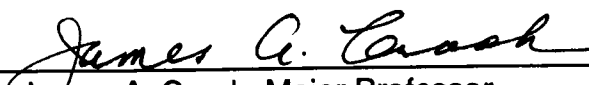
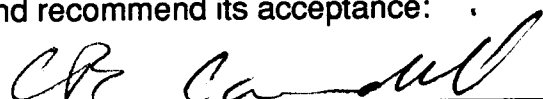
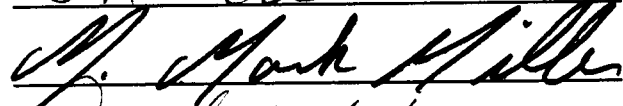


To the Graduate Council:

I am submitting herewith a dissertation written by Jane Harrison Morgan entitled "Cognitive Style and Preference for Scientific Information: A Quasi-Experimental Study." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Communications.


Dr. James A. Crook, Major Professor

We have read this dissertation
and recommend its acceptance:


Accepted for the Council:


Associate Vice Chancellor
and Dean of The Graduate School

**COGNITIVE STYLE
AND
PREFERENCE FOR SCIENTIFIC INFORMATION:
A QUASI-EXPERIMENTAL STUDY**

**A Dissertation
Presented for the
Doctor of Philosophy
Degree
The University of Tennessee, Knoxville**

**Jane Harrison Morgan
August 1992**

Copyright (c) Jane Harrison Morgan, 1992
All rights reserved

DEDICATION

This dissertation is dedicated in memory

of

my father,

Edwin Allen Harrison,

who taught me to do long division,

and

grandfather,

Morton Snow Akers,

who taught me to love reading.

ACKNOWLEDGMENTS

I would like to thank my major professor, Dr. James A. Crook, for his encouragement, guidance, advice, and good humor not only with my dissertation, but throughout my doctoral program in the School of Journalism and the College of Communications at the University of Tennessee, Knoxville. In addition, I would like to thank the other members of my dissertation committee for their help and encouragement. Special thanks go to Dr. David Schumann, who has encouraged my research on cognitive styles as a marketing variable and spent many hours working with me on this first step in that research. Much appreciation also goes to Dr. M. Mark Miller, who has never failed to inspire me in each of his courses that I have taken, and to Dr. Edward Caudill, who is always willing to share his knowledge of and enthusiasm for science.

Two very special ladies helped with my dissertation work in an unofficial, but critical capacity: Dr. Constance Milbourne and Ms. Jean Nagy. Each provided invaluable computer support, as well as moral support on this research. My sincere thanks to them both for their many hours of hardwork and their friendship.

Other very special people include professors and friends, Dr. Paul G. Ashdown, Mrs. Ruth Ware, Ms. Bonnie Hufford, Dr. Michael Singletary and the Rev. Albert Minor, each of whom provided inspiration, encouragement, moral support, and advice at various times throughout the dissertation process, as well as throughout my graduate program.

The faculty and staff in the College of Communications at the University of Tennessee are all special people, who made my three years of graduate study not only a challenge, but also a joy. My sincere appreciation to them all.

Leaving graduate school "ABD" and taking a teaching position across the

state proves problematical when finishing a degree: thus, my sincere appreciation to the Tyson House Student Foundation and the Church of St. Michael and All Angels in allowing me to spend two wonderful summers on campus as a resident at the Episcopal student center while I continued my dissertation research. My dear friends, Ruth and Phil Ware, have been equally as gracious in allowing me to share their home at numerous times, often on the spur of the moment, over the past three years when I needed to visit Knoxville to meet with my professors or research in the library. A very special thank you to them.

In addition, I would also like to express my appreciation to my colleagues and friends, the faculty and staff of the College of Mass Communication and the Department of Journalism at Middle Tennessee State University, for their encouragement and support needed to complete this final phase of my doctoral program. Special thanks go to Drs. Robert Wyatt, Edward Kimbrell, Alex Nagy, Glenn Himebaugh and David Eason, as well as Mrs. Nancy Gorman and Mrs. Sandy Tracy.

However, one cannot finish a graduate program or a dissertation without the patience and support of their families: my mother, my sisters and their families, who endured many shortened vacations and holidays, as well as endless talk about the research topic, but nonetheless provided many hugs and home-made dinners to spur me on.

ABSTRACT

Cognitive style can predict preference for science information according to findings of this research. The study used the Myers-Briggs Type Indicator to type 87 undergraduates on the Sensing-Intuitive scale and 82 undergraduates on the Thinking-Feeling scale. Students in the study with high continuous scores chose between pairs of medical news stories written to match characteristics of each of the four cognitive styles. Five pairs of medical articles presented information that emphasized either objective data or personal warmth; details or generalities; the present or the future; theoretical or concrete information; and practical or impractical information.

The results indicate that cognitive style influences preference for information, with Thinking types preferring information emphasizing objective data, while Feeling types prefer information emphasizing personal warmth. Thinking and Intuitive types prefer practical information, while Sensing and Feeling types prefer information that is impractical by comparison. Sensing types preferred more general information, while Intuitive types preferred the more detailed information.

No significant differences were noted for the choices of Sensing and Intuitive, or Thinking and Feeling between information in the present or the future, or for information that is either theoretical or concrete. No significant differences were found in comparing the preferences of Sensing and Intuitive types for information emphasizing objective data or personal warmth, or in comparing the choices of Thinking and Feeling types between detailed or general information.

Several main effects for gender and an interaction between gender and type were found with a two-way analysis of variance for cognitive style, gender, and

choice of medical article. An interaction between Thinking-Feeling types and gender found that Thinking females and Feeling males prefer concrete information, while Thinking males and Feeling females prefer theoretical information. Females on both the Sensing-Intuitive scale and the Thinking-Feeling scale preferred information emphasizing personal warmth, the present and impracticality, while males on both scales preferred the opposite, selecting information emphasizing objective data, the future and practicality. No significant differences were found between choices by males and females on both scales for information emphasizing details or general information, or for theoretical or concrete information.

The results support the research hypothesis that cognitive style influences and can predict preference for scientific information.

TABLE OF CONTENTS

CHAPTER	PAGE
1. Introduction.....	1
2. Overview of Study.....	4
3. Literature Review.....	8
Readership of Science Information.....	8
Science Writing.....	11
Cognitive and Intellectual Styles.....	12
Jung's Psychological Types.....	15
The Myers-Briggs Type Indicator.....	16
Overview of the Four MBTI Scales.....	16
The MBTI Scales and Each Dichotomous Type.....	17
Extraversion-Introversion Scale.....	17
Sensing-Intuitive Scale.....	18
Thinking-Feeling Scale.....	19
Judgment-Perception Scale.....	20
Combinations of Cognitive Types.....	20
Dynamic Combinations of Types.....	21
Sensing-Thinking Types.....	21
Sensing-Feeling Types.....	21
Intuitive-Feeling Types.....	22
Intuitive-Thinking Types.....	22

Research on the MBTI.....	22
Cognitive Complexity and Conceptualization.....	22
The MBTI in Relation to Reading and Preference for Information.....	24
Cognitive Style as It Relates to Success in Science Courses and Choice of Career in the Sciences.....	26
Cognitive Styles of Scientists.....	28
Cognitive Style as a Marketing Variable.....	30
4. Hypotheses.....	32
Research Question.....	32
Definitions of CognitiveTypes Used in Hypotheses.....	33
Sensing and Intuitive Types.....	32
Thinking and Feeling Types.....	33
Hypotheses.....	34
Hypothesis 1: Objective Data/Personal Warmth.....	34
Hypothesis 2: Details/Generality.....	34
Hypothesis 3: Present/Future.....	34
Hypothesis 4: Concrete/Theoretical.....	35
Hypothesis 5: Practical/Impractical.....	35
5. Methodology.....	36
Sample.....	36
Testing Materials.....	38
Descriptions of Cognitive Types.....	40

Descriptions of Science News Articles.....	40
Science 1 Articles 1A and 1B:	
Objective Data and Personal Warmth.....	40
Science 2 Articles 2A and 2B:	
Details/Generalities.....	41
Science 3 Articles 3A and 3B	
Present/Future.....	41
Science 4 Articles 4A and 4B:	
Theoretical/Concrete.....	42
Science 5 Articles 5A and 5B	
Practicality/Impracticality.....	42
Data Analysis.....	43
MBTI Types as Categorical Data.....	43
MBTI Types as Continuous Data	44
Statistical Tests.....	46
Chi-Square Analysis.....	46
Pearson's Product-Moment Correlation.....	46
Two-Way Analysis of Variance.....	47
Rationale for Dummy-Coding.....	47
6. Results.....	49
Hypothesis 1 Results on Hypothesized High	
Thinking-Feeling Scale.....	49
Chi-Square Analysis on the	
High Thinking-Feeling Scale.....	49

Pearson's Product-Moment Correlation on the	
High Thinking-Feeling Scale.....	50
Two-Way Analysis of Variance on the	
High Thinking-Feeling Scale.....	50
Results of Science 1 Articles Tested on The Non-Hypothesized	
High Sensing-Intuitive Scale.....	55
Chi-Square Analysis on the	
High Sensing-Intuitive Scale.....	55
Pearson's Product-Moment Correlation on the	
High Sensing-Intuitive Scale.....	56
Two-Way Analysis of Variance on the	
High Sensing-Intuitive Scale.....	56
Hypothesis 2 Results on Hypothesized High	
Sensing-Intuitive Scale.....	58
Chi-Square Analysis on the	
High Sensing-Intuitive Scale.....	58
Pearson's Product-Moment Correlation on the	
High Sensing-Intuitive Scale.....	60
Two-Way Analysis of Variance on the	
High Sensing-Intuitive Scale.....	60
Results of Science 2 Articles Tested on The Non-Hypothesized	
High Thinking-Feeling Scale.....	62
Chi-Square Analysis on the	
High Thinking-Feeling Scale.....	62
Pearson's Product-Moment Correlation on the	
High Thinking-Feeling Scale.....	62

Two-Way Analysis of Variance on the High Thinking-Feeling Scale.....	64
Hypothesis 3 Results on Hypothesized High Sensing-Intuitive Scale.....	65
Chi-Square Analysis on the High Sensing-Intuitive Scale.....	65
Pearson's Product-Moment Correlation on the High Sensing-Intuitive Scale.....	66
Two-Way Analysis of Variance on the High Sensing-Intuitive Scale.....	66
Results of Science 3 Articles Tested on The Non-Hypothesized High Thinking-Feeling Scale.....	69
Chi-Square Analysis on the High Thinking-Feeling Scale.....	69
Pearson's Product-Moment Correlation on the High Thinking-Feeling Scale.....	69
Two-Way Analysis of Variance on the High Thinking-Feeling Scale.....	69
Hypothesis 4 Results on Hypothesized High Sensing-Intuitive Scale.....	71
Chi-Square Analysis on the High Sensing-Intuitive Scale.....	72
Pearson's Product-Moment Correlation on the High Sensing-Intuitive Scale.....	72
Two-Way Analysis of Variance on the High Sensing-Intuitive Scale.....	73

Results of Science 4 Articles Tested on The Non-Hypothesized	
High Thinking-Feeling Scale.....	73
Chi-Square Analysis on the	
High Thinking-Feeling Scale.....	73
Pearson's Product-Moment Correlation on the	
High Thinking-Feeling Scale.....	75
Two-Way Analysis of Variance on the	
High Thinking-Feeling Scale.....	75
Hypothesis 5 Results on Hypothesized High	
Sensing-Intuitive Scale.....	77
Chi-Square Analysis on the	
High Sensing-Intuitive Scale.....	77
Pearson's Product-Moment Correlation on the	
High Sensing-Intuitive Scale.....	78
Two-Way Analysis of Variance on the	
High Sensing-Intuitive Scale.....	81
Results of Science 5 Articles Tested on Non-Hypothesized High	
Thinking-Feeling Scale.....	84
Chi-Square Analysis on the	
High Thinking-Feeling Scale.....	84
Pearson's Product-Moment Correlation on the	
High Thinking-Feeling Scale.....	84
Two-Way Analysis of Variance on the	
High Thinking-Feeling Scale.....	87
Summary of Hypothesized Results.....	89
Hypothesis 1.....	89

Hypothesis 2.....	89
Hypothesis 3.....	90
Hypothesis 4.....	90
Hypothesis 5.....	90
Summary of Results of Science Articles Tested on the Non-Hypothesized Scales.....	91
Science 1 Articles on the High Sensing-Intuitive Scale.....	91
Science 2 Articles on the High Thinking-Feeling Scale.....	91
Science 3 Articles on the High Thinking-Feeling Scale.....	92
Science 4 Articles on the High Thinking-Feeling Scale.....	92
Science 5 Articles on the High Thinking-Feeling Scale	92
Summary of Results for ANOVA on Each Scale.....	93
Science 1 Articles on High Thinking-Feeling Scale.....	93
Science 1 Articles on High Sensing-Intuitive Scale.....	93
Science 2 Articles on High Sensing-Intuitive Scale.....	93
Science 2 Articles on High Thinking-Feeling Scale.....	93
Science 3 Articles on High Sensing-Intuitive Scale.....	93
Science 3 Articles on High Thinking-Feeling Scale.....	94
Science 4 Articles on High Sensing-Intuitive Scale.....	94
Science 4 Articles on High Thinking-Feeling Scale..	94
Science 5 Articles on High Sensing-Intuitive Scale.....	94

	Science 5 Articles on High Thinking-Feeling Scale.....	95
7.	Discussion and Conclusions.....	96
	Overview of Results.....	96
	Results on Hypothesized Scales.....	96
	Results on Non-Hypothesized Scales.....	96
	Two-Way Analysis of Variance.....	97
	Overview of Results for Each Hypothesis and	
	Science Articles 1 Through 5.....	99
	Hypothesis 1:	
	Objective Data/Personal Warmth.....	99
	Hypothesis 2:	
	Details/Generalities.....	101
	Hypothesis 3:	
	Present/Future.....	102
	Hypothesis 4:	
	Theoretical/Concrete.....	105
	Hypothesis 5:	
	Practical/Impractical.....	108
	Limitations.....	112
	Sample Size.....	112
	Student Sample.....	113
	Subject.....	113
	Content.....	114
	Consistent Use.....	115
	Order of Presentation.....	115

Number of Activities.....	116
Implications and Conclusions.....	116
General Conclusions.....	120
Further Research.....	122
Bibliography.....	124
Appendices.....	130
Appendix A. Student Demographic Survey Form.....	131
Appendix B. Science Articles Testing Instrument.....	133
Appendix C. Science Articles Pre-Test and Means.....	139
Appendix D. Myers-Briggs Type Indicator Scoring Scale.....	145
Appendix E. Chi-Square Contingency Tables for Science Articles 1-5 on High Sensing-Intuitive Scale.....	150
Appendix F. Chi-Square Contingency Tables for Science Articles 1-5 on High Thinking-Feeling Scale.....	156
Vita.....	162

LIST OF TABLES

TABLE	PAGE
6.1 Chi-Square Analysis of Science 1 Articles on High Thinking-Feeling Scale.....	51
6.2 Means for Two-Way Analysis of Variance of Science 1 Articles A and B.....	53
6.3 Chi-Square Analysis of Science 2 Articles on High Sensing-Intuitive Scale.....	59
6.4 Means for Two-Way Analysis of Variance of Science 2 Articles A and B.....	63
6.5 Means for Two-Way Analysis of Variance of Science 3 Articles A and B.....	67
6.6 Means for Two-Way Analysis of Variance of Science 4 Articles A and B.....	74
6.7 Chi-Square Analysis of Science 5 Articles on High Sensing-Intuitive Scale.....	79
6.8 Means for Two-Way Analysis of Variance of Science 5 Articles A and B.....	82
6.9 Chi-Square Analysis of Science 5 Articles on High Thinking-Feeling Scale.....	85

LIST OF FIGURES

FIGURE		PAGE
6.1	Science 1 Articles on High Thinking-Feeling Scale Correlation Means for Cognitive Type.....	52
6.2	Science 1 Articles on High Thinking-Feeling Scale Main Effect for Gender.....	54
6.3	Science 1 Articles on High Sensing-Intuitive Scale Main Effect for Gender.....	57
6.4	Science 2 Articles on High Sensing-Intuitive Scale Correlation Means for Cognitive Type.....	61
6.5	Science 3 Articles on High Sensing-Intuitive Scale Main Effect for Gender.....	68
6.6	Science 3 Articles on High Thinking-Feeling Scale Main Effect for Gender.....	70
6.7	Science 4 Articles on High Thinking-Feeling Scale Interaction Between Gender and Cognitive Type.....	76
6.8	Science 5 Articles on High Sensing-Intuitive Scale Correlation Means for Cognitive Type.....	80
6.9	Science 5 Articles on High Sensing-Intuitive Scale Main Effect for Gender.....	83
6.10	Science 5 Articles on High Thinking-Feeling Scale Correlation Means.....	86
6.11	Science 5 Articles on High Thinking-Feeling Scale Main Effect for Gender.....	88

CHAPTER 1

INTRODUCTION

In the fall of 1987 the editors and publishers of nine of the top science, technology and health magazines in the United States met to discuss the readership for popular science magazines in this country. The Scientists Institute for Public Information (SIPI) had extended the invitation to the group to discover if an audience existed for general interest science magazines and if there had been "a real basis in popular enthusiasm for the multi-launch of such magazines" eight years before. SIPI hoped to ascertain why many of the magazines had failed or been sold. It hoped the group would "explain the decline of popular science magazines with the simultaneous impressive increase in newspaper science sections" (SIPI, 1987).

A study of the 70-page transcript of that roundtable discussion indicates that the group covered many questions about readership and content of popular science magazines, as well as newspaper science and health sections. One of the more intriguing questions debated in the discussions concerned the reason the general public reads science information. The group pondered the dual questions of **WHY** the public reads science information in magazines and newspaper sections, and **WHAT** it hopes to gain from this coverage.

The argument which arose among the editors and publishers centered on the question of whether readers seek information which is applicable or useful in some manner, either to their own lives or in general, or whether they read for intellectual stimulation and excitement.

Frank Kendig, editor of Science Digest at that time, commented:

It keeps coming up . . . what's important to people. You know that they're interested in health because it has something useful; it has something to do with [their lives]. It seems we're missing one whole

side of what we do . . . the stuff is interesting. There is non-purposeful, non-utilitarian attraction to [this type of information]. That's fascinating. It seems to me [that's] what's missing from most of the publications, a great deal of them (Kendig, 1987, p. 27).

Leon Jaroff, editor of Discover magazine at that time, lamented that the "Harvard MBA's" who ran his company were questioning his magazine's editorial mix asking why he had run so many physics stories in one year. He explained:

This was 1983, a fantastic year for physics. They discovered the WNZ particles, and [management] really resented [the emphasis on physics stories]. 'Why didn't you do more stories about the secrets of the brain?' [they asked]. . . . In a large corporation you do have to fight against this, and the notion that was expressed here . . . that someone will read a story simply for the intellectual stimulation or excitement, rather than what it will bring to them in a practical sense, it had practically no impact on these people (Jaroff, 1987, pp. 29-30).

So that for instance, a story that we tried to do in DISCOVER on the cover, which would have sold like mad, 'Did Comets Kill Dinosaurs?' was relegated by the editor-in-chief to the inside position, and the cover was "Secrets of the Brain." And in my frustration, when I went back to TIME, I sold not 'Secrets of the Brain,' but 'Did Comets Kill the Dinosaurs?' [as a cover story] to TIME, and it was the third best-selling issue of the year (p. 30)

Jaroff commented on his "fatal argument" with the editor-in-chief of Time Incorporated, saying that he had been told by an editor to place "a little box [in every story] to explain to the reader why this story was important to them" (p. 55).

I resisted to my death. I thought it was condescending and I also . . . believed that some of the stories which have the least practical applications are some of those that excite people most and get the most response from them (p. 55).

Jaroff's story on the Supernova was one of the best-selling issues of the year. He asked the group to consider:

Now, of what practical value is the supernova? Of what practical value, or how can you apply it to your life, is the black hole? How does the concept that the dinosaurs were wiped out by a rain of comets in any way affect what you are, how you make your living, how

you will die? . . . There has to be something in the magazines that is of practical application. But, it's the intellectual concept, the intellectual excitement, that I think, in terms of newsstand sales and letters to the editor, indicate that there is a hunger for [intellectual stimulation], (p. 55).

CHAPTER 2

OVERVIEW OF STUDY

One of the questions which the editors and publishers at the SIPI roundtable discussion pondered spurred this doctoral dissertation research: why do people read scientific information in newspapers, newsmagazines, or popular science magazines? The question became more specific when the editors asked pointedly: do people read for practical applications or intellectual stimulation? Furthermore, what type of scientific information do they prefer: information emphasizing practical applications or information emphasizing the conjectural nature of a situation, a theoretical approach?

Answering those questions would seem to require more than the usual demographic information about the target audience, i.e. the readers of scientific information.

Some research has been conducted on the readership of science information: it looks primarily at demographic information such as education, gender, and age. However, little has been done to isolate psychographic variables which might influence preference for this type of information.

What seems to be needed is psychographic information. But what type of psychographic information would be most useful to understanding the motivations and preferences of readers of this particular type of information? And what type is not already available through marketing research? Which psychographic variable(s) might logically influence preference for a specific type of information?

The editors had a clue when they recognized that some people want to read about information with concrete applications, while others want to read about theoretical situations for intellectual stimulation. It seems logical to assume that

whatever people like to **read** about, they must also like to **think** about. And the **ideas and concepts** people think about must be related to the **manner** in which they think. And if the **ideas and concepts** people think about tell us about **manner** in which people think, i.e. their thinking patterns, we have the psychographic variable we need: the type of thinking patterns, or the way and manner in which people think.

