0.54
47	1.03	-0.98	-0.91	-1.27	1.10	-1.13
02	1.16	1.85	-0.65	0.70	0.38	1.60
13	1.23	0.36	-0.14	1.17	2.28	-0.65
03	1.33	1.47	2.00	0.13	0.30	1.44
10	1.44	1.28	-1.13	-0.08	0.46	1.30
17	1.44	1.84	-1.38	0.29	1.10	1.40
27	1.49	1.01	-1.24	-0.56	0.05	0.83
18	1.60	2.10	-1.11	0.61	0.23	1.54
14	1.62	2.11	-0.72	0.73	1.19	1.31
09	1.66	2.27	0.02	-0.43	1.15	1.16
24	1.83	1.41	-0.41	-0.19	0.99	1.36
11	2.12	3.11	-0.08	0.61	1.52	1.32

RANKED ON FACTOR 2

STREAM	I	II	III	IV	V	VI
30	-1.37	-1.92	2.31	0.73	-1.80	-4.71
54	-1.39	-1.85	-0.54	-0.16	0.60	-0.03
58	-0.02	-1.70	-0.82	0.12	-1.34	-0.87
57	-1.99	-1.63	0.64	1.06	-1.95	-0.70
12	-0.28	-1.40	2.07	-0.15	1.58	-2.71
34	-0.54	-1.38	-0.91	-0.86	0.37	-1.89
43	-0.05	-1.23	-0.76	-1.31	1.06	-0.44
50	-1.29	-1.20	-0.77	1.05	-1.97	-0.84
55	-0.58	-1.10	-0.81	1.73	-1.69	-0.58
56	-2.40	-1.06	0.02	3.21	0.84	0.30
35	-0.01	-1.05	-1.01	-1.17	0.11	-0.14
47	1.03	-0.98	-0.91	-1.27	1.10	-1.13
48	-0.68	-0.98	0.28	0.76	0.26	-2.34
53	-2.81	-0.96	-1.36	3.79	0.03	-0.57
51	-1.44	-0.88	-1.07	-0.36	-1.82	1.35
04	0.78	-0.86	0.22	0.10	0.05	-0.17
52	-1.90	-0.75	-0.96	1.31	-2.56	-1.98
31	-0.55	-0.74	1.34	-0.83	0.50	-0.25
08	0.69	-0.73	-1.10	1.02	0.87	-1.39
44	-0.03	-0.72	-0.46	-0.60	0.62	-0.03
05	1.01	-0.70	1.45	-1.41	2.00	-0.54
25	-0.66	-0.62	2.08	0.16	0.13	-1.45
40	0.11	-0.59	-0.70	-1.08	1.40	0.26
49	0.0	-0.52	-0.35	-0.41	-0.11	0.49
15	0.55	-0.51	0.10	-0.19	0.39	-0.27
16	-0.35	-0.44	-0.01	-1.76	-0.80	-0.22
38	0.0	-0.42	0.93	-1.19	1.22	0.28
33	-1.01	-0.40	0.02	-0.85	-0.42	-0.17
01	0.85	-0.38	0.26	0.86	0.75	-0.25
06	-0.47	-0.22	-0.16	-0.12	-1.88	0.09
37	-0.20	-0.18	0.83	-0.48	-0.21	-0.02
32	0.24	0.01	-0.22	-0.95	-0.61	0.59
41	0.36	0.15	-0.23	-1.09	-0.92	0.38
46	0.12	0.16	-0.91	-0.41	0.19	1.10
45	0.0	0.35	-0.31	-0.32	0.95	0.81
13	1.23	0.36	-0.14	1.17	2.28	-0.65
21	-1.41	0.36	0.82	0.99	-1.54	-0.17
42	0.53	0.47	0.88	-0.94	-0.65	0.75
28	0.24	0.49	0.35	0.15	0.29	1.29
36	0.43	0.61	-0.62	-1.39	-0.96	-0.77
23	-0.48	0.63	3.01	0.68	0.24	0.33
26	-0.22	0.65	-0.85	0.72	-0.11	0.92
39	-0.25	0.65	0.60	-1.30	-0.58	0.35
19	-0.83	0.76	0.79	-0.59	-0.68	0.48
29	-0.12	0.82	0.23	0.32	-0.80	0.74
20	0.0	0.88	-0.16	-0.78	-0.66	0.96
27	1.49	1.01	-1.24	-0.56	0.05	0.83
22	0.0	1.04	1.47	0.06	-1.44	0.35
07	0.34	1.17	0.18	0.08	0.28	1.37
10	1.44	1.28	-1.13	-0.08	0.46	1.30
24	1.83	1.41	-0.41	-0.19	0.99	1.36
03	1.33	1.47	2.00	0.13	0.30	1.44
17	1.44	1.84	-1.38	0.29	1.10	1.40
02	1.16	1.85	-0.65	0.70	0.38	1.60
18	1.60	2.10	-1.11	0.61	0.23	1.54
14	1.62	2.11	-0.72	0.73	1.19	1.31
09	1.66	2.27	0.02	-0.43	1.15	1.16
11	2.12	3.11	-0.06	0.61	1.52	1.32