Thus people who prefer concrete information would tend to be more concrete in their thinking, and consequently less abstract, less theoretical. Conversely, those who prefer to read information of a conjectural nature, information that is abstract and theoretical, would tend to be more abstract and less concrete in their thinking.

The different ways in which people think have long been studied in the fields of psychology and education. These different ways can be easily identified through any number of psychological tests and psychometric instruments. The basic tendency toward concreteness or abstraction in thinking has been of particular interest to psychologists and educators.

This tendency to think in a specific way, one which dictates mental processes and functioning, and pertains to the ways in which individuals seek information and process it, is called an intellectual style or a cognitive style. Thus, knowing one's particular cognitive style can tell how a person thinks, and, theoretically, what that person would like to think about.

It is the underlying assumption of this dissertation that cognitive style can not only tell us how a person thinks, but also what that person will prefer to think about and read about. Thus, if we know a person's cognitive style, we can predict his or her preference for various types of information or the manner in which it is presented. It is the research hypothesis of this study that cognitive style influences preference for science information and can be used to predict this preference.

Specifically, the study endeavors to ascertain if a reader's cognitive style

(intellectual style) drives his or her preference for a type of science information. Will readers of varying cognitive styles prefer either science information with an emphasis on applications, something that is useful and practical, or will they prefer science information with a theoretical and abstract orientation, one which offers only food for thought or invites conjecture?

One of the questions this dissertation research asks is whether individuals read science information seeking practical applications to their everyday lives or if they read for intellectual stimulation. While the SIPI group considered only readers of popular science magazines, the question could also apply to the readers of science sections in newspapers, i.e. any type of science information for popular consumption.

Surely there are differences in the readers of science information which would influence their desire to read the magazines or newspaper sections for either news to use or for intellectual stimulation. These differences would not only have editorial, but also marketing implications. It would answer some of the questions that editors and publishers at the SIPI roundtable pondered.

Thus the basic interest of this study is to discern differences in the readership of science information, whether it be in science magazines, or in the science sections of newsmagazines and newspapers, based upon their cognitive style.

This study used the Myers-Briggs Type Indicator, a well-known and much used psychometric instrument, to assess the cognitive style of the reader. Another instrument measured preference for types of information; medical information was the specific science subject used to test the hypotheses. This instrument, constructed especially for this research, allowed the reader to choose between pairs of articles on various medical topics with each emphasizing information with specific characteristics based upon the Myers-Briggs' description of four cognitive types,

such as an applied approach or a theoretical approach. An analysis of the data indicated that cognitive style influences preference for specific types of medical information and can predict this preference.

The study was exploratory in nature and further studies using other types of scientific information, as well as experimental research designs, are needed to gather further information about this cognitive influence. It should be noted, however, that this study is not seen only as just another step in uses and gratifications research, as it looks at cognitive style as an independent variable.

CHAPTER 3

LITERATURE REVIEW

READERSHIP OF SCIENCE INFORMATION

Little has been done to study the readers of science information other than looking at demographics, the preference for sources of the information, or preference for newspaper topics.

Wade and Schramm (1969) focused upon the relation of different patterns of information-seeking to different levels of public knowledge in the areas of public affairs, science, and health. They looked at readers' preferred sources of science or medical information, but did not study preferred content or reader characteristics other than demographics.

Nunn (1979), however, looked at age of readers in relation to level of interest in science articles per se, then went further to compare interest in specific newspaper content categories. Pion and Lipsey (1981) studied public attitudes toward science and technology finding that "the most striking aspect of public attitudes towards science, and scientists, however, is that they appear to be based on nebulous and distorted conceptions which are dominated by themes of applied technology" (p. 303).

Miller (1985) looked only at those who have an interest in scientific information for practical purposes. He conceptualized a "stratified model of participants in science policy formulation" (p. 59). Within this pyramidal framework he places decision makers and policy leaders on the two top rungs, with the attentive public and the interested public on the following two, and the nonattentive public on the bottom.

The "attentive public," according to Miller, wants to be informed about scientific controversies and learn about alternatives to scientific problems, while the

"interested public" seeks less technical information due to less education.

Various marketing studies have shown that science readers differ in their demographic and psychographic variables from other consumers in numerous ways (Simmons, 1987). As noted before, they differ not only in their preferred sources of scientific information and choices of media (Wade & Schramm, 1969), but in preference for scientific content as well (Nunn, 1979). However, little work has been done to differentiate between (1) the type of readers of popular science material, (2) the preferred style of presentation (e.g. with graphs, illustrations, or photographs), or (3) the writing style of the publication.

Advertisers, marketers and editors recognize science readers as a distinct market group - a part of the babyboom generation - and they differentiate between them and the readers of other publications (Simmons, 1987). But they assume that all science readers are alike, and have a tendency to lump the members of this audience into one amorphous mass. Thus, science readers are approached as a homogeneous group whose readers possess similar demographics of age, sex, education, and income.

However, the advent and the subsequent demise of several popular science magazines during the 1980s points to the fallacy inherent in this marketing strategy. It was, and is, a mistake to approach science readers in this manner. The readers of these several magazines (Discover, Omni, Science Digest, and Science 86) span a wide range of demographic variables. The promotion and advertising for the various magazines attracted a large readership, but not necessarily readers possessing the upscale demographics that editors and advertisers wanted (Pfaff, 1985). Not only did the advertisers make erroneous assumptions about this audience, the editors and publishers of the magazines did also. The magazines themselves courted the advertisers who usually promoted their high-tech, upscale

products in Scientific American, eschewing advertisers of other products used by their heterogeneous readers (Lewenstein, 1987; Pfaff, 1985). They, too, assumed that their readers were similar demographically to the readers of that prestigious, scientific periodical.

This marketing error was exacerbated by the lack of differentiation among the science magazines and their respective audiences. Advertisers could not readily discern a difference between the four popular science magazines (Discover, Omni, Science Digest, and Science 86) or their readers. The magazines seemed to carry articles on the same subject and their covers often touted the same subject during the same publication month. While the editors of each magazine "felt" their magazines each reflected a specific editorial stance and appealed to a specific segment of the science reader market (Wilson, 1982), there was no empirical evidence to support these intuitive evaluations. To potential advertisers there seemed to be few discernible differences in the publications: they seemed to be parody products all vying for the same set of readers (Kaufman, 1983; Lewenstein, 1987; Pfaff, 1985).

As a group, science readers are seen as a part of the middle- and upper-middle class market segment. They tend to be among the babyboomers of that segment and are representative of their fellow babyboomers in that they are "the first generation of middle- and upper-middle class workers uniformly educated in science and technology . . . a ready audience for popular science," according to Lewenstein (1987, p. 30). They are recognized as possessing an "explosive hunger for more information," (Lewenstein, 1987, p. 30), choices of media (Ubell, 1963; Wade & Schramm, 1969), and in preference for the content of media as well (Nunn, 1979).

The assumption under which science magazine editorial and marketing

staffs, and advertisers as well, have operated is that readers of popular science magazines are similar demographically to the readers of Scientific American, although a bit younger. These readers are seen as "this great elite market of young, upwardly mobile people who are interested in science" (Lewenstein, 1987, p.31). This group is especially drawn to specialty magazines narrowly targeted at specific groups (Lewenstein, 1987, p 31). However, this targeting approach has not taken into account that there are some readers who do not fit into this mold: members of this group while homogeneous in some ways, are not in others.

Two problems exist in regard to science readers: first, many readers who do not match these demographics are interested in reading about science and are subscribers to the popular science magazines. Unfortunately, these readers are not appreciated. At one point Discover magazine re-worked its television advertising strategy because it attracted "unwanted downscale subscribers," (Pfaff, 1985, p. 146).

Second, those readers who do represent the desired demographics differ in the magazine they prefer. They seem to differ in the type of science information they want: some want news to use with practical applications, while others are more interested in interpretive pieces which stimulate thought and conjecture about the future, technology, the planet and the cosmos.

SCIENCE WRITING

While little has been done to study readership of scientific information, just as little has been done to study science writing itself. Funkhouser (1969) determined that there are measurable differences in science writing aimed at audiences of different educational levels and that "differences tend to be consistent with findings on audience effects of textual variations" (p. 721).

Funkhouser and Maccoby (1973, 1974) continued this study by tailoring science writing for general audiences. Both studies manipulated stylistic and rhetorical variables to maximize audience comprehension and enjoyment of scientific information. Bostonian (1983), and Bostonian and Byrne (1984) studied how active, passive and nominal styles in science writing affected its readability.

Johnson (1963) studied the dimensions of judgment of science stories by editors, science writers, scientists and readers finding that editors rated stories by level of excitement, while writers, scientists and readers rated them by accuracy and significance. Accuracy of science news reporting was also studied by Broberg (1973), Tankard and Ryan (1974), and Tichenor, et al., (1983). Ryan (1979) also explored the attitudes of scientists and journalists toward media coverage of science news, finding that their attitudes about news coverage of major science issues were "remarkably similar" (p. 18).

The social and ethical content in science coverage by newsmagazines was examined by Oates (1973), while Sorenson and Sorenson (1973) compared the science content of magazines finding that science content increased considerably between 1964 and 1970 with the largest increase in coverage of space, conservation and environment.

The impact of science reporting on human behavior was studied by Robinson (1963) when he found that "despite the efforts made by the mass media, only modest progress has been made in affecting human behavior" (p. 306).

COGNITIVE AND INTELLECTUAL STYLES

The term cognitive style has numerous meanings in psychology. Basically it refers to mental processes and functioning, pertaining to the ways in which individuals seek information and process it, and the ways that individuals search for

meaning in their environment. In addition, it also refers to the type of information an individual prefers, and the manner in which he or she will order it in the mind.

Some measures of cognitive style look at preference for varying levels of abstractness or concreteness, referring to levels of thinking. This can also imply the amount of information a person needs: many, minute facts which can be analyzed or fewer, more in-depth pieces of information which can be weighed and considered.

Guilford (1980) writes that cognitive styles have been thought of as "cognitive controls" and "cognitive attitudes" (p. 715). Various researchers, such as Messick, Guilford notes, speak of "cognitive strategies," which are mental functions. Some see style as a trait which determines "the amount and organization of information available to the individual at the moment." Guilford proposes that "most cognitive styles bear apparent relations to certain aspects of the structure-of-intellect model" (p. 718).

In his report on the best established cognitive styles, Guilford lists the traits/functions most often thought of as categories or abilities associated with the term. These included field independence versus dependence, complexity versus simplicity, equivalence range, leveling and sharpening, focusing versus scanning, and analytical versus global.

In addition, Guilford discusses the various synonyms for the term "cognitive styles" found in the research literature (p. 728). One such term is conceptual styles. Under this rubric one finds the style traits of conceptualization, conceptual articulation, conceptual integration, and integrative complexity.

Cognitive style as it relates to other personality traits is also explored by Guilford. Cognitive style can be seen as a personality variable. The style of "scanning" (p. 729), is associated with meticulousness and concern with detail. Style can also be thought of as "a tolerance for unrealistic experiences, or a

readiness to accept unconventional ideas," as well as a propensity for either reflection or impulsivity (p. 730). Some dimensions of cognitive style are considered personality traits in various psychometric assessments of personality. For example, Cattell's 16PF personality inventory measures abstractness and concreteness as one of its 16 factors comprising personality.

Guilford concedes that "there are actually a number of different kinds of dimensions involved; they are clearly not all of the same breed" (p.730). He feels that overall, the label of "intellectual styles" would be a more appropriate term for the processes with which most researchers are concerned (p. 731).

It is unlikely that cognitive styles are merely abilities, for many of them definitely appear to represent directions of preferences in information processing, for example.

Preference for divergent versus convergent production is an example of a choice between two intellectual operations.

Other cognitive styles appear to involve preferences among different products of information. Conceptualizing styles involve favoring units versus classes versus relations as items with which to deal (731).

Summing up his study of the various interpretations of cognitive styles, Guilford writes:

One more thing should be said concerning these preference styles is that they look more like types than dimensions. That is, each represents a profile of interest or motivation within individuals (p. 731).

Cognitive style, or intellectual style, is an important component of human behavior, of personality, whether one views it as a trait or a function. Cognitive style is concerned with information: obtaining it, processing it, ordering, preference for it. How an individual obtains information from that environment is at the core of personality, according to psychoanalyst Carl Jung. Thus, for the purposes of this study cognitive styles will be defined as intellectual styles, and each will be construed

as a personality trait. The term "style" will be used synonymously with psychological "type" as defined by Jung, and subsequently by McCaulley and Myers.

The cognitive style, intellectual style or personality type of this study's subjects, was determined by the Myers-Briggs Type Indicator which is based upon Carl Jung's Theory of Personality.

JUNG'S PSYCHOLOGICAL TYPES

Jung proposes that the structure of personality is three-tiered. "In Jungian psychology the personality as a whole is called the psyche" (Hall, 32), which is composed of three levels: consciousness, the personal unconscious and the collective unconscious.

It is the level of consciousness with which this study is concerned. Conscious awareness grows through the application of four mental functions which Jung termed thinking, feeling, sensing, and intuiting. According to Jung, one doesn't use the four functions in equal measures, but will use one more than others, preferring one function over the others.

In addition, Jung proposed two attitudes that determine the orientation of the conscious mind: extraversion and introversion. As Hall explains it, "The extraverted attitude orients consciousness toward the external, objective world: the introverted attitude orients consciousness toward the inner, subjective world" (Hall, 33).

Both the functions and the attitudes make-up the conscious level of personality which Jung sees, essentially, as ways of relating to the world, of orienting one's self to the world. Individuals, based upon their preference for one function and attitude over another, will have a particular orientation to the world which can be thought of as a preferred style, a cognitive style. Jung proposed that the combinations of the various functions and attitudes resulted in types of personalities, thus he developed

a theory of personalities based upon the functions and attitudes of consciousness. From this theory came the concept of psychological types.

In 1962 Isabel Myers Briggs developed a personality inventory based upon Jung's theory of psychological types which she felt provided "a powerful way for illuminating everyday observations about individual styles of information gathering and decision making" (Myers & McCaulley, 1985).

The purpose of the Myers-Briggs Type Indicator is to make the theory of psychological types described in C. G. Jung (1921/1971) understandable and useful in people's lives. The essence of the theory is that much of the seemingly random variation in behavior is actually quite orderly and consistent, being due to basic differences in the way individual's prefer to use their perception and judgment (p. 1).

THE MYERS-BRIGGS TYPE INDICATOR

The Myers-Briggs Type Indicator is a self-report inventory developed to measure the variables in Jung's personality typology. It consists of four scales: Extraversion-Introversion (E-I), Sensing-Intuitive (S-N), Thinking-Feeling (T-F), and Judging-Perceiving (J-P). The four scales represent dichotomous preferences, unusual psychometric properties, which affect "not only **what** people attend to in any given situation, but also **how** they draw conclusions about **what** they perceive." These opposite and dichotomous properties indicate **preferred ways** of dealing with the world (Myers & McCaulley, 1985, p. 2).

Overview of the Four MBTI Scales

The E-I scale indicates where individuals focus their attention: the outer world of things and people or the inner world of thoughts.

The S-N scale indicates a preference for acquiring or perceiving information, how individuals go about finding out things.

The T-F scale indicates how decisions are made. Once information is acquired, something must be done with it. Will this information be used to reach conclusions, make decisions, or form opinions? This scale describes the opposite ways of making decisions or judgments about something.

The J-P scale describes the lifestyle adopted in dealing with the outer world or how one orients him- or herself in relation to it. The opposite here refers back to the previous two scales. In other words, one either takes primarily a judging attitude (**Thinking or Feeling**) or a perceptive attitude (**Sensing or Intuition**) toward the world (Myers & McCaulley, 1985, p. 2).

The MBTI Scales and Each Dichotomous Type

Extraversion-Introversion Scale

The Extraversion-Introversion Scale (E-I) scale does not reflect the popular connotation of out-going or shy tendencies and behaviors; rather it indicates whether a person focuses his attention on the outer or the inner world.

Extraverts (E) on this scale are people who tend to "focus on the outer world of people and the external environment." When one is "extraverting," he is "energized by what goes on in the outer world, and this is where [he] will direct [his] energy. He prefers "to communicate more by talking than by writing." He "needs to experience the world in order to understand it and thus [tends] to like action" (Myers, et al., 1989, p. 5).

Introverts (I) are those who on this scale "focus more on their own inner world." When introverting, one is energized by what goes on in the inner world of the mind and this is where this individual's energy is focused. "Introverts tend to be more interested and comfortable when their work requires a good deal of their

activity to take place quietly inside their heads. They like to understand the world before experiencing it, and so often think about what they are doing before acting" (Myers, et al., 1989, p. 5).

Sensing-Intuitive Scale

The **Sensing-Intuitive (S-N)** scale indicates a preference for taking in information about the world. **Sensation (Sensing-S)** seeks the fullest possible experience of what is immediate and real, while **Intuition (N)** seeks the broadest view of what is possible and insightful (Myers & McCaulley, 1985, p.2).

Sensing types (S) use their sensing functions, their eyes, ears, and other senses, to find out about what is happening. They appreciate the realities of situations and are realistic and practical. They focus upon the here and now. They are good at remembering and working with a great number of facts (Myers, et al., 1989, p.5).

Researchers Carskadon and Knudson (1985) explain:

... sensing types perceive the world strictly through their five senses. They prefer not to go beyond objective tangible, readily available data in dealing with the world and forming their percepts (p.483).

The MBTI manual characterizes this scale by saying that Sensing types tend to "accept and work with what is 'given' in the here and now," thus they become realistic and practical. They are also good at "remembering and working with a great number of facts" (p. 5).

Intuitive types (N) find out information through intuition, which shows "the meanings, relationships, and possibilities that go beyond information from [the] senses. Intuition looks at the big picture and tries to grasp the essential patterns. Intuitors are "expert at seeing new possibilities and new ways of doing

things. Intuitive types value imagination and inspiration" (Myers, et al., 1989, p. 5).

Intuitive types prefer to perceive the world more indirectly and with greater use of the unconscious; emphasis is placed on the ideas associations, and possibilities implicit in the things perceived, as (Carskadon & Knudson, 1978, p. 484).

Thinking-Feeling Scale

The T-F (Thinking-Feeling) scale indicates the manner in which one prefers to make decisions, form opinions, and reach conclusions.

Thinking types (T) look for "logical consequences of any particular choice or action." Thinking requires deciding objectively, on the basis of cause and effect, in making decisions by analyzing and weighing the evidence, including unpleasant facts. Thinkers seek an objective standard for truth and are good at analyzing what is wrong with something (Myers, et al., 1989, p. 6).

Feeling (F) types, however, decide through their feelings by considering what is important to themselves or to others, without requiring that it be logical. Thus decisions are made on the "basis of person-centered values." "It is important to understand that the word 'feeling' when used here, means making decisions based on values; it does not refer to your feelings or emotions." Rather than weighing facts when making a decision, the feeling type asks himself how much he cares about each of the alternatives, or how much personal investment he has in each. "Those with a preference for feeling like dealing with people and tend to become sympathetic, appreciative, and tactful" (Myers, et al., 1989, p. 6).

Judgment-Perception Scale

The **Judging-Perceiving (J-P)** attitude describes the lifestyle one adopts in dealing with the outer world or how one orients himself in it.

Judging types (J) are those who prefer the judging attitude. They "live in a planned, orderly way, wanting to regulate life and control it." There is a tendency "to make decisions, come to closure and then carry on, as well as a tendency to prefer to be structured, organized and wanting things settled." The function of judging, it should be noted, does not mean judgmental (Myers, et al., 1989, p. 6).

Perceiving types are those who adopt the **Perceptive (P)** process in dealing with the outer world and like to live in a flexible, spontaneous way. They gather information and keep their options open, seeking to understand life rather than controlling it. They stay open to experiences, enjoying and trusting their ability to adapt to the moment.

COMBINATIONS OF COGNITIVE TYPES

When the two types on the Sensing-Intuitive scale are combined with the two types on the Thinking-Feeling scale, the four resulting combinations will create new types with dynamic qualities coming from the interaction of a person's preference for perception and his way preference for judgment.

The kind of perception you prefer to use, either sensing or intuition, can team up with whichever kind of judgment you prefer to use, either thinking or feeling. So there are four possible combinations, each producing a different set of characteristics-different interests, different values, different needs, different habits of mind and different surface traits (Myers, 1980, p. 2).

Dynamic Combinations of Types

The following dynamic combinations are described according to the definitions in the MBTI guide and manual (Myers & McCaulley, 1985. p. 33-35):

Sensing-Thinking Types

ST: people who prefer sensing and thinking, focus their attention on facts, handle these with impersonal analysis, tend to become practical and matter-of-fact and find scope for their abilities in technical skills with facts and objects. "Their interests focus upon facts, because facts can be collected and verified directly by the senses - by seeing, hearing, touching, counting, weighing, and measuring." They approach decisions with impersonal analysis, "because what they trust is thinking, with its step-by-step logical process of reasoning from cause to effect, from premise to conclusion." Thus, they are practical and matter-of-fact, preferring fields that require analysis of concrete facts such as business, surgery, law, etc., (Myers & McCaulley, 1985, p.33).

Sensing-Feeling Types

SF: people who prefer sensing and feeling, focus their attention on facts, handle these with personal warmth, tend to become sympathetic and friendly, and find scope for their abilities in practical help and services for people. "They too are mainly interested in facts that they can gather directly through the senses, but they approach their decisions with more subjectivity and personal warmth." Their success and satisfaction "lie in fields where their personal warmth can be effectively applied to concrete situations," such as service-with-a-smile jobs. They also like selling tangibles, teaching, and working in applied medical fields such as nursing and pediatrics (Myers & McCaulley, 1985, p.34).

Intuitive-Feeling Types

NF: people who prefer intuition and feeling, focus their attention on possibilities, handle these with personal warmth, tend to become enthusiastic and insightful, and find scope for their abilities in understanding and communicating with people. The NF person does not focus his or her interest on concrete situations, but on possibilities, "such as new projects, things that have never happened but might be made to happen, or truths that are not yet known but might be. Intuition provides an interest in patterns underlying immediate facts, symbolic meanings, and theoretical relationships" (Myers & McCaulley, 1985, p. 35).

Intuitive-Thinking Types

NT: people who prefer intuition and thinking, focus their attention on possibilities, handle these with impersonal analysis, tend to become logical and ingenious. These individuals also focus their attention on "possibilities, theoretical relationships and abstract patterns, but they judge these with impersonal analysis. Often the possibility they pursue is a technical, scientific, theoretical, or executive one, with the human element subordinated (Myers & McCaulley, 1985, p. 35).

RESEARCH ON THE MBTI

Cognitive Complexity and Conceptualization

Looking at the Sensing-Intuitive scales of the Myers-Briggs Type Indicator, Ross (1966, p.14) in his comparison of the MBTI with other tests of ability, personality and interest, found that:

Items in the S-N scale suggest a distinction in terms of preference for abstract thinking (indicating intuition) and a related, but different,

distinction in terms of preference for common sense and practicability (indicating sensation).

Along this same line, Thompson and Melancon (1987) supported the validity of the MBTI as a measure of critical thinking finding that "a more intuitive and less sensing personality orientation was associated with higher scores on the measure of critical thinking skills" (p. 1228).

Ferguson and Fletcher (1987) found that "there is definitely some variation in cognitive style with different preferences" on the MBTI (p. 962). "The correlations showed a positive association between intuition and cognitive integration and a nonsignificant tendency towards association with cognitive complexity" (p. 962). Their study also supported the hypothesis that there would be a "positive correlation between the Judging-Perceiving scales and the complexity and integration scores, as this scale reflects whether in general a person prefers judging (T-F) or perceiving (S-N) processes (p. 962). Thus, the research found that "basic differences in style of information processing and cognitive ability are inferred between different personality types" (p. 963).

The relationship between conceptual systems and psychological types was examined by Carskadon and Knudson (1978). Their analysis showed significant findings on the Sensing-Intuition scale of the Myers-Briggs, "such that markedly higher proportions of sensing types were found in the lower conceptual systems while much higher proportions of intuitive types were found among the higher conceptual systems" (p. 485), confirming the main hypothesis of their study. "This is exactly what would be expected given the concrete-abstract dimension on which the conceptual systems are based (p. 486).

The MBTI in Relation to Reading and Preference for Information

No evidence as yet links MBTI personality types per se with preference for a specific type of reading material. However, some research does support the premise that cognitive style/personality type as determined by other similar instruments as bearing upon choice of reading material.

Reading specialist G. D. Spache (1976a, 1976b) proposed that reading was an extension of personality. However, Spache focused upon poor readers, hoping to determine why some children have reading difficulties.

Millott and Cranney (1976) state that their study "recognizes the research literature [Spache's] and the generally accepted belief that some relationship does exist between reading and personality" (p.335). In this study of personality correlates of college reading and study skills, they found a "very low but because of large sample size significant correlations ($p < .001$) between paragraph comprehension and preference for MBTI personality type of Intuition, Introversion, and Perception" (p. 336).

In light of a previous study reporting much higher correlations using the MBTI and a different reading test and other supportive research literature relating reading and personality, the experiments concluded that the overall hypothesis received some support. The findings indicate that there is a relationship, albeit a weak one in this study, between the reading situation and what he obtains from reading (p. 336).

Miller and Tobacyk (1987, p. 561) using Holland's personality typology found a correspondence between personality type and magazine selection. In their study popular magazines were classified under the six respective Holland personality types: Realistic (Field & Stream or Sports Illustrated); Investigative (Science Digest or Omni); Artistic (National Geographic or House Beautiful); Social (Psychology Today or People); Enterprising (Money or Forbes); and conventional (Reader's

Digest or Prevention). The types are also found in the Strong Interest Inventory.

Several studies support a correlation of Holland's types based upon his Self Directed Search scales with the MBTI.

Nord's (1976) study of undecided students (N=80) indicates that the scales of the Myers-Briggs Type Indicator (MBTI) are correlated with the SDS scales in predictable directions. For example, Artistic correlates with -.46 with Sensing, .26 with Intuition, -.41 with Judgment, and .38 with Perception. In contrast Conventional correlates .34 with Sensing, -.20 with Intuition, and -.20 with Perception (Holland, 1985, p. 66).

Stricker and Ross (1964) studying "Some Correlates of a Jungian Personality Inventory" further supported a correlation between the scales of the MBTI and Holland's typology as measured by the Strong Vocational Interest Blank.

Another link, although a somewhat weak one, between personality variables and selection of reading material was supported by Saper and Forest (1987). Research about cognitive style as a predictor of media use was conducted by Furse and Greenberg (1975).

Reading materials can be thought of as information per se, in addition to classifying the information by its physical form, such as a book or magazine, or by content such as self-help or scientific information. Some research in the area of management indicates that managers and workers with differing cognitive styles show preferences in both the type of information, as well as the amount of information, they use in making decisions. Blaylock and Reese (1984) concluded that information preference does differ by the MBTI cognitive styles. Sensing types in the study had difficulty with less than optimum amounts of information when making merger/acquisition decisions. "Analysis of merger/acquisition venture is essentially an intuitive task - that is, an unstructured, decision requiring projections of future possibilities, examination of uncertain information, and novel problem-

solving processes" (p. 84). They reported:

Specifically, we conclude that cognitive style influences a decision maker's evaluation of an unstructured, strategic-planning project. Just as importantly, differences in prepared information sets can be explained in terms of Jung's theory of psychological type and can be measured by Larcker and Lessig's importance of information construct (p. 87).

Kern and Slocum (1981) looked at the usefulness of the MBTI in understanding the decision-making process. They noted that "intuitive types and feeling types do differ in their information preference with the principal difference being that thinking types prefer more objective, quantitative data than feeling types" (p. 132). Thinkers relied on logical structures to clarify situations, objectively organized and weighed facts, and when confronted with an unstructured problem, "solicited data that were highly congruent with their personalities as measured" by the MBTI (p.134).

Cognitive Style as It Relates to Success in Science Courses and Choice of Career in the Sciences

The Myers-Briggs has been used extensively in educational research to determine preference for and success in various courses of study, as well as in choice of careers. Much of this work on careers has focused upon the ministry, the hard sciences and psychology.

Baker (1985) in studying the attitude of middle school students to science found that there was a correlation between three factors - attitude toward science, cognitive ability and personality - to science achievement in classes.

Baker writes:

A review of the research literature in science education indicates that individuals found in science have the following personality, values, attitudes, interests and abilities.

Their personality is characterized by an interest in ideas rather than people or the world, a tendency toward introversion, creativity, and intuitiveness. Individuals with the scientific personality are also logical and analytical. They prefer order and have an aesthetic appreciation of the world. Cognitive skills include good spatial ability . . . and good mathematical ability . . . and they have a positive attitude toward science (p. 104).

Using the MBTI he concluded that:

Subjects with the most positive attitudes toward science were more intuitive and introverted, factors associated with science, than subjects with strongly negative attitudes toward science (p. 110).

Hart (1982) questioned if theoretical and methodological orientation were expressions of psychology majors' personalities. He concluded that they were. His studies found that: " 'objectively oriented' psychology majors tended to score high on Sensing on the Myers-Briggs, while 'subjectively oriented' psychology majors tended to score high on Intuition" (p. 795).

An 'objective' orientation in psychology is related to high scores on Extraversion, Sensing, Thinking, and Judging. Conversely, a high score on 'subjectivism' is likely to be found by persons having high scores on the Myers-Briggs Type Indicator on Introversion, Intuition, Feeling, and Perceiving. This generally agrees with Coan who equates objectivism with Sensing-Thinking types and subjectivism with Intuitive-Feeling types (p. 800).

The "objectively oriented" psychologist will prefer to "stick close to the facts, is behavioral, and chooses to reduce terms to physical referents" (p. 800).

Using the MBTI as a predictor of success in high school science classes, Reynolds and Hope (1970) found that "the intuition (S-N) scale provided consistent indication of typological differences moderating performance" in science courses (p. 711).

In the study, introverts "had the edge on science achievement criteria over extraverts," while "intuitors demonstrated a major advantage over the sensors both

in science achievement and in the other intellectual variables (GPA, IQ)" (p. 715).

We do expect potential scientists to be interested in concepts, ideas; we expect them to step beyond the input of our five senses; we want them to be objective, logical; and we expect them to be aware of new possibilities, to be able to adapt to changes, to be flexible. Apparently this described the advanced group (p. 716).

The manual and guide to the development and use of the Myers-Briggs Type Indicator contains descriptions and results of numerous studies that have been conducted using the MBTI. The guide indicates that science is the one academic subject preferred by all the NT types: the INTJ, the INTP, the ENTP, and the ENTJ types. Thus it would seem that the Intuitive (N) and the Thinking (T) scales are most important in determining preference for science subjects in school.

While all areas of study, as well as professions and jobs, have people with a wide range of cognitive styles or personality types in them, research has shown that certain types prefer specific fields of study and work. Students in the Sensing (S) and Feeling (F) categories prefer mathematics and practical skills courses. The types preferring both mathematics and practical skills are: ISTJ, ISTP, ESTP, and ESTJ types, with ISFJ and ISFP types favoring only practical skills courses and ESFJ favoring mathematics.

Cognitive Styles of Scientists

Ian Mitroff conducted a four-year extensive study of "forty-two of the most prestigious scientists who studied the Apollo moon rocks" (Mitroff & Kilman, 1978, p. 20). In this study he pondered these scientists' work in relation to their cognitive styles and in relation to their propensity for convergent or divergent thinking.

Mitroff's study revealed intense differences between the way scientists approach their work. Even more important, it revealed that scientists themselves are aware of such differences, often think about them, and

some have even constructed operationally significant typologies of their own (p. 20).

Mitroff and Kilman (1978) discussed Mitroff's original studies, as well as other researchers' studies and essays about scientists' work styles in their book, Methodological Approaches to Social Science (1978). In this book Mitroff defined scientists' research styles by C. G. Jung's psychological types. Under the Jungian typology framework, scientists were classified as (1) the Conceptual Theorist - Intuitive-Thinking; (2) the Conceptual Humanist - Intuitive-Feeling; (3) the Particular Humanist - Sensing-Feeling; and (4) the Analytical Scientist - Sensing-Thinking (p. 30-31).

Mitroff saw each type of scientist as approaching his work with a different orientation based upon the Sensing-Intuitive, and the Thinking-Feeling scales. Under Jungian typology theory, the first dimension (S-N) is informational, indicating an "individual's preference for kinds of input data characteristically sought from the world, either the world external to the individual or from the inner world" (p. 24). The second dimension (T-F) is the decision-making function.

In Mitroff's book, Sensing is described as a preference for "hard and realistic facts with regard to any matter" and an attention "to the details and specifics of any situation." These scientists are practical and "are concerned with what is feasible in the immediate present, not with vague plans for some unspecified future" (p. 24-25).

Intuition is seen as a preference for taking in information through the imagination and seeing the whole, the gestalt, of any situation. These scientists prefer hypothetical situations to actual facts and tend to be idealists. "They are not oriented to the immediate present of the 'here and now,' but prefer instead to use their imagination to take a broad, long-range view of any situation." They prefer "what might be" rather than "what is" (p. 25).

Thinking is "the process, of reaching a decision based upon impersonal, formal or theoretical modes of reasoning," while Feeling is the process of "reaching a decision based on personalistic value judgments that may be unique to the particular individual" (p. 25-26).

Cognitive Style as a Marketing Variable

This dissertation study proposes that individuals of particular personality types or cognitive styles will prefer specific types of reading materials, such as scientific information with either a theoretical or a practical emphasis.

Research cited in this paper supports the idea that different cognitive types show specific preferences for varying types of and amounts of information, as well as for reading material. However, other research has determined that media use and cognitive style are associated.

A number of researchers have done factor analyses of television-show watching and magazine-readership patterns . . . with different degrees of complexity or prediction used (Urban, 1980, p. 74).

Furse and Greenberg (1975) have conducted research that has shown cognitive style is related to mass media consumption. "Cognitive style segments do not discriminate any of the advertising response or product usage measures, but do serve to discriminate mass media consumption" (p. 42). In their research examining cognitive style as a segmentation variable, they found that one particular cognitive style, as determined by their self-constructed instrument, appeared to have a print media orientation, particularly for magazines, while another cognitive segment preferred television. In addition, they determined that the basic presentation style of magazines read regularly by one cognitive style segment appealed to their "relational and difference modes" of information processing (p. 43).

As they explain it: "cognitive style attempts to describe the manner in which an individual searches for meaning. It is defined as three multivariate sets of influence on cognitive activity - propensity to use certain senses and symbolic forms, orientation to different cultural roles, and propensity to reason in different ways" (p. 40).

They report that previous research has shown that similarity of cognitive style is an important factor affecting the evaluation of job and classroom performance of others, and that students with similar cognitive styles were found to make similar choices of curriculum.

They contend that "while the attitude construct is undoubtedly much richer in describing the whole milieu of feelings, beliefs, and behavior relating to specific products, cognitive style is presumed to offer a better predictor of information seeking behavior in the marketplace" (Furse & Greenberg, 1975, p. 40). Cognitive style, unlike attitude, "is not a substitute for thinking but rather defines the preferred cognitive strategy to be employed. . . . Detecting audience cognitive style for predicting information seeking behavior in the market deserves exploration" (p. 44).

Millott and Cranney (1976) state that their study "recognizes the research literature and the generally accepted belief that some relationship does exist between reading and personality" (p. 335). Their work found a significant correlation between paragraph comprehension and the Myers-Briggs personality types of Intuition, Introversion, and Perception.

Based upon an examination of previous research, the use of cognitive style and personality type to differentiate between readers of specific types of science information, between science magazines, and between readers of a particular magazine, such as the various general interest, popular science magazines, would seem possible.

CHAPTER 4

HYPOTHESES

RESEARCH QUESTION

Previous research has shown that cognitive styles can determine which magazine a reader will prefer. It has shown that cognitive styles influence the acquisition of information, as well as the amount of information desired for decision-making. But can cognitive style influence the preference for different types of information or the manner in which it is presented?

The research question for this study asks: Does cognitive style influence preference for science information?

The hypotheses listed below will ask more specific questions about preference for science information based upon the tendencies of the four cognitive types to prefer different ways of gathering information from their environment, as well as their particular patterns of ordering information in their minds.

DEFINITIONS OF COGNITIVE TYPES USED IN HYPOTHESES

The hypotheses for this study focus upon the Sensing-Intuitive and the Thinking-Feeling Scales of the Myers-Briggs Type Indicator.

Sensing and Intuitive Types

Sensing types use their sensing functions, their eyes, their ears and other senses, to find out about what is happening. They appreciate the realities of situations and are realistic and practical. Sensing types tend to accept and work with what is a "given" in the here and now. They are "good at remembering and working with a great number of facts" (Myers, et al., 1989, p. 5).

Intuitive types find out information through intuition, which shows "the meanings, relationships, and possibilities that go beyond information from [the] senses." They also look "at the big picture and [try] to grasp the essential patterns." Intuitors are "expert at seeing new possibilities and new ways of doing things. Intuitive types value imagination and inspirations" (Myers, et al., 1989, p. 5).

Intuitive types prefer to perceive the world more indirectly and with greater use of the unconscious. Emphasis is placed on the ideas, associations, and possibilities implicit in the things perceived, as Intuitive types prefer to go well beyond the concrete facts at hand (Carskadon & Knudson, 1978, p. 484).

Thinking and Feeling Types

Thinking types look for "logical consequences of any particular choice or action." Thinking requires deciding objectively, on the basis of cause and effect, in making decisions by analyzing and weighing the evidence, including unpleasant facts. Thinkers seek an objective standard for truth and are good at analyzing what is wrong with something (Myers, et al., 1989, p. 6).

Feeling types, however, decide through their feelings by considering what is important to themselves or to others, without requiring that it be logical. Thus, decisions are made on the "basis of person-centered values." Rather than weighing facts when making a decision, the feeling type asks himself how much he cares about each of the alternatives, or how much personal investment he has in each. "Those with a preference for feeling like dealing with people and tend to become sympathetic, appreciative, and tactful" (Myers, et al., 1989, p. 6).

HYPOTHESES

Hypothesis 1: Objective Data/Personal Warmth

Thinking types prefer to assess situations and information objectively through impersonal analysis, while **Feeling types** rely on the subjectivity of personal warmth as an indicator evaluating situations with person-centered values.

Hypothesis 1A predicts that Thinking types, in comparison to Feeling types, will prefer Science 1 Article A, which emphasizes objective data.

Hypothesis 1B predicts that Feeling types, in comparison to Thinking types, will prefer Science 1 Article B, which emphasizes personal warmth and people.

Hypothesis 2: Details/Generality

Sensing types tend to rely mainly on facts to assess a situation or problem, usually preferring the greatest number of facts possible on which to base a decision, while **Intuitive types** prefer to work with fewer facts, combining a few known facts with intuition, valuing insight.

Hypothesis 2A predicts that Sensing types, in comparison to Intuitive types, will prefer Science 2 Article A, which emphasizes a large number of specific facts and details about a subject.

Hypothesis 2B predicts that Intuitive types, in comparison to Sensing types, will prefer Science 2 Article B, which emphasizes few specific facts or details, and is more general in nature, emphasizing the "big picture."

Hypothesis 3: Present/Future

Sensing types tend to prefer to deal with the present and the immediate application of technology, a process or procedure, while **Intuitive types** look to the

future, imagining possible uses for such processes and procedures.

Hypothesis 3A predicts that Sensing types, in comparison to Intuitive types, will prefer Science 3 Article A, emphasizing immediate uses in the present.

Hypothesis 3B predicts that Intuitive types, in comparison to Sensing types, will prefer Science 3 Article B, which emphasizes conjecture and possibilities in the future.

Hypothesis 4: Concrete/Theoretical

Sensing types tend to be highly practical, focusing upon actual uses of technology, processes, or procedures, while **Intuitive types** look for truths not yet known, and abstract, theoretical relationships.

Hypothesis 4A predicts that Sensing types, in comparison to Intuitive types, will prefer Science 4 Article B, which emphasizes an actual, concrete application, and describes a proven medical concept and theory already in use.

Hypothesis 4B predicts that Intuitive types, in comparison to Sensing types, will prefer Science 4 Article A, which emphasizes possible uses, and describes an abstract, theoretical concept or theory.

Hypothesis 5: Practical/Impractical

Sensing types tend to be highly practical, focusing upon actual uses of technology, processes, or procedures, while **Intuitive types** look for truths not yet known, and abstract, theoretical relationships.

Hypothesis 5A predicts that Sensing types, in comparison to Intuitive types, will prefer Science 5 Article A, which emphasizes a practical, concrete application.

Hypothesis 5B predicts that Intuitive types, in comparison to Sensing types, will prefer Science 5 Article B, which emphasizes an impractical method or procedure.

CHAPTER 5

METHODOLOGY

SAMPLE

One hundred ninety students enrolled in three separate sections of an "Introduction to Mass Communications" course participated in this study. Two sections of the three courses were designated for students majoring in disciplines other than mass communications. These were students who elected to take a mass communication course to satisfy general studies requirements for an undergraduate degree at this southeastern state university with 15,000 students.

One section of this class was the first course students would take if majoring in any of the three mass communication areas of broadcasting, journalism, or recording industry management. All the classes use the same text and are basically the same course.

Of the original 190 students who chose to participate in the study, 174 completed both the Myers-Briggs Type Indicator and the stimulus materials, a booklet of science articles. Those 15 students who did not complete both activities were deleted from the sample. Of these, five students did not complete the Myers-Briggs, nine did not complete the science articles and one did not complete either the MBTI or the science articles.

The 174 students who completed the activities were divided into either Sensing or Intuitive types, while the same 174 were also classified as either Thinking or Feeling types. Of the 174, 98 were typed as Sensing, with the remaining 76 Intuitive types. Ninety-one of the 174 were typed as Thinking and 83 as Feeling.

Of the 174 participating, 55 percent were classified as non-majors, with these respondents representing 36 majors, with 45 percent classified as mass

communication majors. While the students were predominantly freshmen and sophomores, 32 percent and 33 percent respectively, some juniors (22 percent) and seniors (13 percent) were also enrolled in the course. The age of respondents ranged from 17 to 50 years of age; the median age for students participating in the study was 22 years. Thus approximately 78 percent were between the ages of 17 to 22 years of age, with 22 percent non-traditional students 23 to 50 years of age. Of the 174 respondents, 58 percent were male and 43 percent were female.

The number of cases was reduced when scores at the median and below on each of the four scales of Thinking, Feeling, Sensing and Intuitive were deleted, netting the students who could be described as "clear" and "very clear" in their cognitive styles. Using only those scores above the median reduced the number of total cases to 87 Sensing and Intuitive types, and 82 Thinking and Feeling Types.