RANKED ON FACTOR 3

STREAM	I	II	III	IV	V	VI
17	1.44	1.84	-1.38	0.29	1.10	1.40
53	-2.81	-0.96	-1.36	3.79	0.03	-0.57
27	1.49	1.01	-1.24	-0.56	0.05	0.83
10	1.44	1.28	-1.13	-0.08	0.46	1.30
18	1.60	2.10	-1.11	0.61	0.23	1.54
08	0.69	-0.73	-1.10	1.02	0.87	-1.39
51	-1.44	-0.88	-1.07	-0.36	-1.62	1.35
35	-0.01	-1.05	-1.01	-1.17	0.11	-0.14
52	-1.90	-0.75	-0.96	1.31	-2.56	-1.98
34	-0.54	-1.38	-0.91	-0.86	0.37	-1.89
46	0.12	0.16	-0.91	-0.41	0.19	1.10
47	1.03	-0.98	-0.91	-1.27	1.10	-1.13
26	-0.22	0.65	-0.85	0.72	-0.11	0.92
58	-0.02	-1.70	-0.82	0.12	-1.34	-0.87
55	-0.58	-1.10	-0.81	1.73	-1.69	-0.58
50	-1.29	-1.20	-0.77	1.05	-1.97	-0.84
43	-0.05	-1.23	-0.76	-1.31	1.06	-0.44
14	1.62	2.11	-0.72	0.73	1.19	1.31
40	0.11	-0.59	-0.70	-1.08	1.40	0.26
02	1.16	1.85	-0.65	0.70	0.38	1.60
36	0.43	0.61	-0.62	-1.39	-0.96	-0.77
54	-1.39	-1.85	-0.54	-0.16	0.60	-0.03
44	-0.03	-0.72	-0.46	-0.60	0.62	-0.03
24	1.83	1.41	-0.41	-0.19	0.99	1.36
49	0.0	-0.52	-0.35	-0.41	-0.11	0.49
45	0.0	0.35	-0.31	-0.32	0.95	0.81
41	0.36	0.15	-0.23	-1.09	-0.92	0.38
32	0.24	0.01	-0.22	-0.95	-0.61	0.59
06	-0.47	-0.22	-0.16	-0.12	-1.88	0.09
20	0.0	0.88	-0.16	-0.78	-0.66	0.96
13	1.23	0.36	-0.14	1.17	2.28	-0.65
11	2.12	3.11	-0.08	0.61	1.52	1.32
16	-0.35	-0.44	-0.01	-1.76	-0.80	-0.22
09	1.66	2.27	0.02	-0.43	1.15	1.16
33	-1.01	-0.40	0.02	-0.85	-0.42	-0.17
56	-2.40	-1.06	0.02	3.21	0.84	0.30
15	0.55	-0.51	0.10	-0.19	0.39	-0.27
07	0.34	1.17	0.18	0.08	0.28	1.37
04	0.78	-0.86	0.22	0.10	0.05	-0.17
29	-0.12	0.82	0.23	0.32	-0.80	0.74
01	0.85	-0.38	0.26	0.86	0.75	-0.25
48	-0.68	-0.98	0.28	0.76	0.26	-2.34
28	0.24	0.49	0.35	0.15	0.29	1.29
39	-0.25	0.65	0.60	-1.30	-0.58	0.35
57	-1.99	-1.63	0.64	1.06	-1.95	-0.70
19	-0.83	0.76	0.79	-0.59	-0.68	0.48
21	-1.41	0.36	0.82	0.99	-1.54	-0.17
37	-0.20	-0.18	0.83	-0.48	-0.21	-0.02
42	0.53	0.47	0.88	-0.94	-0.65	0.75
38	0.0	-0.42	0.93	-1.19	1.22	0.28
31	-0.55	-0.74	1.34	-0.83	0.50	-0.25
05	1.01	-0.70	1.45	-1.41	2.00	-0.54
22	0.0	1.04	1.47	0.06	-1.44	0.35
03	1.33	1.47	2.00	0.13	0.30	1.44
12	-0.28	-1.40	2.07	-0.15	1.58	-2.71
25	-0.66	-0.62	2.08	0.16	0.13	-1.45
30	-1.37	-1.92	2.31	0.73	-1.80	-4.71
23	-0.48	0.63	3.01	0.68	0.24	0.33