Because this deletion of scores left only those students with high scores on the continuous scales, they were labeled with the adjective "high" to denote that the groups were composed of the high scoring subjects. This also served to differentiate them from the original total population of the 174 subjects. On the High Sensing-Intuitive scale, 49 were classified as High Sensing, with 38 as High Intuitive. On the High Thinking-Feeling scale, 45 were classified as High Thinking, with 37 as High Feeling.

Of the 87 High Sensing-Intuitive cases, 33 percent were freshmen, 33 percent were sophomores, 18 percent were juniors, and 15 percent were seniors. Approximately 75 percent were from 18-22 years of age, with the remaining 25 percent ranging in age from 23 to 44 years of age. Fifty-six percent were males, with 44 percent females. On the High Sensing-Intuitive scale, 46 percent were majors and 54 percent non-majors.

Of the 82 High Thinking-Feeling cases, 37 percent of the students were

freshmen, 28 percent were sophomores, 24 percent were juniors, and 11 percent were seniors. Approximately 74 percent ranged in age from 18 to 22 years of age, with the remaining 26 percent from 23 to 44 years of age. Approximately 59 percent were males, with 42 percent females. On the High Thinking-Feeling scale 44 percent were mass communication majors, with 56 percent non-majors.

TESTING MATERIALS

The testing materials consisted of packets containing four activities: a student demographic survey form, the Myers-Briggs Type Indicator Form F (Briggs & Myers, 1976), a booklet with five pairs of medical news stories, and the Need for Cognition scale (Cacioppo & Petty, 1982). To minimize presentation effects, the packets were divided into three groups for distribution: in each group the order of the three test activities was reversed, so that every third student would begin and end with a different activity.

The student demographic form asked the usual demographic questions about age, sex, race, major field of study, class standing, and grade point average. Name or student identification number was not requested. (See Appendix A).

The Myers-Briggs Type Indicator Form F, the form of this instrument designated for research purposes, was given to determine the cognitive type for each student. This form of the self-report instrument has 166 multiple choice items.

The Need for Cognition scale was also given to the group at the same time as the other dissertation materials, although it will not be used in the dissertation. The data gained from it will be used in a research article at a later date.

The stimulus materials, constructed specifically for this dissertation research, was a booklet of medical new stories. The booklet contained five pairs of medical news stories, with each pair representing two versions of the same story. However,

rather than use several different topics, only one science topic, that of medical news, was used in order to hold constant the variable of science information.

The booklets consisted of five sheets of paper stapled together. Each page had two versions of the same news story on it, printed in columns just as it would appear in the newspaper. The two versions were placed side-by-side on the page.

Medical news was chosen because readership studies indicate that most people, regardless of gender, education or income, will read medical news. By presenting a topic most everyone likes to read about, the problem of a confounding variable in the form of preference for a specific topic, such as archaeology or astronomy, was removed. (See Appendix B).

The articles were based upon actual news stories that had appeared in the Vanderbilt University Medical Center's weekly tabloid newspaper, the VUMC Reporter, (Cramer, 1991a & 1991b; Neel, 1991; Poston, 1991; & Williams, 1991). However, many facts and names in the stories were changed and the articles generally re-written in order to fit the specific points in the hypotheses they were to test. To eliminate bias resulting from students reacting to the well-known name of Vanderbilt University, the name of the medical center was changed to "Polk University Medical Center."

Each hypothesis was written in accordance with the description of the four Myers-Briggs types of Sensing, Intuitive, Thinking, and Feeling. The stories contained the type of information that each type should, hypothetically, prefer based upon the ways of knowing that each type prefers according to the Myers-Briggs manual.

As a validity check the stimulus materials were pretested on 54 mass communication students using seven-point semantic differential scales; a different scale was used for each pair of stories. Students were presented with each pair of articles, side-by-side as they would be in the actual testing instrument. Below each

article was a scale with the end points designating the opposite emphasis of each pair of articles. For example, a scale with the description "objective data" at one end and "personal warmth" at the other was placed below each of the two articles used to test the first hypothesis. The pretest confirmed the dominant emphasis of each of the 10 articles. (See Appendix C).

DESCRIPTIONS OF COGNITIVE TYPES

The hypotheses for this study are based upon the descriptions of each of the four types of Sensing, Intuitive, Thinking and Feeling as described in the manual for the Myers-Briggs Type Indicator (Myers & McCaulley, 1985; Myers, 1980).

DESCRIPTIONS OF SCIENCE NEWS ARTICLES

Science 1 Articles A and B: Objective Data/Personal Warmth

This pair of news articles tests Hypotheses 1A and 1B. The concept of personal warmth in the hypotheses is defined as a subjective tone or emphasis as opposed to an objective tone. One news article emphasizes a particular patient helped by a medical procedure, i.e., the article emphasizes a specific person rather than anonymous and faceless numbers of patients or the medical procedure itself.

The news story, Science 1 Article A, which represents objective data and tone, is one which emphasizes a great number of faceless patients, referring to these in the third person.

Science 1 Article B emphasizes a more subjective tone by the use of a single patient's name and references to him in the second person, using personal pronouns. In addition, the article describes the manner in which the medical procedure has helped this one particular individual (Poston, 1991).

Science 2 Articles A and B: Details/Generalities

This pair of news articles tests Hypotheses 2A and 2B. The two are written with varying degrees of specificity, which in this case is operationalized as a number of specific facts and details as compared with more general information.

Science 2 Article A, emphasizing specific details, mentions both the brand name and chemical name of the new drug, gives exact percentages of patients it helps, and names the doctor introducing this drug at the Polk University Medical Center. This article also names the specific chemotherapy regimens whose side effects it alleviates and gives graphic information about these side effects.

Science 2 Article B, which represents generality, offers fewer details about the new drug, as well as the previous drugs used. It presents the "big picture," rather than detailed information about the new and old drugs. It refers to researchers in the third person, does not use the doctor's name, gives only general information about the side effects the drug alleviates (Cramer, 1991a).

Science 3 Articles A and B: Present/Future

Science 3 Articles A and B test Hypotheses 3A and 3B which refer to time frame, either something happening now or something to happen in the future.

For Science 3 Article A an actual living person is described taking a treatment in the hyperbaric chamber. The article emphasizes the present treatment uses for the chamber. All verbs are emphatic, definite and in the present tense.

Science 3 Article B describes a dummy which is being used to test the hyperbaric chamber for possible use in the future. Verbs such as "plan," "hope," and "envision" note possibilities for future uses (Cramer, 1991b).

Science 4 Articles A and B: Theoretical/Concrete

These news articles test Hypotheses 4A and 4B which emphasize concrete, actual references or theoretical, abstract references. While they seem similar to the Present/Future articles, the abstract, theoretical article emphasizes a research idea, an actual theory, that is being tested. Rather than referring to a piece of equipment being tested as in the "Future" article, Science 4 Article B refers to testing a hypothesis about the possibility that fat calories are stored more readily in the body than carbohydrate calories.

Science 4 Article A reports on an on-going research project and emphasizes the possibility of the researcher discovering a scientific "truth" about body metabolism. Verbs such as "might," "anticipates," "may," and "suggests" emphasize the tone of conjecture about a theoretical possibility. The article states that "the jury is still out" on the theory and that "no hard evidence exists as yet."

Science 4 Article B announces the actual discovery of the fat storage mechanism in the human body. Verbs are emphatic and definite in tone: the researcher "documents" the evidence; the fat calories "do indeed" have a tendency to be stored in the body more readily than carbohydrate calories; and this research project "has given us the answer." The tone is one of "a fait accompli" (Neel, 1991).

Science 5 Articles A and B: Practicality/Impracticality

Science 5 Articles A and B test Hypotheses 5A and 5B, both referring to practicality, in the context of a medical procedure being useful, the nature of being utilitarian. The concept of something being practicable or useful is operationalized to mean something of comparatively moderate cost; a procedure that works better than previous methods used; one which is safer and eliminates post-surgery complications; one which will benefit many people; and, using the cultural emphasis

on youth, a procedure which will benefit younger people, rather than older people, because younger people have longer lifespans ahead of them and are considered in themselves "more useful" to society.

Science 5 Article A emphasizes the practical aspects of the radiosurgery in regard to cost, efficiency, safety, recovery time, age of patients, and the number of patients benefiting from the new surgical technique.

Science 5 Article A emphasizes opposite qualities of the procedure: it costs no less than conventional surgery; recovery time is the same; it is not quite as safe as the scalpel surgery; and fewer patients and older patients will benefit from the procedure (Williams, 1991).

DATA ANALYSIS

MBTI Types as Categorical Data

Data analysis with the Myers-Briggs Type Indicator can be performed with categorical or continuous data. First, it must be remembered that the MBTI is not a test: it is an instrument which will identify types of individuals based upon their cognitive styles. The MBTI manual cautions against thinking of the type indicator as a test with right or wrong answers (Myers & McCaulley, 1985, p. 53): the answers chosen merely indicate a choice of, a preference for, a particular answer. Based upon those answers, the MBTI will classify individuals into categories in accordance with their preference for a style of thinking, their cognitive style.

Cognitive styles can be classified as categorical data and as dichotomous variables at the nominal level, such as a Sensing or Intuitive type, or as a Thinking or Feeling Type. Or these four types can be used together creating a dynamic relationship between the scales. Thus, a person can have a Sensing-Feeling or

Sensing-Thinking style or type; others might possess an Intuitive-Feeling or an Intuitive-Thinking style.

A person's style is determined by the number of points he or she scores on the Myers-Briggs instrument. These points are then converted to preference scores. An individual's tendency to choose a certain line of action can be associated with the magnitude of the subject's preference scores. These preference scores, one for each dominant scale, do not imply excellence, but rather this numerical portion of the MBTI results assumes strength of the preference. The manual to the MBTI explains that "a larger [preference] score simply means that the respondent, when forced to choose, is more clear about what he or she prefers" (Myers & McCaulley, 1985, page 58).

The manual suggests four levels of preference strength based upon those scores: slight, moderate, clear and very clear preferences. The suggested cutoff points for the different levels are "merely approximations," according to the manual.

MBTI Types as Continuous Data

For more complex data analysis, preference scores can be converted into continuous scores. For this study only the continuous Sensing-Intuitive and the continuous Thinking-Feeling scales are of interest. The Sensing-Intuitive scales and the Thinking-Feeling scales both range from 33 to 167.

The Sensing scores run from 33, the highest Sensing score, to 99, the lowest Sensing score; then continues from 101, as the lowest Intuitive score, to 167, the highest Intuitive score. The lower the continuous Sensing score, the stronger the Sensing preference, while the higher the continuous Intuitive score, the stronger the Intuitive preference. The same scoring range also applies to the Thinking-Feeling scale. Using a conversion table in the manual, one can turn points into preference

scores, then preference scores into continuous scores. One can mark the four preference strength levels on the continuous scales. (See Appendix D).

The manual states that larger preference scores indicate that "when an individual's preference scores are 21 through 39, [or at the corresponding continuous score] there is a reasonable probability that the respondent holds and acts on the reported preference" (Myers & McCaulley, 1985, p. 58).

The testing data showed that the highest continuous Feeling score for students in this study was 139, compared to the ceiling score of 167, while the highest continuous Intuitive score was 147. Given this difference of 20 to 28 continuous points in the top scores and the frequency of low scores, it seemed advisable to take only students with high scores, approximating the suggested Myers-Briggs preference levels of "clear" and "very clear," to study .

One hundred seventy-four students completed both the Myers-Briggs Type Indicator and the booklet of medical news stories. To select only those students with high scores to use in the data analysis, all the scores on each scale were deleted at and below the median score, leaving only the high scores, those above the median. After this process, the number of subjects was pared-down to 82 cases on the Sensing-Intuitive scale and 87 on the Thinking-Feeling scale. The procedure created new variables of High Sensing, High Intuitive, High Thinking, and High Feeling types.

Whether using the manual's suggested levels or selecting out subjects above the median, using only those students who have strong preferences increases the internal validity of the study.

STATISTICAL TESTS

Chi-Square Analysis

The five hypotheses were tested at the nominal level using a chi-square statistic. Only High Sensing, High Intuitive, High Thinking and High Feeling continuous scores above the median were used in the data analysis.

The chi-square analysis indicated the proportions of the types selecting either Article A or B for each of the pairs of articles. However, the chi-square tests were not able to indicate a relationship between cognitive type and choice information.

Given the results of the chi-square analysis, which indicated both significant and marginally significant levels, it seemed that more powerful statistical tests would be in order and would be more sensitive to the differences between the types and their preferences. Thus, the hypotheses were further tested at the interval level using a Pearson product-moment correlation and a two-way analysis of variance.

Pearson's Product-Moment Correlation

All five hypotheses were also tested with a Pearson's product-moment correlation coefficient on both the High Sensing-Intuitive scale and the High Thinking-Feeling scale. Since the chi-square analysis only gave the proportions of types choosing each article, the correlation was used to determine if a relationship existed between cognitive type and choice of articles.

The continuous scores were dummy-coded, with High Sensing represented by a "1," while High Intuitive was represented by a "2." Choices of Article A and B were also dummy-coded with "1" representing A, with "2" representing B. The correlations for the High Thinking and High Feeling scales were dummy-coded in the same manner.

Two-Way Analysis of Variance

Because a chi-square test of the various demographic factors indicated a level of significance at the $p < .05$ level for gender, a two-way analysis of variance test seemed in order to further test this relationship between the independent variables of cognitive type and gender, and the dependent variable of choice of article.

Each hypothesis was tested on both the High Sensing-Intuitive scale and the High Thinking-Feeling scale. All of the science articles were dummy-coded "1" for A and "2" for B. Gender was dummy-coded "0" for male and "1" for female, with High Sensing as "1" and High Intuitive as "2." High Thinking was "1" and High Feeling was "2."

Rationale for Dummy-Coding

Dummy coding was used to facilitate data analysis, maintaining a consistent coding through-out the three statistical tests.

The consistent use of dummy codes of "1" for all Article A's and "2" for Article B's, and the "1" for High Sensing and "2" for High Intuitive, and also for High Thinking and High Feeling, allowed an easily understood correlation. Means for the correlations specified the relationships between cognitive types and information. These means were obtained through a one-way analysis of variance.

In the two-way analysis of variance, the consistent dummy coding using "1's" and "2's" was also necessary to understand the means. As a cognitive type moved in the direction of Science 3 Article A, which is dummy-coded a "1" and emphasizes present tense in Hypothesis 3, it was much easier to see that a mean of 1.31 meant the choice was for the present-day article. A mean of 1.76 was definitely more in the direction of Science 3 Article B, a "2," emphasizing the future. Of course, level of

significance was the determining factor on significant differences, or lack thereof, on the ANOVA's.

Such coding for categorical data is often used in studies to code dichotomous variables such as gender, so that a correlation with continuous level data is possible. The computer automatically "assumes" that the categorical data is continuous and that there is "something" between the values of "1" and "2."

CHAPTER 6

RESULTS

HYPOTHESIS 1

RESULTS ON HYPOTHESIZED HIGH THINKING-FEELING SCALE

Hypothesis 1A predicts that Thinking types, in comparison to Feeling types, will prefer Science 1 Article A, which emphasizes objective data.

Hypothesis 1B predicts that Feeling types, in comparison to Thinking types, will prefer Science 1 Article B, which emphasizes personal warmth and people.

Chi-Square Analysis on the High Thinking-Feeling Scale

Hypotheses 1A and 1B, which were hypothesized along the High Thinking-Feeling scale, were confirmed at the $p = .004$ level of significance.

In comparing those selecting Article A, Thinking types were in the majority with 79.17 percent preferring Article A emphasizing objective data, while High Feeling types, at 20.83 percent, chose Article A. Thus the data supported H1A ($n = 24$).

In comparing the percentage of types preferring Article B emphasizing personal warmth, more High Feeling types, 55.17 percent, preferred Article B than did High Thinking types, 44.83 percent, thereby supporting H1B ($n = 58$).

In examining the percentage of High Thinking types choosing between Articles A and B, 42.22 percent chose Article A emphasizing objective data, while 57.78 percent chose Article B emphasizing personal warmth ($n = 45$). However, 86.49 percent High Feeling types, preferred Article B emphasizing personal warmth

and 20.83 chose Article A ($n = 37$). (See Table 6.1 for chi-square contingency table).

Pearson's Product-Moment Correlation on the High Thinking-Feeling Scale

Hypothesis 1A and 1B were confirmed ($p = .004$) when tested with a Pearson's product-moment correlation on the High Thinking-Feeling scale.

The correlation coefficient ($r = .31$) was significant at less than .05 with High Feeling types tending to choose Article B emphasizing personal warmth (mean = 1.86) as predicted in H1B, while High Thinking types preferred Article A with objective data (mean = 1.58), as predicted in H1A. (See Figure 6.1 for graphed correlation).

Two-Way Analysis of Variance on the High Thinking-Feeling Scale

Main Effect

A marginal level of significance ($p < .10$) was found when a two-way analysis of variance was used to test Science 1 Articles A and B for an interaction between cognitive type and gender. (See Table 6.2 for ANOVA means).

The ANOVA found a marginally significant main effect for gender ($p = .08$). The females in the study, both High Thinking and High Feeling, preferred Article B with personal warmth (mean = 1.88), while the study's males, both High Thinking and High Feeling, preferred Article A emphasizing objective data (means 1.58). (See Figure 6.2 for graphed main effect).

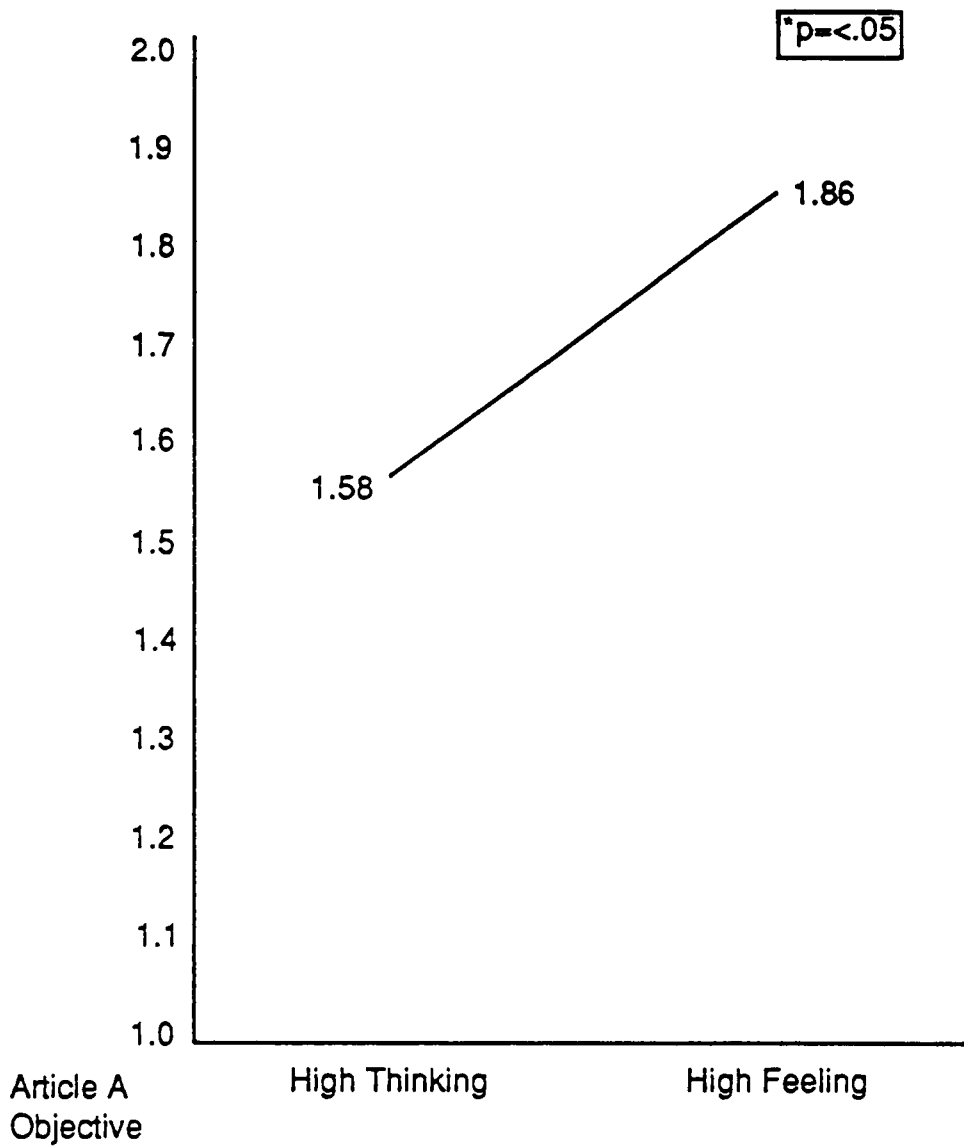
Main Effect

The difference in means for High Thinking types (mean = 1.58) and High Feeling types (mean = 1.86) was not significant ($p = .12$). However, it appeared that the Thinking types preferred Article A with objective information, while Feeling types preferred Article B with the personal warmth.

Table 6.1
Chi-Square Analysis of Science 1 Articles on High Thinking-Feeling Scale

*p<.05			
Frequency Percent Row Pct. Col. Pct.	Article A Objective	Article B Personal Warmth	<u>Total</u>
High Thinking	19 23.17 42.22 79.17	26 31.71 57.78 44.83	45 54.88
High Feeling	5 6.10 13.51 20.83	32 39.02 86.49 55.17	37 45.12
Total	24 29.27	58 70.73	82 100.00
*p=.004 DF=1			

Article B
Personal
Warmth



Article A
Objective

Cognitive Type
 $r=0.31$
 $*p=.004$

Figure 6.1
Science 1 Articles on High Thinking-Feeling Scale
Correlation Means for Cognitive Type

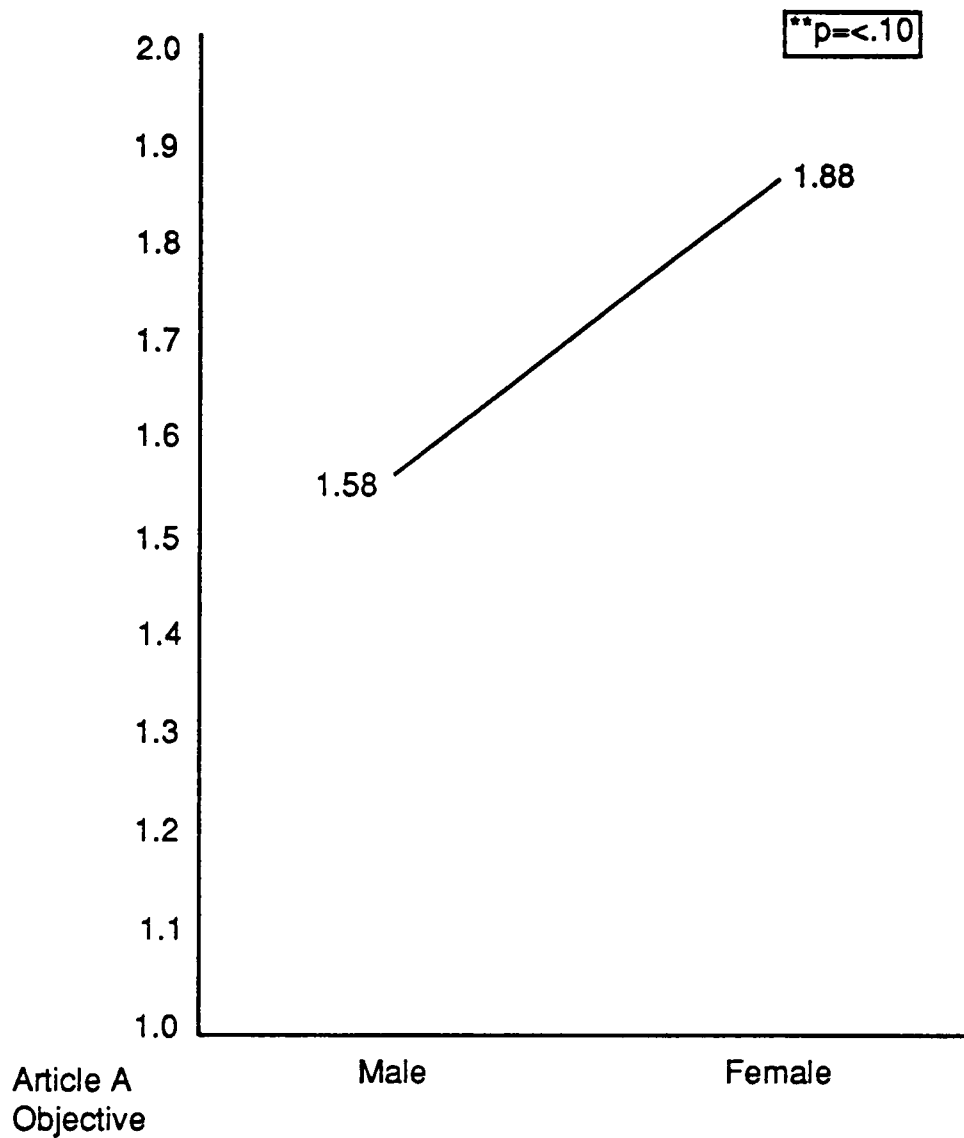
Table 6.2
Means for Two-Way Analysis of Variance of Science 1 Articles A and B

Type / Gender	N	Mean	S.D.	P.
<u>Thinking-Feeling Scale</u>				
Feeling	37	1.87	0.347	.12
Thinking	45	1.58	0.499	
Female	34	1.88	0.327	**.08
Male	48	1.58	0.498	
Feeling Female	26	1.92	0.272	.95
Feeling Male	11	1.73	0.467	
Thinking Female	8	1.75	0.463	
Thinking Male	37	1.54	0.505	
<u>Sensing-Intuitive Scale</u>				
Intuitive	38	1.61	0.495	.6
Sensing	49	1.71	0.456	
Female	38	1.84	0.369	*.003
Male	49	1.53	0.504	
Intuitive Female	13	1.85	0.376	.59
Intuitive Male	25	1.48	0.509	
Sensing Female	25	1.84	0.374	
Sensing Male	24	1.58	0.504	

*p < .01

**p < .10

Article B
Personal
Warmth



Article A
Objective

Gender
 $**p = .08$

Figure 6.2
Science 1 Articles on High Thinking-Feeling Scale
Main Effect for Gender

Interaction

The interaction between cognitive style and gender was not significant ($p = .95$). The means suggest that Feeling Females preferred Article B with personal warmth (mean = 1.92), while Feeling Males (mean = 1.73) and Thinking Females (1.75) also preferred personal warmth. Thinking males, however, preferred the objective data of Article A (mean = 1.54).

RESULTS OF SCIENCE 1 ARTICLES TESTED ON THE NON-HYPOTHESIZED HIGH SENSING-INTUITIVE SCALE

Chi-Square Analysis on the High Sensing-Intuitive Scale

Although not hypothesized along the High Sensing-Intuitive scale, Science 1 Articles were also tested with a chi-square on this scale. The result was not significant ($p = .29$). (See Appendix E).

In comparing High Sensing with High Intuitive types, they were almost evenly divided over Article A emphasizing objective data, with 48.28 percent High Sensing types and 51.72 High Intuitive types choosing Article A ($n = 29$).

However, more High Sensing types, 60.34 percent, than High Intuitive types, 39.66 percent, chose Article B with personal warmth ($n = 58$).

Looking at the number of High Sensing types across Article A and B, the majority of High Sensing types, 71.43 percent, selected the personal warmth of Article B to the 28.57 percent selecting Article A with objective data ($n = 49$).

An examination of the High Intuitive types across Articles A and B found the majority of High Intuitive types, 60.53 percent, selecting the personal warmth of Article B to the 39.47 percent, who chose the objective data of Article A ($n=38$).

Pearson's Product-Moment Correlation on the High Sensing-Intuitive Scale

A correlation test of the data along the High Sensing-Intuitive scale was not significant ($p = .29$), with a negative correlation ($r = -0.11$). There was no significant difference between the choices of High Sensing types (mean = 1.71) and High Intuitive types (mean = 1.61), both types preferred Article B emphasizing personal warmth.

Two-Way Analysis of Variance on the High Sensing-Intuitive Scale

Main Effect

A significant main effect for gender ($p = .003$) was found in a two-way analysis of variance of the Science 1 Articles. (See Figure 6.3 for graphed ANOVA).

Females in the study strongly preferred Article B with personal warmth (mean = 1.84), while in comparison, the males preferred Article A emphasizing objective data (mean = 1.53). (See Table 6.2 for ANOVA means).

Main Effect

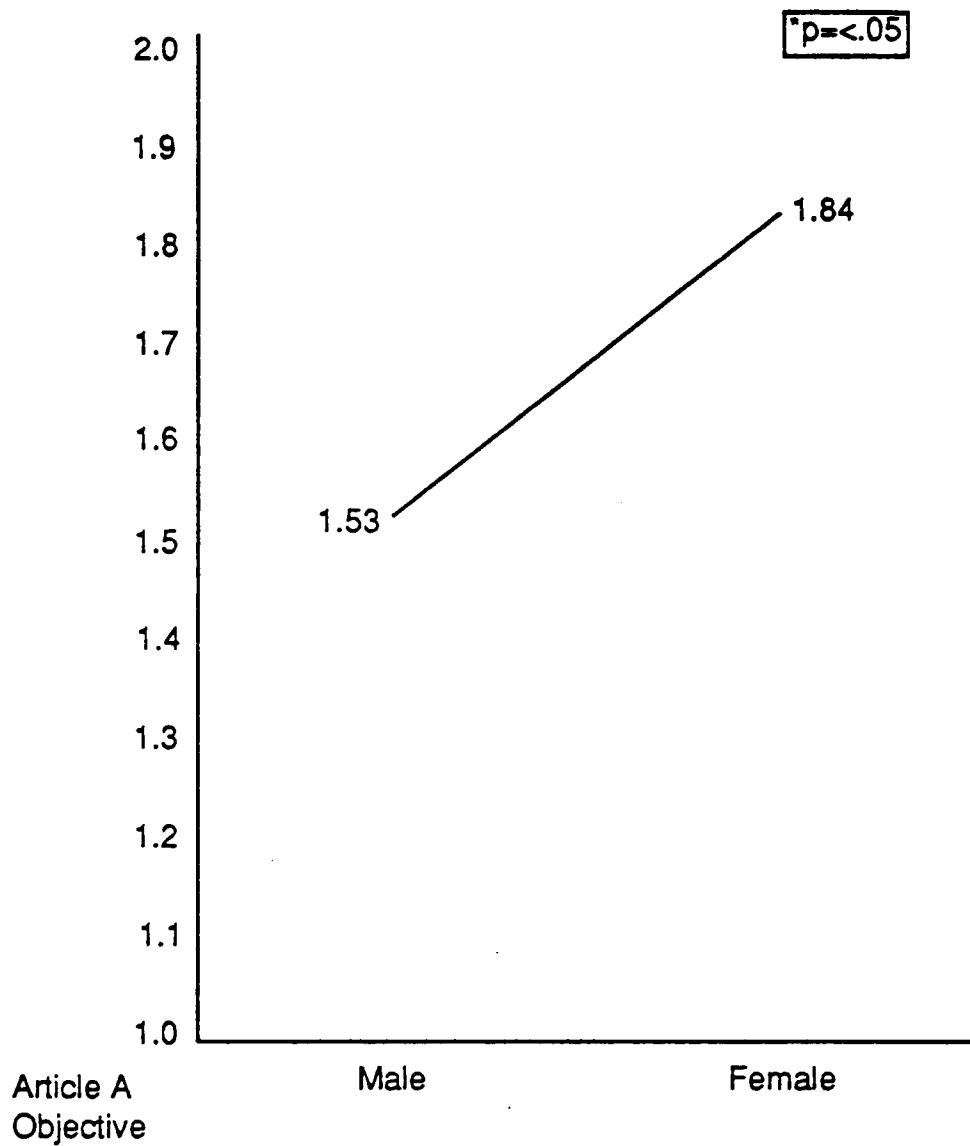
The data showed no significant difference between the choices of cognitive types ($p = .63$). In looking at the means for the High Sensing-Intuitive scale, High Sensing (mean = 1.71) preferred Article B, while High Intuitive (mean = 1.60) preferred Article A.

Interaction

The interaction between cognitive type and gender was not significant ($p = .59$).

In examining the interaction, both High Sensing and High Intuitive females preferred the personal warmth of Article B (means = 1.84 and 1.85, respectively), while High Sensing and High Thinking males preferred the objective data of Article A (means = 1.58 and 1.48, respectively).

Article B
Personal
Warmth



Gender
*p=.003

Figure 6.3
Science 1 Articles on High Sensing-Intuitive Scale
Main Effect for Gender

HYPOTHESIS 2

RESULTS ON HYPOTHESIZED HIGH SENSING-INTUITIVE SCALE

Hypothesis 2A predicts that Sensing types, in comparison to Intuitive types, will prefer Science 2 Article A, which emphasizes a large number of specific facts and details about a subject.

Hypothesis 2B predicts that Intuitive types, in comparison to Sensing types, will prefer Science 2 Article B, which emphasizes few specific facts or details, and is more general in nature, emphasizing the "big picture."

Chi-Square Analysis on the High Sensing-Intuitive Scale

Hypotheses 2A and 2B were confirmed at a marginal level of significance ($p = .08$), but the results were not in the expected hypothesized direction. (See Table 6.3 for chi-square contingency table).

Of the 48 students choosing Article A emphasizing details, High Sensing and High Intuitive types are almost evenly divided, with 47.92 percent High Sensing types and 52.08 percent High Intuitive types selecting the detailed article, contrary to H2A by a small margin.

However, twice as many High Sensing, 66.67 percent selected Article B with generalities as did High Intuitive respondents, 33.33 percent, also contrary to H2B ($n = 39$).

The High Sensing types were almost evenly divided between Articles A and B, 46.94 percent and 53.06 percent, respectively ($n = 49$), while the High Intuitive types showed a more definite preference for the details of Article A over the broad generalities of Article B, 65.79 percent to 34.21 percent, respectively ($n = 38$).

Therefore, a marginal level of significance is indicated by the small amount

Table 6.3
Chi-Square Analysis of Science 2 Articles on High Sensing-Intuitive Scale

**p<.10			
Frequency Percent Row Pct. Col. Pct.	Article A Details	Article B Generalities	<u>Total</u>
High Sensing	23 26.44 46.94 47.92	26 29.89 53.06 66.67	49 56.32
High Intuitive	25 28.74 65.79 52.08	13 14.94 34.21 33.33	38 43.68
Total	48 55.17	39 44.83	87 100.00
**p=.08 DF=1			

of difference between the High Sensing choosing Article B over A, and between High Sensing and High Intuitive types choosing Article A. All are opposite the expected hypothesized direction.

Pearson's Product-Moment Correlation on the High Sensing-Intuitive Scale

Hypothesis 2 using the High Sensing-Intuitive scale had a marginal level of significance ($p = .08$) with a negative correlation coefficient ($r = -0.19$), but in the opposite direction than H2 predicted.

In this negative correlation, High Sensing respondents preferred Article B with broad generalities (mean of 1.53), and High Intuitive preferred Article A with details (mean = 1.34), both contrary to H2A and H2B. The results were opposite to the expected hypothesized direction; therefore, Hypothesis 2 was not supported by the data. (See Figure 6.4 for graphed correlation).

Two-Way Analysis of Variance on the High Sensing-Intuitive Scale

No significant differences were found between the means of the two independent variables of cognitive type and gender on the two-way analysis of variance on the Science 2 articles on the High Sensing-Intuitive scale.

Main Effect

High Sensing types tended to select Article B with generalities (mean = 1.53), while High Intuitive types chose Article A with details (mean = 1.34), though the differences were not significant ($p = .11$).

Main Effect

Little difference existed between the males' mean of 1.41 and the females' mean of 1.50 ($p = .58$). The males were more in the direction of Article A preferring details, while the females preferred Article B with generalities.

Article B
Generalities

2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0

** $p < .10$

1.53

1.34

High Sensing

High Intuitive

Article A
Details

Cognitive type

$r = -0.18$

** $p = .08$

Figure 6.4

Science 2 Articles on High Sensing-Intuitive Scale
Correlation Means for Cognitive Type

Interaction

No interaction between cognitive type and gender was noted ($p = .98$). The means shows that High Intuitive males and females were more apt to select Article A with details (means of 1.32 and 1.38, respectively), while High Sensing males and females were more inclined to select Article B with generalities (means = 1.50 and 1.56, respectively). (See Table 6.4 for ANOVA means).

RESULTS OF SCIENCE 2 ARTICLES TESTED ON THE NON-HYPOTHESIZED HIGH THINKING-FEELING SCALE

Chi-Square Analysis on the High Thinking-Feeling Scale

Science 2 Articles were not hypothesized as Thinking-Feeling and the results of a chi-square analysis on this scale were not significant ($p = .76$).

In comparing those choosing Article A, more High Thinking types, 53.33 percent chose detailed Article A, than did High Feeling types, 46.67 percent ($n = 45$). However, more High Thinking types, 56.76 percent, also chose the more general Article B, than did High Feeling, 43.24 percent ($n = 37$).

In comparing the choices of the High Thinking types, a majority, 53.33 percent, chose detailed Article A, while fewer High Thinking types, 46.67 percent, chose the more general Article B ($n = 45$). More of the High Feeling types, 56.76 percent selected detailed Article A, compared to the 43.24 percent, who selected the more general Article B ($n = 37$). (See Appendix F).

Pearson's Product-Moment Correlation on the High Thinking-Feeling Scale

The Science 2 articles were not hypothesized along the High Thinking-Feeling scale and results of a Pearson's product-moment correlation on this scale

Table 6.4
Means for Two-Way Analysis of Variance of Science 2 Articles A and B

Type / Gender	N	Mean	S.D.	P.
<u>Thinking-Feeling Scale</u>				
Feeling	37	1.43	0.502	.62
Thinking	45	1.47	0.505	
Female	34	1.47	0.507	.61
Male	48	1.44	0.501	
Feeling Female	26	1.46	0.508	.83
Feeling Male	11	1.36	0.505	
Thinking Female	8	1.50	0.535	
Thinking Male	37	1.46	0.505	
<u>Sensing-Intuitive Scale</u>				
Intuitive	38	1.34	0.481	.11
Sensing	49	1.53	0.504	
Female	38	1.50	0.507	.58
Male	49	1.41	0.497	
Intuitive Female	13	1.38	0.506	.98
Intuitive Male	25	1.32	0.477	
Sensing Female	25	1.56	0.507	
Sensing Male	24	1.50	0.511	

were not significant ($p = .76$) with a negative correlation coefficient ($r = -0.03$).

There was no significant difference in the choices of the two types. Both High Thinking types (mean = 1.47), and High Feeling types (mean = 1.43) tended to select Article A with detailed information.

Two-Way Analysis of Variance on the High Thinking-Feeling Scale

No significant values resulted from a two-way analysis of variance on the High Thinking-Feeling scale (See Table 6.4 for ANOVA means).

Main Effect

A comparison of the cognitive types was nonsignificant ($p = .62$) with means of 1.47 for High Thinking types, and 1.43 for High Feeling types, indicating that both types selected Article A with detailed information.

Main Effect

Article choices by gender were also nonsignificant ($p = .61$), with females and males choosing Article A (means = 1.47 and 1.44, respectively).

Interaction

The interaction term of gender and cognitive type was not significant on the High Thinking-Feeling scale ($p = .83$) with each of the four types choosing the detailed information. High Feeling males chose Article A (mean = 1.36), while High Thinking males also chose A (mean = 1.46). High Feeling females selected the detailed Article A (mean = 1.46), as did the High Thinking females (mean = 1.50).

HYPOTHESIS 3

RESULTS ON HYPOTHESIZED HIGH SENSING-INTUITIVE SCALE

Hypothesis 3A predicts that Sensing types, in comparison to Intuitive types, will prefer Science 3 Article A, which emphasizes immediate uses in the present.

Hypothesis 3B predicts that Intuitive types, in comparison to Sensing types, will prefer Science 3 Article B, which emphasizes conjecture and possibilities in the future.

Chi-Square Analysis on the High Sensing-Intuitive Scale

Hypotheses 3A and 3B were not supported by the data ($p = .61$) and results were divided with only one-half in the hypothesized direction. The data show that more High Sensing types, 58.06 percent, chose Article A emphasizing the present, than did High Intuitive types, 41.94 percent, as was hypothesized in H3A ($n = 62$).

However, more High Sensing, 52.00 percent, also selected Article B emphasizing the future, than did High Intuitive types, 48.00 percent, contrary to H3B ($n = 25$).

In looking at the division of High Sensing types, the majority, 73.47 percent, chose Article A written in present tense, while 26.53 percent chose B, written in the future tense, as was predicted by H3 A($n = 49$).

Of High Intuitive types, 68.42 percent, also selected the present tense Article A, compared to the 31.58 percent choosing Article B, contrary to H3B ($n = 38$). (See Appendix E).

Pearson's Product-Moment Correlation on the High Sensing-Intuitive Scale

Hypothesis 3 was not confirmed by the Pearson product-moment correlation. For the High Sensing-Intuitive scale, the coefficient ($r = 0.06$) had a nonsignificant probability value of .61.

Both types tended to select the information in the present, rather than the future, with High Sensing types having a mean of 1.27 and High Intuitive types having a mean of 1.32.

Two-Way Analysis of Variance on the High Sensing-Intuitive Scale

Main Effect

A significant main effect for gender was found with a two-way analysis of variance on Hypothesis 3 ($p = .04$) on the High Sensing-Intuitive scale. (See Table 6.5 for ANOVA means). A comparison of the means indicates that females preferred Article A in the present (mean = 1.16), while males preferred Article B in the future (mean = 1.39). (See Figure 6.5 for graphed main effect).

Main Effect

An analysis of the cognitive types was not significant ($p = .79$) with means of 1.27 for High Sensing types and 1.32 for High Intuitive types.

Interaction

The interaction term also was not significant ($p = .40$) with High Sensing and High Intuitive females preferring Article A emphasizing the present (means = 1.12 and 1.23, respectively). The High Sensing males and High Intuitive males were less strongly pulled toward Article A. The means of 1.42 for High Sensing males and 1.36 for the High Intuitive males both indicate that the males were moving in the direction of Article B, preferring the future tense.