RANKED ON FACTOR 4

STREAM	I	II	III	IV	V	VI
16	-0.35	-0.44	-0.01	-1.76	-0.80	-0.22
05	1.01	-0.70	1.45	-1.41	2.00	-0.54
36	0.43	0.61	-0.62	-1.39	-0.96	-0.77
43	-0.05	-1.23	-0.76	-1.31	1.06	-0.44
39	-0.25	0.65	0.60	-1.30	-0.58	0.35
47	1.03	-0.98	-0.91	-1.27	1.10	-1.13
38	0.0	-0.42	0.93	-1.19	1.22	0.28
35	-0.01	-1.05	-1.01	-1.17	0.11	-0.14
41	0.36	0.15	-0.23	-1.09	-0.92	0.38
40	0.11	-0.59	-0.70	-1.08	1.40	0.26
32	0.24	0.01	-0.22	-0.95	-0.61	0.59
42	0.53	0.47	0.88	-0.94	-0.65	0.75
34	-0.54	-1.38	-0.91	-0.86	0.37	-1.89
33	-1.01	-0.40	0.02	-0.85	-0.42	-0.17
31	-0.55	-0.74	1.34	-0.83	0.50	-0.25
20	0.0	0.88	-0.16	-0.78	-0.66	0.96
44	-0.03	-0.72	-0.46	-0.60	0.62	-0.03
19	-0.83	0.76	0.79	-0.59	-0.68	0.48
27	1.49	1.01	-1.24	-0.56	0.05	0.83
37	-0.20	-0.18	0.83	-0.48	-0.21	-0.02
09	1.66	2.27	0.02	-0.43	1.15	1.16
46	0.12	0.16	-0.91	-0.41	0.19	1.10
49	0.0	-0.52	-0.35	-0.41	-0.11	0.49
51	-1.44	-0.88	-1.07	-0.36	-1.82	1.35
45	0.0	0.35	-0.31	-0.32	0.95	0.81
15	0.55	-0.51	0.10	-0.19	0.39	-0.27
24	1.83	1.41	-0.41	-0.19	0.99	1.36
54	-1.39	-1.85	-0.54	-0.16	0.60	-0.03
12	-0.28	-1.40	2.07	-0.15	1.58	-2.71
06	-0.47	-0.22	-0.16	-0.12	-1.88	0.09
10	1.44	1.28	-1.13	-0.08	0.46	1.30
22	0.0	1.04	1.47	0.06	-1.44	0.35
07	0.34	1.17	0.18	0.08	0.28	1.37
04	0.78	-0.86	0.22	0.10	0.05	-0.17
58	-0.02	-1.70	-0.82	0.12	-1.34	-0.87
03	1.33	1.47	2.00	0.13	0.30	1.44
28	0.24	0.49	0.35	0.15	0.29	1.29
25	-0.66	-0.62	2.08	0.16	0.13	-1.45
17	1.44	1.84	-1.38	0.29	1.10	1.40
29	-0.12	0.82	0.23	0.32	-0.80	0.74
11	2.12	3.11	-0.08	0.61	1.52	1.32
18	1.60	2.10	-1.11	0.61	0.23	1.54
23	-0.48	0.63	3.01	0.68	0.24	0.33
02	1.16	1.65	-0.65	0.70	0.38	1.60
26	-0.22	0.65	-0.85	0.72	-0.11	0.92
14	1.62	2.11	-0.72	0.73	1.19	1.31
30	-1.37	-1.92	2.31	0.73	-1.80	-4.71
48	-0.68	-0.98	0.28	0.76	0.26	-2.34
01	0.85	-0.38	0.26	0.86	0.75	-0.25
21	-1.41	0.36	0.82	0.99	-1.54	-0.17
08	0.69	-0.73	-1.10	1.02	0.87	-1.39
50	-1.29	-1.20	-0.77	1.05	-1.97	-0.84
57	-1.99	-1.63	0.64	1.06	-1.95	-0.70
13	1.23	0.36	-0.14	1.17	2.28	-0.65
52	-1.90	-0.75	-0.96	1.31	-2.56	-1.98
55	-0.58	-1.10	-0.81	1.73	-1.69	-0.58
56	-2.40	-1.06	0.02	3.21	0.84	0.30
53	-2.81	-0.96	-1.36	3.79	0.03	-0.57