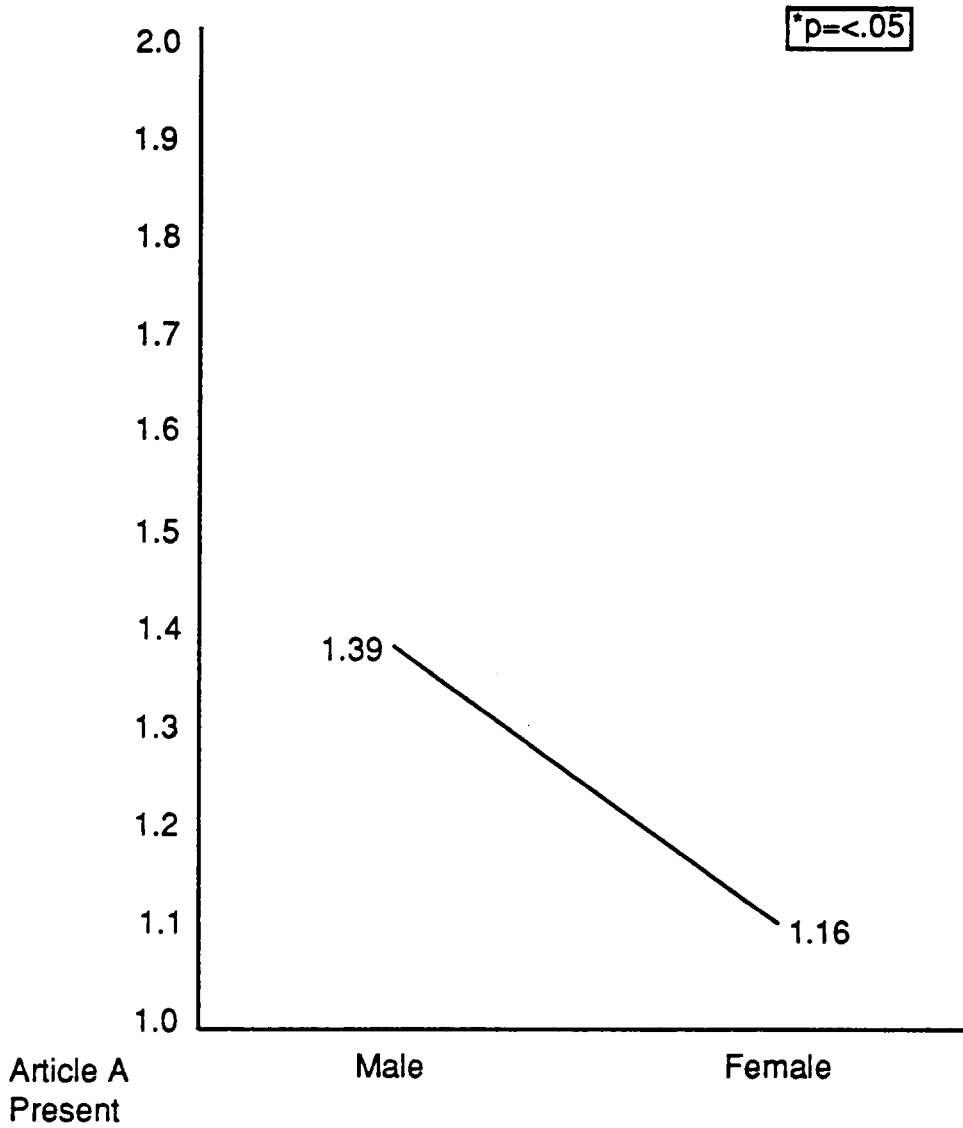
Table 6.5
Means for Two-Way Analysis of Variance of Science 3 Articles A and B

Type / Gender	N	Mean	S.D.	P.
<u>Thinking-Feeling Scale</u>				
Feeling	37	1.32	0.475	.19
Thinking	45	1.29	0.458	
Female	34	1.24	0.431	**.10
Male	48	1.35	0.483	
Feeling Female	26	1.31	0.471	.23
Feeling Male	11	1.36	0.505	
Thinking Female	8	1.00	0.000	
Thinking Male	37	1.35	0.484	
<u>Sensing-Intuitive Scale</u>				
Intuitive	38	1.32	0.471	.79
Sensing	49	1.27	0.446	
Female	38	1.16	0.369	*.04
Male	49	1.39	0.492	
Intuitive Female	13	1.23	0.439	.40
Intuitive Male	25	1.36	0.489	
Sensing Female	25	1.12	0.332	
Sensing Male	24	1.42	0.504	

*p < .05

**p ≤ .10

Article B
Future



Article A
Present

Gender
 $*p = .04$

Figure 6.5
Science 3 Articles on High Sensing-Intuitive Scale
Main Effect for Gender

RESULTS OF SCIENCE 3 ARTICLES TESTED ON THE NON-HYPOTHESIZED HIGH THINKING-FEELING SCALE

Chi-Square Analysis on the High Thinking-Feeling Scale

This hypothesis predicted results with the Sensing-Intuitive scale. When tested on the High Thinking-Feeling scale, the results were not significant ($p = .73$).

In comparing those selecting Article A, more High Thinking types, 56.14 percent, selected Article A emphasizing the present, than did High Intuitive types, 43.86 percent ($n = 57$). The High Thinking and the High Feeling types were almost evenly divided over Article B, 52 percent to 48 percent, respectively ($n = 25$).

In looking at the division of High Thinking types between Articles A and B, the majority, 71.11 percent, selected A, while 28.89 percent selected B ($n = 45$). However, the majority of High Feeling types, 67.57 percent, also chose Article A, as compared to the 32.43 percent who chose Article B ($n = 37$). (See Appendix F).

Pearson's Product-Moment Correlation on the High Thinking-Feeling Scale

On the High Thinking-Feeling scale, the results for Science 3 articles were not significant ($p = .73$) with a correlation coefficient of 0.04.

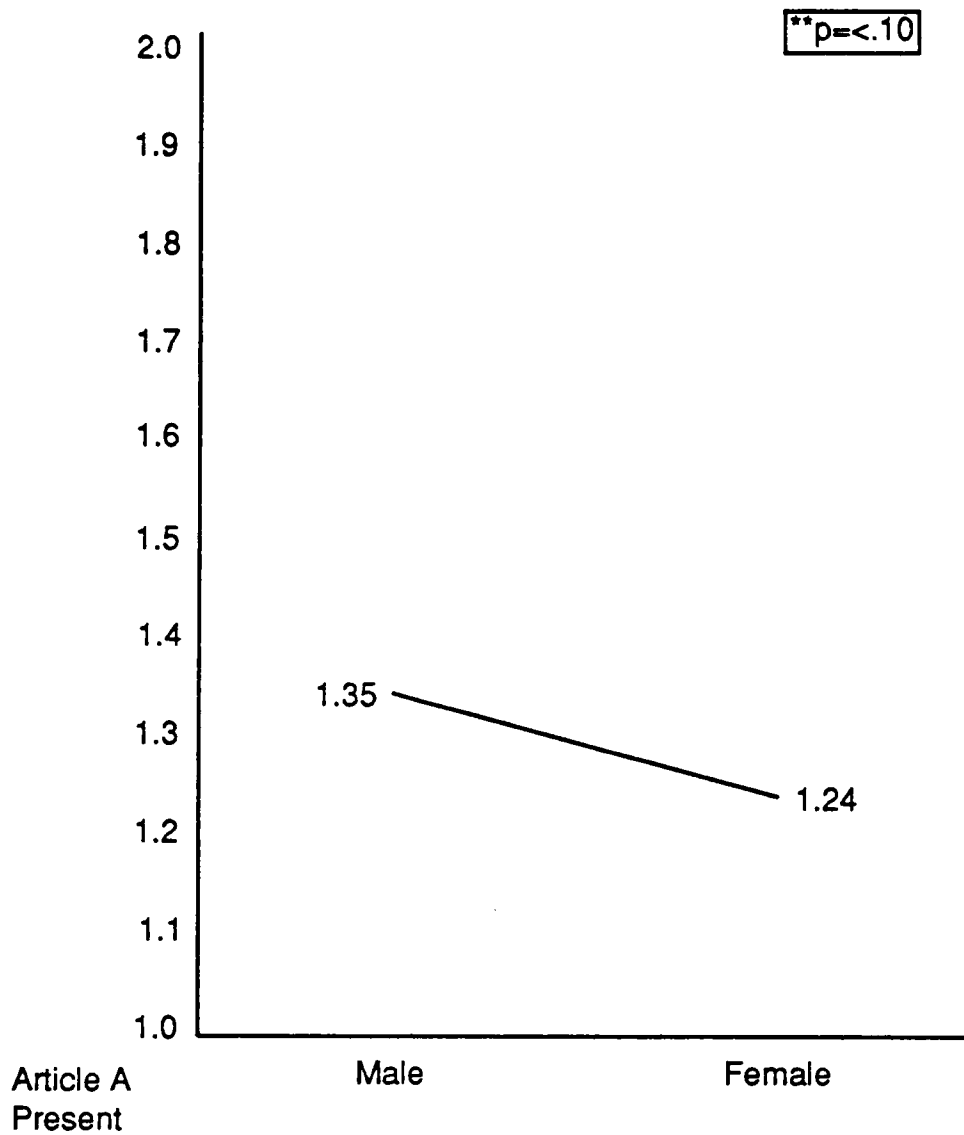
High Feeling types (mean = 1.32) and High Thinking types chose Article A in the present tense (mean = 1.29).

Two-Way Analysis of Variance on the High Thinking-Feeling Scale

Main Effect

A marginally significant main effect for gender ($p = .10$) was found with the two-way analysis of variance along the High Thinking-Feeling scale. (See Figure 6.6 for graphed ANOVA).

Article B
Future



Gender
****p=.10**

Figure 6.6
Science 3 Articles on High Thinking-Feeling Scale
Main Effect for Gender

A comparison of means in this test indicated that females preferred Article A emphasizing the present (mean = 1.24), while males were more in the direction of Article B, preferring the article emphasizing the future (mean = 1.35).

Main Effect

Cognitive type was not significant ($p = .19$) with a mean of 1.29 for High Thinking and 1.32 for High Feeling, both preferring Article A in the present.

Interaction

The interaction term was also not significant ($p = .23$) with High Thinking females' mean an exact 1.00, at the present tense information. The High Thinking males mean was 1.35, preferring future tense information.

Very little difference existed between the High Feeling males' and females' means, 1.36 and 1.31, respectively. Both preferred Article B in the future tense. (See Table 6.5 for ANOVA means).

HYPOTHESIS 4

RESULTS ON HYPOTHESIZED HIGH SENSING-INTUITIVE SCALE

Hypothesis 4A predicts that Sensing types, in comparison to Intuitive types, will prefer Science 4 Article B, which emphasizes an actual, concrete application, and describes a "proven" medical concept and theory already in use.

Hypothesis 4B predicts that Intuitive types, in comparison to Sensing types, will prefer Science 4 Article A, which emphasizes possible uses, and describes an abstract, theoretical concept or theory.

Chi-Square Analysis on the High Sensing-Intuitive Scale

Hypotheses 4A and 4B were not supported by the chi-square analysis on the High Sensing-Intuitive scale ($p = .76$).

Comparing the choices of theoretical information, more High Sensing types, 59.09 percent, selected A, contrary to H4B, than did High Intuitive types, 40.91 percent of whom chose A ($n = 22$).

In looking at those choosing Article B emphasizing concrete information, more High Sensing types, 55.38 percent, chose B, than did High Intuitive types, 44.62 percent. This is in the expected hypothesized direction for H4A.

In examining the choices of only High Sensing types, the majority of this type chose the suggested Article B emphasizing concrete information. Of the 49 High Sensing types, 73.47 percent selected B with concrete information, while 25.53 percent chose Article A with theoretical information. This was in line with H4A ($n = 49$).

However, the majority of the High Intuitive types also selected the concrete information in Article B, 76.32 percent to the 23.68 percent choosing Article A with theoretical information, contrary to H4B. Overall, both types tended to favor the concrete information. (See Appendix E).

Pearson's Product-Moment Correlation on the High Sensing-Intuitive Scale

The results of a Pearson product-moment correlation on the High Sensing-Intuitive scale was not significant ($p = .77$) with the correlation coefficient at 0.03. Hypothesis 4 was not supported by the correlation.

The data indicated that both types tended to favor the concrete information: the mean for High Intuitive types was 1.76, while the mean for High Sensing was 1.73.

Two-Way Analysis of Variance on the High Sensing-Intuitive Scale

Tested with a two-way analysis of variance, none of the three probability values were significant along the High Sensing-Intuitive scale (See Table 6.6 for ANOVA means).

Main Effect

High Sensing types and High Intuitive types selected Article B with concrete information (means = 1.73 and 1.76, respectively) with a probability value of .76

Main Effect

Females and males also preferred concrete information with means of 1.76 and 1.73, respectively ($p = .76$).

Interaction

The interaction term ($p = .83$) had the High Intuitive males' and the High Sensing males' means at 1.76, while the High Intuitive females' mean was 1.77. High Sensing females were in agreement with the others preferring the concrete information with a mean of 1.71. All four preferred the concrete information of Article B.

RESULTS OF SCIENCE 4 ARTICLES TESTED ON THE NON-HYPOTHESIZED HIGH THINKING-FEELING SCALE

Chi-Square Analysis on the High Thinking-Feeling Scale

A chi-square analysis on the High Thinking-Feeling scale was not significant ($p = .41$).

Comparing the types choosing Article A with theoretical information, more High Thinking types, 61.54 percent, chose A, than did High Feeling types, 38.46 percent ($n = 26$).

Table 6.6
Means for Two-Way Analysis of Variance of Science 4 Articles A and B

Type / Gender	N	Mean	S.D.	P.
<u>Thinking-Feeling Scale</u>				
Feeling	37	1.73	0.450	.87
Thinking	45	1.64	0.484	
Female	34	1.74	0.448	.53
Male	48	1.65	0.483	
Feeling Female	26	1.70	0.471	.10
Feeling Male	11	1.82	0.405	
Thinking Female	8	1.88	0.354	
Thinking Male	37	1.60	0.498	
<u>Sensing-Intuitive Scale</u>				
Intuitive	38	1.76	0.431	.76
Sensing	49	1.73	0.446	
Female	38	1.76	0.431	.76
Male	49	1.73	0.446	
Intuitive Female	13	1.77	0.439	.83
Intuitive Male	25	1.76	0.436	
Sensing Female	25	1.76	0.436	
Sensing Male	24	1.70	0.464	

With Article B emphasizing concrete information, more High Thinking types, 51.79 percent, selected B, than did High Feeling types, 48.21 percent ($n = 56$).

Of the 45 High Thinking types, the majority, 64.44 percent, selected the concrete information in B, while only 35.56 percent selected A.

Of the 37 High Feeling types, the majority, 72.97 percent, chose Article B, with only 27.03 percent choosing A emphasizing theory. The trend was toward the concrete information, although the results were not significant. (See Appendix F).

Pearson's Product-Moment Correlation on the High Thinking-Feeling Scale

A Pearson's correlation on the High Thinking-Feeling scale was not significant ($p = .42$); the correlation coefficient was ($r = 0.09$). The means indicate there was no significant difference in the choices of High Feeling types (mean = 1.73) or High Thinking types (mean = 1.64). Both types tended to select the concrete information.

Two-Way Analysis of Variance on the High Thinking-Feeling Scale

Interaction

A marginal level of significance ($p = .10$) resulted from the interaction between High Thinking-Feeling types and gender in a two-way analysis of variance. (See Figure 6.7 for graphed interaction).

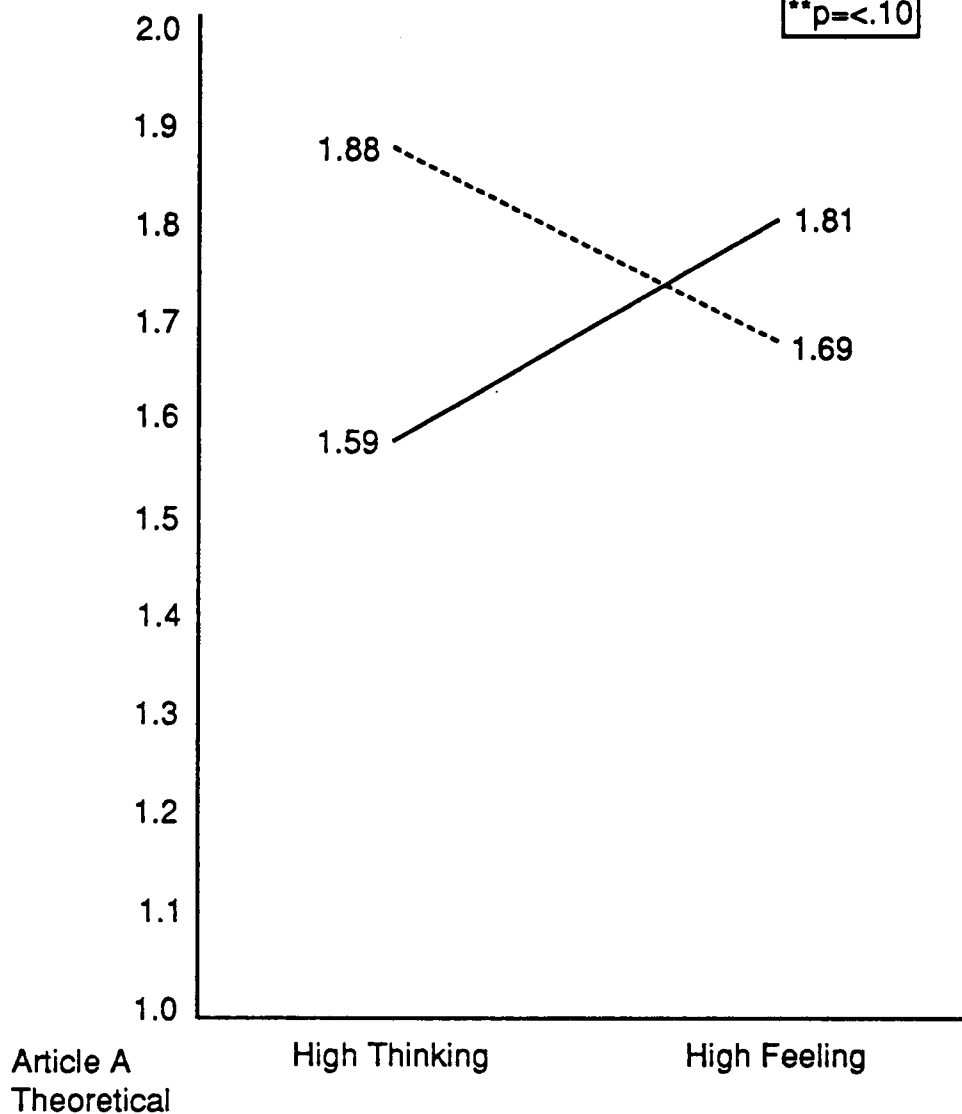
High Thinking females (mean = 1.88) and High Feeling males (mean = 1.82) were more strongly drawn to the concrete information preferring Article B, than High Thinking males (mean = 1.60) and High Feeling females (mean = 1.69), who leaned toward the theoretical information preferring Article A.

The High Thinking females' mean was the highest of the four means, very strongly toward the concrete information. However, the High Thinking males also leaned more toward the theoretical information, preferring Article A.

Article B
Concrete

Males ———
Females - - - - -

**p=<.10



Gender and Cognitive Type
**p=.10

Figure 6.7
Science 4 Articles on High Thinking-Feeling Scale
Interaction Between Gender and Cognitive Type

This cross-over effect was again evident when comparing the High Feeling females' and males' means. The High Feeling females were more drawn to the theoretical information, while the High Feeling males were more strongly pulled toward the concrete information, preferring Article B.

Main Effect

There was no significant difference between choices by cognitive types ($p = 0.87$). Means for cognitive type found High Thinking at 1.64 and High Feeling at 1.73, with both preferring the concrete information.

Main Effect

The difference between choices by the males and females was not significant ($p = 0.53$). Males' mean was 1.65 and females' mean at 1.74, with both preferring the concrete information. (See Table 6.6 for ANOVA means).

HYPOTHESIS 5

RESULTS ON HYPOTHESIZED HIGH SENSING-INTUITIVE SCALE

Hypothesis 5A predicts that Sensing types, in comparison to Intuitive types, will prefer Science 5 Article A, which emphasizes a practical, concrete application.

Hypothesis 5B predicts that Intuitive types, in comparison to Sensing types, will prefer Science 5 Article B, which emphasizes an impractical method or procedure.

Chi-Square Analysis on the High Sensing-Intuitive Scale

Hypotheses 5A and 5B were confirmed at a marginal level of significance ($p = .08$). However, the results were not in the expected hypothesized direction.

In comparing the High Sensing with High Intuitive types selecting Article A emphasizing a practical process, they were almost evenly divided with 47.92 percent of High Sensing choosing A, while 52.08 percent of High Intuitive types chose A ($n = 48$), contrary to H5A.

Twice as many High Sensing as High Intuitive types, 66.67 percent to 33.33 percent, chose Article B emphasizing the impractical process, contrary to H5B ($n = 39$).

In examining how High Sensing types were divided between Articles A and B, 53.06 percent chose the impractical information of B, while 46.94 percent chose the practical information of A, contrary to H5A ($n = 49$).

Of the High Intuitive types, 65.79 percent chose Article A with the practical emphasis, with 34.21 percent choosing Article B with the impractical emphasis ($n = 38$), contrary to H5B. (See Table 6.7 for chi-square contingency table).

Pearson's Product-Moment Correlation on the High Sensing-Intuitive Scale

An examination of the correlational analysis on Hypothesis 5A and 5B shows that it was marginally confirmed on the High Sensing-Intuitive scale ($p = .08$), but the correlation was not in the expected hypothesized direction.