RANKED ON FACTOR 5

STREAM	I	II	III	IV	V	VI
52	-1.90	-0.75	-0.96	1.31	-2.56	-1.98
50	-1.29	-1.20	-0.77	1.05	-1.97	-0.84
57	-1.99	-1.63	0.64	1.06	-1.95	-0.70
06	-0.47	-0.22	-0.16	-0.12	-1.88	0.09
51	-1.44	-0.88	-1.07	-0.36	-1.82	1.35
30	-1.37	-1.92	2.31	0.73	-1.80	-4.71
55	-0.58	-1.10	-0.81	1.73	-1.69	-0.56
21	-1.41	0.36	0.82	0.99	-1.54	-0.17
22	0.0	1.04	1.47	0.06	-1.44	0.35
58	-0.02	-1.70	-0.82	0.12	-1.34	-0.87
36	0.43	0.61	-0.62	-1.39	-0.96	-0.77
41	0.36	0.15	-0.23	-1.09	-0.92	0.36
16	-0.35	-0.44	-0.01	-1.76	-0.80	-0.22
29	-0.12	0.82	0.23	0.32	-0.80	0.74
19	-0.83	0.76	0.79	-0.59	-0.68	0.48
20	0.0	0.88	-0.16	-0.78	-0.66	0.96
42	0.53	0.47	0.88	-0.94	-0.65	0.75
32	0.24	0.01	-0.22	-0.95	-0.61	0.59
39	-0.25	0.65	0.60	-1.30	-0.58	0.35
33	-1.01	-0.40	0.02	-0.85	-0.42	-0.17
37	-0.20	-0.18	0.83	-0.48	-0.21	-0.02
26	-0.22	0.65	-0.85	0.72	-0.11	0.92
49	0.0	-0.52	-0.35	-0.41	-0.11	0.49
53	-2.81	-0.96	-1.36	3.79	0.03	-0.57
04	0.78	-0.86	0.22	0.10	0.05	-0.17
27	1.49	1.01	-1.24	-0.56	0.05	0.83
35	-0.01	-1.05	-1.01	-1.17	0.11	-0.14
25	-0.66	-0.62	2.08	0.16	0.13	-1.45
46	0.12	0.16	-0.91	-0.41	0.19	1.10
18	1.60	2.10	-1.11	0.61	0.23	1.54
23	-0.48	0.63	3.01	0.68	0.24	0.33
48	-0.68	-0.98	0.28	0.76	0.26	-2.34
07	0.34	1.17	0.18	0.08	0.28	1.37
28	0.24	0.49	0.35	0.15	0.29	1.29
03	1.33	1.47	2.00	0.13	0.30	1.44
34	-0.54	-1.38	-0.91	-0.86	0.37	-1.89
02	1.16	1.85	-0.65	0.70	0.38	1.60
15	0.55	-0.51	0.10	-0.19	0.39	-0.27
10	1.44	1.28	-1.13	-0.08	0.46	1.30
31	-0.55	-0.74	1.34	-0.63	0.50	-0.25
54	-1.39	-1.85	-0.54	-0.16	0.60	-0.03
44	-0.03	-0.72	-0.46	-0.60	0.62	-0.03
01	0.85	-0.38	0.26	0.86	0.75	-0.25
56	-2.40	-1.06	0.02	3.21	0.84	0.30
08	0.69	-0.73	-1.10	1.02	0.87	-1.39
45	0.0	0.35	-0.31	-0.32	0.95	0.81
24	1.83	1.41	-0.41	-0.19	0.99	1.36
43	-0.05	-1.23	-0.76	-1.31	1.06	-0.44
17	1.44	1.84	-1.38	0.29	1.10	1.40
47	1.03	-0.98	-0.91	-1.27	1.10	-1.13
09	1.66	2.27	0.02	-0.43	1.15	1.16
14	1.62	2.11	-0.72	0.73	1.19	1.31
38	0.0	-0.42	0.93	-1.19	1.22	0.28
40	0.11	-0.59	-0.70	-1.08	1.40	0.26
11	2.12	3.11	-0.08	0.61	1.52	1.32
12	-0.28	-1.40	2.07	-0.15	1.58	-2.71
05	1.01	-0.70	1.45	-1.41	2.00	-0.54
13	1.23	0.36	-0.14	1.17	2.28	-0.65

RANKED ON FACTOR 6

STREAM	I	II	III	IV	V	VI
30	-1.37	-1.92	2.31	0.73	-1.80	-4.71
12	-0.28	-1.40	2.07	-0.15	1.58	-2.71
48	-0.68	-0.98	0.28	0.76	0.26	-2.34
52	-1.90	-0.75	-0.96	1.31	-2.56	-1.98
34	-0.54	-1.38	-0.91	-0.86	0.37	-1.89
25	-0.66	-0.62	2.08	0.16	0.13	-1.45
08	0.69	-0.73	-1.10	1.02	0.87	-1.39
47	1.03	-0.98	-0.91	-1.27	1.10	-1.13
58	-0.02	-1.70	-0.82	0.12	-1.34	-0.87
50	-1.29	-1.20	-0.77	1.05	-1.97	-0.84
36	0.43	0.61	-0.62	-1.39	-0.96	-0.77
57	-1.99	-1.63	0.64	1.06	-1.95	-0.70
13	1.23	0.36	-0.14	1.17	2.28	-0.65
55	-0.58	-1.10	-0.81	1.73	-1.69	-0.58
53	-2.81	-0.96	-1.36	3.79	0.03	-0.57
05	1.01	-0.70	1.45	-1.41	2.00	-0.54
43	-0.05	-1.23	-0.76	-1.31	1.06	-0.44
15	0.55	-0.51	0.10	-0.19	0.39	-0.27
01	0.85	-0.38	0.26	0.86	0.75	-0.25
31	-0.55	-0.74	1.34	-0.83	0.50	-0.25
16	-0.35	-0.44	-0.01	-1.76	-0.80	-0.22
04	0.78	-0.86	0.22	0.10	0.05	-0.17
21	-1.41	0.36	0.82	0.99	-1.54	-0.17
33	-1.01	-0.40	0.02	-0.85	-0.42	-0.17
35	-0.01	-1.05	-1.01	-1.17	0.11	-0.14
44	-0.03	-0.72	-0.46	-0.60	0.62	-0.03
54	-1.39	-1.85	-0.54	-0.16	0.60	-0.03
37	-0.20	-0.18	0.63	-0.48	-0.21	-0.02
06	-0.47	-0.22	-0.16	-0.12	-1.88	0.09
40	0.11	-0.59	-0.70	-1.08	1.40	0.26
38	0.0	-0.42	0.93	-1.19	1.22	0.28
56	-2.40	-1.06	0.02	3.21	0.84	0.30
23	-0.48	0.63	3.01	0.68	0.24	0.33
22	0.0	1.04	1.47	0.06	-1.44	0.35
39	-0.25	0.65	0.60	-1.30	-0.58	0.35
41	0.36	0.15	-0.23	-1.09	-0.92	0.38
19	-0.83	0.76	0.79	-0.59	-0.68	0.48
49	0.0	-0.52	-0.35	-0.41	-0.11	0.49
32	0.24	0.01	-0.22	-0.95	-0.61	0.59
29	-0.12	0.82	0.23	0.32	-0.80	0.74
42	0.53	0.47	0.88	-0.94	-0.65	0.75
45	0.0	0.35	-0.31	-0.32	0.95	0.81
27	1.49	1.01	-1.24	-0.56	0.05	0.83
26	-0.22	0.65	-0.85	0.72	-0.11	0.92
20	0.0	0.88	-0.16	-0.78	-0.66	0.96
46	0.12	0.16	-0.91	-0.41	0.19	1.10
09	1.66	2.27	0.02	-0.43	1.15	1.16
28	0.24	0.49	0.35	0.15	0.29	1.29
10	1.44	1.28	-1.13	-0.08	0.46	1.30
14	1.62	2.11	-0.72	0.73	1.19	1.31
11	2.12	3.11	-0.08	0.61	1.52	1.32
51	-1.44	-0.88	-1.07	-0.36	-1.82	1.35
24	1.83	1.41	-0.41	-0.19	0.99	1.36
07	0.34	1.17	0.16	0.06	0.28	1.37
17	1.44	1.84	-1.38	0.29	1.10	1.40
03	1.33	1.47	2.00	0.13	0.30	1.44
18	1.60	2.10	-1.11	0.61	0.23	1.54
02	1.16	1.85	-0.65	0.70	0.38	1.60

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ERRATA

Page 19: The Slide No. for Scene 5 should be 130.