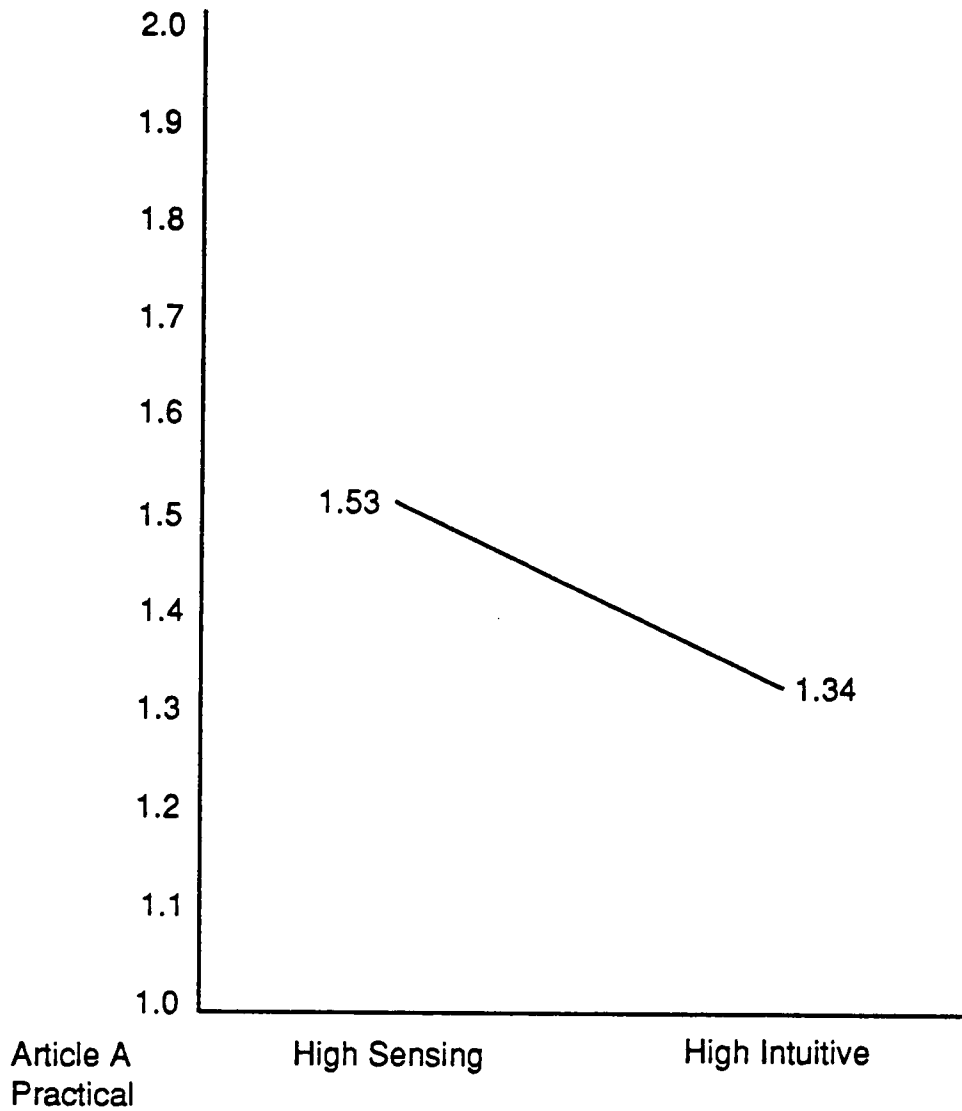
The negative correlation ($r = -0.09$) indicated that the High Sensing types selected Article B with the impractical information (mean = 1.53), while the High Intuitive types selected the practical information in Article A (mean = 1.34). The hypotheses predicted the opposite: that Sensing types would choose the practical information and Intuitive types would choose the impractical information. (See Figure 6.8 for graphed correlation.)

Table 6.7
Chi-Square Analysis of Science 5 Articles on High Sensing-Intuitive Scale

**p<.10			
Frequency Percent Row Pct. Col. Pct.	Article A Practical	Article B Impractical	<u>Total</u>
High Sensing	23 26.44 46.94 47.92	26 29.89 53.06 66.67	49 56.32
High Intuitive	25 28.74 65.79 52.08	13 14.94 34.21 33.33	38 43.68
Total	48 55.17	39 44.83	87 100.00
**p=.08 DF=1			

Article B
Impractical

****p=<.10**



Cognitive Type

$r=-0.18$

****p=.08**

Figure 6.8

Science 5 Articles on High Sensing-Intuitive Scale
Correlation Means for Cognitive Type

Two-Way Analysis of Variance on the High Sensing-Intuitive Scale

A two-way analysis of variance found a marginally significant main effect for gender ($p = .09$). (See Table 6.8 for Anova means).

Main Effect

The difference in the means for males and females was marginally significant ($p = .09$). In comparing the means, females were drawn to the impractical process preferring Article B (mean = 1.59), while males preferred the practical Article A (mean = 1.35). (See Figure 6.9 for graphed main effect).

Main Effect

No main effect for cognitive type was found ($p = .11$). High Sensing types (mean = 1.53) preferred the impractical information, while High Intuitive types (mean = 1.34) preferred the practical information. Both were opposite to the expected hypothesized direction.

Interaction

The interaction term was not significant ($p = 0.27$). Here the nonsignificant results indicated a large numerical difference between the means of High Sensing females (mean = 1.68) and High Sensing males (mean = 1.37), with the females preferring the impractical information of B and the males preferring the practical information of A.

Of the High Intuitive types, both the males and females preferred the practical information with means of 1.32 and 1.38, respectively.

In comparing the High Sensing females with the High Intuitive types, the High Sensing females, who were leaning in the direction of the impractical information (mean = 1.68) preferring Article B, differed quite a bit from the High Intuitive females, who tended to prefer the practical information (mean = 1.38). However, both means were in the wrong direction when compared to Hypothesis 5A and 5B.

Table 6.8
Means for Two-Way Analysis of Variance of Science 5 Articles A and B

Type / Gender	N	Mean	S.D.	P.
<u>Thinking-Feeling Scale</u>				
Feeling	37	1.54	0.505	.60
Thinking	45	1.33	0.477	
Female	34	1.59	0.499	.07
Male	48	1.32	0.468	
Feeling Female	26	1.58	0.504	.37
Feeling Male	11	1.45	0.522	
Thinking Female	8	1.63	0.518	
Thinking Male	37	1.27	0.450	
<u>Sensing-Intuitive Scale</u>				
Intuitive	38	1.34	0.480	.10
Sensing	49	1.53	0.504	
Female	38	1.59	0.500	.09
Male	49	1.35	0.481	
Intuitive Female	13	1.38	0.506	.27
Intuitive Male	25	1.32	0.476	
Sensing Female	25	1.68	0.476	
Sensing Male	24	1.38	0.495	

*p ≤ .10

Article B
Impractical

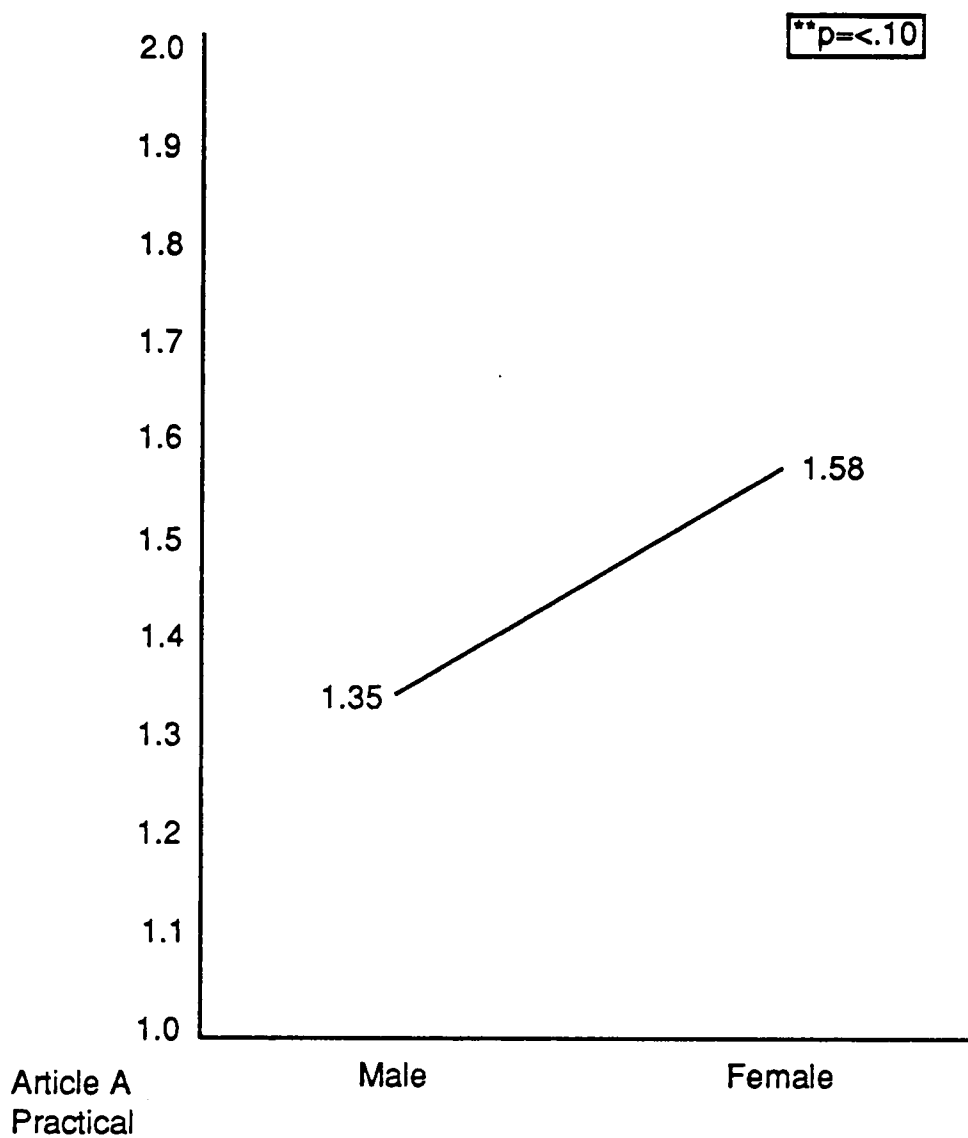


Figure 6.9
Science 5 Articles on High Sensing-Intuitive Scale
Main Effect for Gender

Little difference existed between the High Sensing males' mean (mean = 1.37) and the High Intuitive males' mean (mean = 1.38). Both preferred the practical information: opposite to the direction suggested in Hypothesis 5.

RESULTS OF SCIENCE 5 ARTICLES TESTED ON THE NON-HYPOTHESIZED HIGH THINKING-FEELING SCALE

Chi-Square Analysis on the High Thinking-Feeling Scale

A chi-square analysis of the Science 5 Articles on the High Thinking-Feeling scale was marginally significant ($p = .06$).

In comparing High Thinking with High Feeling types on Article A, 63.83 percent of the High Thinking types selected A with the practical process, while 36.71 of the High Feeling types also chose it ($n = 47$).

Conversely, a majority of those choosing Article B were High Feeling types at 57.41 percent, with High Thinking types at 42.86 percent ($n = 35$).

The majority of the 45 High Thinking types, 66.67 percent, selected Article A with practical information, and 33.33 percent selected B with impractical information.

The 37 High Feeling types were almost evenly divided between A and B at 45.95 and 54.05 percent, respectively. (See Table 6.9 for chi-square contingency table).

Pearson's Product-Moment Correlation on the High Thinking-Feeling Scale

On the High Thinking-Feeling scale, the correlation ($r = 0.21$) was marginally significant ($p = .06$). High Feeling types chose Article B with impractical information (mean = 1.54) and High Thinking types selected Article A with practical information (mean 1.33). (See Figure 6.10 for graphed correlation).

Table 6.9
Chi-Square Analysis of Science 5 Articles on High Thinking-Feeling Scale

*p<.05			
Frequency Percent Row Pct. Col. Pct.	Article A Practical	Article B Impractical	<u>Total</u>
High Thinking	30 36.59 66.67 63.83	15 18.29 33.33 42.86	45 54.88
High Feeling	17 20.73 45.95 36.17	20 24.39 54.05 57.14	37 45.12
Total	47 57.32	35 42.68	82 100.00
*p=.05 DF=1			

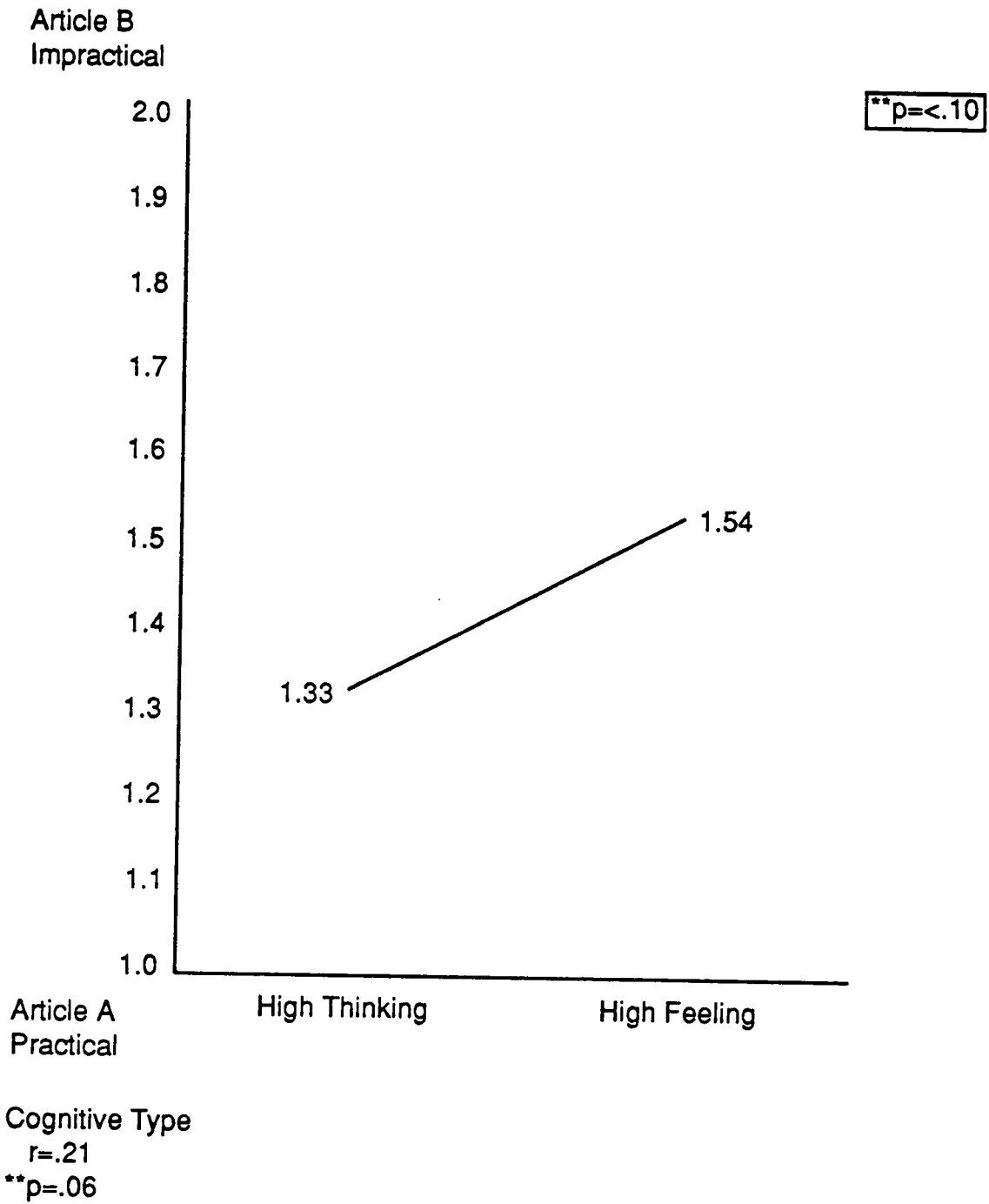


Figure 6.10
Science 5 Articles on High Thinking-Feeling Scale
Correlation Means

Two-Way Analysis of Variance on the High Thinking-Feeling Scale

Main Effect

On the High Thinking-Feeling scale, once again a main effect for gender was marginally significant ($p = .07$).

Females preferred the impractical process of Article B (mean = 1.59), while males preferred the practical process of Article A (mean = 1.31). (See Figure 6.11 for graphed main effect).

Main Effect

Means for the High Thinking types (mean = 1.33) and High Feeling types (mean = 1.54) were not significantly different ($p = 0.60$). The High Thinking selected the practical article and the High Feeling selected the impractical article.

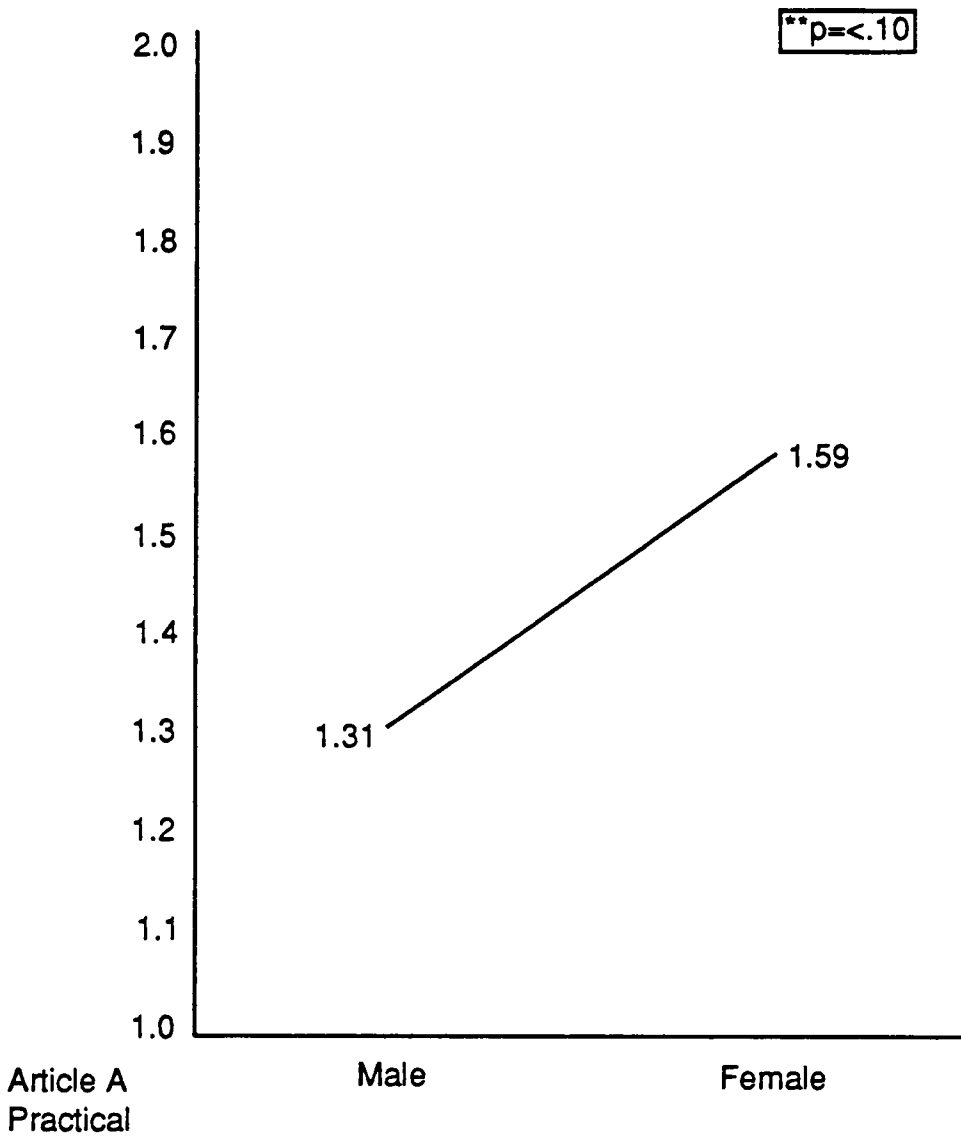
Interaction

The interaction term was also nonsignificant ($p = .37$), although there were large numerical differences in the four means. High Thinking females (mean = 1.62) preferred the impractical information, while High Thinking males (mean 1.27) preferred the practical information.

High Feeling males (mean = 1.45) were more apt to select practical information, than the High Feeling females (mean = 1.57), who tended to select the impractical information.

Females, both High Thinking and High Feeling, were more inclined toward the impractical information, than were the High Thinking and High Feeling males. (See Table 6.8 for ANOVA means).

Article B
Impractical



Gender
p=.07

Figure 6.11
Science 5 Articles on High Thinking-Feeling Scale
Main Effect for Gender

SUMMARY OF HYPOTHESIZED RESULTS

Hypothesis 1

Hypotheses 1A and 1B were confirmed on the High Thinking-Feeling scale by both a chi-square analysis ($p = .004$) and a Pearson's product-moment correlation.

Both statistical tests supported the hypotheses predicting that Thinking types would select the objective information in Article A, while Feeling types would select the information emphasizing personal warmth in Article B.

Hypothesis 2

While Hypotheses 2A and 2B had a chi-square statistic and correlation that were both marginally significant ($p < .10$), the percentages in the cross-tabulations and the correlation means were not in the hypothesized directions.

While more High Sensing types, according to the hypothesis, should have chosen Article A with the detailed information, more High Intuitive types chose A, although only by a small margin, yet contrary to H2A.

Furthermore, twice as many High Sensing types chose B with the general information, than did the High Intuitive types, contrary to H2B.

High Intuitive types showed a definite preference for the detailed Article A over B, also opposite to the expected hypothesized direction. The High Sensing types, on the other hand, were almost evenly divided between the detailed article and the more general article.

The marginal level of significance supports the small amount of difference in the number of High Sensing types choosing between A and B. The percentages indicate that the High Sensing choices were all weak and indefinite choices with minimal differences between the selections. However, the large number of High

Intuitive types choosing Article A with the details, over Article B with the generalities, indicates a strong preference here.

Hypothesis 3

Hypotheses 3A and 3B were not supported by either the chi-square test ($p = .60$), nor by the Pearson's correlation ($p = .61$). However, the percentages in the chi-square indicate that both the High Sensing and High Intuitive types chose the information in the expected hypothesized directions of Hypothesis 3A and 3B.

The correlation, on the other hand, did not indicate a relationship between type and choice: both High Sensing and High Intuitive types selected the information in the present.

Hypothesis 4

As in Hypotheses 3A and 3B, Hypotheses 4A and 4B were not supported by either the chi-square ($p = .76$), nor by the correlation statistic ($p = .77$). However, the percentages in the chi-square indicate that the majority of High Sensing types tended to select the concrete information as predicted by H4A, but the High Intuitive types did not select the theoretical information as predicted by H4B. The concrete information was favored by both.

Hypothesis 5

The chi-square test and the correlation statistic were both marginally significant ($p < .10$) for Hypotheses 5A and 5B. However, the percentages and the correlation coefficient indicate that none of the hypothesized results were realized.

The High Sensing types tended to prefer Article B with the impractical process, contrary to H 5A, while the High Intuitive types tended to prefer Article B with

the practical information of Article A, also contrary to H5B. There was a definite difference in the percentages in each case, for each type, indicating a strong preference by the types.

RESULTS OF SCIENCE ARTICLES TESTED ON THE NON-HYPOTHESIZED SCALE

Science 1 Articles on the High Sensing-Intuitive Scale

The Science 1 Articles were hypothesized on the Thinking-Feeling Scale; however, a test of the data on the Sensing-Intuitive scale shows no significant differences.

While it seems logical to expect High Sensing types to prefer the objective data in Article A and the High Intuitive types to prefer the personal warmth of Article B, both types chose in the opposite direction.

The correlation was also not significant. The High Sensing types selected the personal warmth of Article B, while High Intuitive types chose the objective data of Article A.

Science 2 Articles on the High Thinking-Feeling Scale

The Science 2 articles were hypothesized on the High Sensing-Intuitive scale on which a marginal level of significance was found. However, a test of the data on the High Thinking-Feeling scale with a chi-square and a Pearson's correlation showed no significant differences.

Although nonsignificant, the data indicated that High Thinking types tended to select the detailed information of Article A, while the High Feeling types preferred the general information of Article B.

Science 3 Articles on the High Thinking-Feeling Scale

Although hypothesized on the High Sensing-Intuitive scale, when tested on the High Thinking-Feeling scale the results were also nonsignificant.

The percentages indicate that both High Thinking types and High Feeling types tended to select the information in the present tense. The correlation results concurred with the chi-square.

Science 4 Articles on the High Thinking-Feeling Scale

Hypothesis 4 was hypothesized on the High Sensing-Intuitive scale. When tested on the High Thinking-Feeling scale, the differences were not significant.

More High Thinking types chose Article A with theoretical information than did High Feeling types, but more High Thinking types also chose Article B with concrete information than did High Feeling types.

Basically, though, it appears that there was no significant difference in the choices of both High Thinking and High Feeling, who tended more toward the concrete information. The correlation also supports the chi-square data.

Science 5 Articles on the High Thinking-Feeling Scale

Although hypothesized on the High Sensing-Intuitive scale, the data revealed a marginally significant difference ($p = .06$) on the High Thinking-Feeling scale with the chi-square test. A marginally significant difference ($p = .06$) also resulted from the correlation analysis.

In both the chi-square and the correlation, High Thinking types preferred the practical information, while High Feeling preferred the impractical information.

SUMMARY OF RESULTS FOR ANOVA ON EACH SCALE

Science 1 Articles on High Thinking-Feeling Scale

The two-way analysis of variance found a marginally significant ($p = .08$) main effect for gender on the High Thinking-Feeling scale. The females in the study ($n = 34$) preferred Article B emphasizing personal warmth, while the males ($n = 48$) preferred the objective data in Article 1. Science 1 was hypothesized on the High Thinking-Feeling scale.

Science 1 Articles on High Sensing-Intuitive Scale

The two-way analysis of variance on the High Sensing-Intuitive scale showed a significant difference ($p = .003$) between females ($n = 38$) selecting Article B with personal warmth and males ($n = 49$) selecting the de-personalized objective data of Article A.

Science 2 Articles on High Sensing-Intuitive Scale

Science 2 was hypothesized on the Sensing-Thinking scale. However, no significant differences were found for the two independent variables of cognitive type and gender, or for the interaction term on this scale.

Science 2 Articles on High Thinking-Feeling Scale

No significant differences were found for the two independent variables of cognitive type and gender, or for the interaction term on this scale.

Science 3 Articles on High Sensing-Intuitive Scale

A significant main effect ($p = .03$) for gender was found on the High Sensing-

Intuitive scale for the Science 3 articles.

Females ($n = 38$) showed a preference for information emphasizing the present, as compared with the males ($n = 49$), who preferred the information emphasizing the future.

Science 3 Articles on High Thinking-Feeling Scale

The two-way analysis of variance found a marginally significant ($p = .10$) main effect for gender in which females ($n = 34$) preferred the information in the present, while males ($n = 48$) preferred the article set in the future.

Science 4 Articles on High Sensing-Intuitive Scale

Neither of the two independent variables of cognitive style and gender, nor the interaction of the two showed a significant difference in means on the High Sensing-Intuitive scale.

Science 4 Articles on High Thinking-Feeling Scale

A marginally significant interaction ($p = .10$) occurred between High Thinking and High Feeling types and gender. High Thinking females and High Feeling males strongly preferred the concrete information, while High Thinking males and High Feeling Females preferred the theoretical information.

Science 5 Articles on High Sensing-Intuitive Scale

The two-way analysis of variance found one marginally significant ($p = .09$) main effect for gender on the hypothesized High Sensing-Intuitive scale. The interaction was not significant; neither was the analysis of the cognitive types.

Science 5 Articles on High Thinking-Feeling Scale

A main effect for gender was marginally significant ($p = .07$) on the High Thinking-Feeling scale, with females preferring the impractical information and males preferring the practical information.

CHAPTER 7

DISCUSSION AND CONCLUSIONS

OVERVIEW OF RESULTS

Looking at the results as a whole, there is support for the research hypothesis that cognitive type can predict preference for science information. The data were examined on both the High Sensing-Intuitive and the High Thinking-Feeling scales, although the hypotheses were written for one scale only. Thus the following information reports significance levels found on both the hypothesized scale and on the non-hypothesized scale.

Results on Hypothesized Scales

The results of the study show that of the five hypotheses, one was significant and two were marginally significant. Hypothesis 1 ($p = .004$), concerning objective information and personal warmth in information, was significant on the High Thinking-Feeling Scale on which it was hypothesized.

Hypothesis 2 ($p = .08$), concerning detailed information and general information, was marginally significant on the High Sensing-Intuitive scale on which it was hypothesized. Hypothesis 5 was also marginally significant ($p = .08$). It concerned practical and impractical information hypothesized on the High Sensing-Intuitive scale.

Results on Non-Hypothesized Scales

The Science 5 articles were marginally significant ($p = .06$) on the High Thinking-Feeling scale, although hypothesized on the High Sensing-Intuitive scale.

Two-Way Analysis of Variance

A two-way analysis of variance was also conducted on the science articles on both the High Sensing-Intuitive scale and the High Thinking-Feeling scale. This examination of the data was conducted after a chi-square analysis of cognitive type and student demographic information indicated a significant difference between the articles preferred by males and females.

Thus, in testing for an interaction between cognitive type and gender, two significant main effects, four marginally significant main effects and one marginally significant interaction were found.

One marginally significant ($p = .10$) interaction between cognitive type and gender was found for the Science 4 articles on concrete versus theoretical information on the High Thinking-Feeling scale. It was originally hypothesized on the High Sensing-Intuitive scale.

In looking at the science articles on the hypothesized scales, there was one significant main effect for gender on Hypothesis 3, concerning information written in the present tense as opposed to the future tense ($p = .04$) preferred by males or the present tense preferred by females on the Sensing-Intuitive scale.

Another significant main effect for gender was found for the Science 1 articles concerned with objective data and personal warmth on the High Sensing-Intuitive scale ($p = .003$). The Science 1 articles were originally hypothesized on the High Thinking-Feeling scale.

Four marginally significant main effects resulted from an examination of the data; all were for gender. Two were found on the hypothesized scales, while two were on non-hypothesized scales.

Both Hypothesis 1 on the High Thinking-Feeling scale ($p = .08$) about objectivity and personal warmth, and Hypothesis 5 on the High Sensing-Intuitive

scale ($p = .09$) about practical and impractical information were marginally significant for gender.

Neither the Science 3 articles about present and future tense, nor the Science 5 articles about practical and impractical information, were hypothesized on the High Thinking-Feeling scale. However, both were marginally significant for gender on this scale: Science 3 with a probability value of .09 and Science 5 with a probability value of .07.

The data indicate that cognitive type can predict preference for science information. While several tests had significant or marginally significant results, not all were in the hypothesized directions. Small sample size after the low scores were deleted could have influenced the several marginal levels of significance. When a chi-square and correlation analysis were conducted on the entire sample of 174 students, two pairs of articles on both scales netted a level of significance below the .05 level. When examined with the two-way analysis of variance, two significant and one marginally significant main effects, as well as one marginally significant interaction, were found on the hypothesized scales. On the non-hypothesized scales, three marginally significant main effects and one marginally significant interaction between cognitive type and gender were found.

Deleting the "slight" and "moderate" subjects, leaving only "clear" and "very clear" cases, increased the number of significant or marginally significant tests to eight. However, because of the small sample size, fewer significant ($p < .05$) differences were found.

OVERVIEW OF RESULTS FOR EACH HYPOTHESIS AND SCIENCE ARTICLES 1 THROUGH 5

Hypothesis 1: Objective Data/Personal Warmth

Hypothesis 1 concerning the preference for either objective data or personal warmth information showed significant differences ($p = .004$) between High Thinking and High Feeling types on that hypothesized scale. However, the analysis on the High Sensing-Intuitive scale was not significant ($p = .29$).

These choices would be logical in light of the characteristics of each type. The key to the respective choices by the two types is the personal warmth emphasis. Article B is written in a person-centered style. It reports about a real patient, a young high school student named Robert Johnson, who has a life-threatening condition. In Article B the reader is constantly reminded of this young man by the use of his name, as in "Robert's condition," and by the use of the possessive pronoun "his," as in "his kidneys." The emphasis of this article is on personal warmth.

Article A, on the other hand, speaks of "millions of Americans" being helped by the new diagnostic procedure. These are faceless millions. The rest of the article focuses upon the procedure and the condition, not mentioning the "millions" again. Kidneys in this article do not belong to one specific person; all further references after the first two paragraphs are depersonalized. The remainder of the article is clinical and impersonal, written in an objective manner.

There is little wonder that the objective, clinical emphasis of Article A appealed to the High Thinking types. The MBTI manual explains that Thinking types are logical, tending to base decisions on impersonal analysis. Characteristics of Thinking, which is a rationale function according to Jung, include objectivity,

criticality, and analytical ability.

On the other hand, Feeling types would logically be the group to prefer the personal warmth in Article B. Feeling types tend to approach situations with personal warmth and are sympathetic and friendly. They are not logical in their approach to life or situations, being more subjective than thinking. They make decisions based on person-centered values rather than weighing facts.

Main Effects for Gender Hypothesis 1

A two-way analysis of variance on the Science 1 articles on the High Sensing-Intuitive scale found significant differences ($p = .003$) between the females' choice of Article B with personal warmth and the males' choice of the objective information in Article A.

A marginally significant ($p = .08$) main effect for gender was also found in a two-way analysis of variance on the hypothesized High Thinking-Feeling scale. The females in the study showed a strong preference for Article B emphasizing personal warmth, while the males preferred the objective information.

Marginally significant gender differences ($p = .08$) on the hypothesized High Thinking-Feeling scale can be explained by the manner in which the articles are written and the social expectations of males' and females' behavior in our society. Article A was written to be more objective, while Article B was written with an emphasis on personal warmth. The chi-square and correlation analysis indicate that the types chose in the hypothesized directions. Thus, the articles obviously appealed to the types upon which their characteristics were based.

According to Myers and McCaulley in the MBTI manual, men and women in our society are socialized differently. Men are encouraged more toward Thinking activities and women toward Feeling activities. They caution those using the MBTI to inquire of respondents if their low scores indicate clear preferences that are not

clear to the respondent because he or she answered in a socially expected manner, or if their low scores indicate conflict between sex-role expectations and type preferences.

It is obvious that women preferring the article emphasizing personal warmth are behaving in a socially expected manner, as are the men choosing the objective information. On the High Thinking-Feeling scale, the two-way analysis of variance indicated that the males preferred the objective data (mean = 1.58) and the females chose the personal warmth (mean = 1.88).

The same argument would hold true for significant differences ($p = .003$) in means between the males (mean = 1.53) and females (mean = 1.84) on the High Sensing-Feeling scale. Note the highest mean (1.88) was, naturally, held by the High Feeling females, who use person-centered values and subjectivity on which to base judgments.

Hypothesis 2: Details/Generalities

Hypothesis 2, examining information that is either detailed or general in nature was marginally significant ($p = .08$), but not all of the results were in the hypothesized directions. However, the differences in the proportions on the chi-square lead one to believe that given a larger sample, the results would have been more definite for both cognitive types.

On Hypothesis 2, High Sensing proportions were very close, some almost evenly divided between the articles. The High Intuitive types, however, were more decisive in their choices, showing clear preferences for the detailed information about the new drug, contrary to the hypothesized direction.

One possible explanation for this preference is that Intuitive types tend to be more critical in their thinking and tend to be more skeptical than Sensing types, and

as such would be more discerning readers, requiring a better quality of information about a subject. In this case, better quality of information might be construed as more in-depth information and the in-depth information could be the more detailed information, particularly if it were offered in comparison with information which is of a general nature.

Perhaps the articles would have been better framed if both contained detailed information, but one had the greater number of details, or if a number of questions about the subject were answered more fully. Contrasting detailed information with general information might not have been the best way to test this hypothesis.

While Sensing types tend to rely on facts, according to the MBTI manual, Intuitive types might still want an ample number of facts on which to base their logic and analysis, and with which to foster ideas and possibilities.

In addition, none of the literature indicates that Intuitive types do not like facts about a subject; they are just not dependent upon them. They can take fewer facts and make more inferences about the subject than the Sensing types can. They apparently can see associations and relationships in a body of facts, that Sensing types cannot. Intuitive types look beyond facts, focusing upon relationships and possibilities.

Hypothesis 3: Present/Future

The results of the tests of Hypothesis 3 on both scales were not significant, and the majority of the four types chose the information set in the present.

Article A and B reported about a hyperbaric chamber, filled with oxygen, that promotes faster healing of injuries. Article A details the chamber which has been in use on humans since 1984, while Article B reports that the chamber is still being tested and will not be ready for use by human patients until 1993.

The choice of Article A by High Sensing types is in keeping with their characteristics. They are oriented to the immediate experience and the present moment; their senses establish what exists. The Sensing preference is used to define reality for these cognitive types and enables them to accept and work with what is a "given" in the here-and-now.

On the other hand, Intuitive types tend to look toward the future, seeing new possibilities, such as new projects and things that have not been done before. Why, then, did the Intuitive types and the Feeling types prefer the article about equipment presently under use? Once again, the subject of the articles and the choices given the High Intuitive types is probably the answer.

It is one thing to consider a treatment that is still under research, but has possible uses in the future. Intuitive types, according to their descriptions in the MBTI manual, should enjoy speculating on this marvel of modern medicine. But it is quite another thing to choose between a highly beneficial treatment that is presently available and one that won't be ready for years. As Intuitive types see the consequences of situations and theoretical relationships underlying these, it would be natural to choose the article which reports about a treatment that is already saving lives and is useful for a number of different ailments and conditions. It would be illogical to choose the report of the treatment not yet proven effective and not ready for use.

Looking at the choices of Article A and B by the High Thinking and High Feeling types, it is also logical that the High Thinking group would prefer the treatment presently in use. As they tend to weigh facts, a comparison of the present usefulness of a treatment and one in the future is obvious. The reality of lives being saved now is more important than the possibilities of lives being saved in the future.

Feeling types chose Article A because Feeling types care about people,

approaching life with personal warmth and looking for the human factor in situations. Their values are both subjective and personal and they are concerned with the human, rather than the technical aspects of problems. Feeling types are obviously going to be more concerned with helping others than with a process or treatment. And helping people now is more important than helping them in the future. A Feeling type would consider those patients who would not have the benefit of a treatment if it were not ready until 1993.

The subject of medicine could also be a confounding factor. If the subject had been about a new telescope that would not be ready for years, it would not matter. But the subject of a medical treatment brings an immediate and personal aspect to the choices that the subject of astronomy, for example, does not. A different topic might receive a different reception by the types.

Main Effects for Gender Hypothesis 3

A significant main effect for gender ($p = .04$) was found in a two-way analysis of variance on the hypothesized High Sensing-Intuitive scale, as well as a marginally significant ($p = .10$) main effect for gender on the non-hypothesized High Thinking-Feeling scale.

Females on both scales showed a preference for the information emphasizing the present, as compared with males who preferred the information emphasizing the future.

Once again, social pressures to behave in proscribed ways can influence females toward feeling activities, while males are encouraged toward thinking activities. Article A set in the present describes a specific person, an older woman, who is receiving treatment in the hyperbaric chamber, while Article B describes technicians using a dummy to test the new chamber which should be ready for use in 1993. Article A, inadvertently, has a quality of personal warmth, that Article B does

not; Article B is more technical in nature.

Females would more likely choose the information about a medical procedure which is helping another female, who is older and in poor health, than the more technical, objective article which has no personal warmth in it. The results of Hypothesis 1 confirm that females prefer information with personal warmth.

This could also account for the higher level of significance on the High Sensing-Intuitive scale. The females on that scale had means (mean = 1.16) much closer to the article set in the present (and exhibiting personal warmth), than did the High Thinking-Feeling females (mean = 1.24). However, there was little difference in the males' means on the High Thinking-Feeling scale (mean = 1.35) and on the High Sensing-Intuitive scale (mean = 1.39).

Hypothesis 4: Theoretical/Concrete

The results of tests on the Science 4 articles with theoretical and concrete information on both scales were disappointing, considering that the inspiration for this study came from editors' remarks about people reading for concrete, useful information or for intellectual stimulation. The question did not seem to be adequately tested due to confounding variables. But, Science 4 did net a marginally significant interaction between cognitive type and gender on the High Thinking-Feeling scale.

The majority of both types tended to choose the concrete information, although the High Sensing types had the larger proportions. While the High Sensing types chose in the hypothesized direction, the High Intuitive types did not.

It is logical that Sensing types would prefer the concrete information because they accept whatever is a 'given,' becoming realistic and practical. They like facts and situations that can be verified by the senses, such as by seeing or hearing, or counting and weighing. Article A, emphasizing a completed study about fat storage

in the human body, had all of those elements. The "proven" theory would naturally appeal to High Sensing types because it is just that: a "proven" theory.

However, the High Intuitive types did not choose the theoretical information as hypothesized; they, too, preferred the concrete information. Perhaps one explanation for the preference by both types for concrete information over the theoretical lies in the subject matter used to test Hypothesis 4, that of health-related information about body fat.

One might venture that medical and health-related information is taken seriously by both types of readers: they want accurate facts that they can use to prevent disease and injury, as well as enhancing the quality of their lives. They do not want to speculate about medical or health-related issues: they want definite information on which to base their eating habits and their life styles.

This makes medical and health-related information more personal in the sense that it directly affects the reader. Given this situation readers might take their medical information more seriously than other types of scientific information that they might read for intellectual stimulation. They will approach this information wanting something different from it, knowledge to use, than they would an article about dinosaurs and comets.

Readers might prefer their medical information with one emphasis, such as concrete facts written in the present tense with a practical emphasis and an objective tone, while with other scientific subjects, such as astronomy, they might welcome conjecture and theory.

Comparatively speaking, medicine is concerned with realistic and certain dangers, such as the ever present threat from cancer and heart disease, while there is no real way of knowing for certain what killed dinosaurs eons ago. With the emphasis toward preventive medicine and wellness, readers would most likely want

their medical information to be useful: one's personal health and survival depend upon it. These are realities, while speculation about dinosaurs and comets is in the realm of fantasy.

If indeed Intuitive types focus their attention on possibilities, realistic information on medical topics and health-related issues can certainly describe the possibilities of problems resulting from not eating correctly, exercising regularly, or having yearly check-ups.

The specific topic of fat storage in the body is an emotionally-charged one for Americans, regardless of cognitive type. Weight loss is good; weight gain is bad. Body image is everything because Western culture has decreed it so. The media and advertising have glorified slimness: hence, the phenomenal sales of exercise tapes, books on diet and weight-loss plans. New information explaining how the body's metabolism works seems to be welcomed by most Americans.

If given the choice, most Americans would probably choose an article about a theory on fat storage, that has been supported by research and for which there is ample evidence, rather than the article which reports that the study is underway, but not completed.

Interaction of Cognitive Type and Gender on Hypothesis 4

A marginally significant ($p = .10$) interaction between cognitive type and gender was found with a two-way analysis of variance on the non-hypothesized High Thinking-Feeling scale.

High Thinking females and High Feeling males strongly preferred the concrete information, as opposed to High Thinking males and High Feeling females who preferred the theoretical information.

If we rank order means, we find that High Thinking Females have the largest mean (1.88). High Feeling males are next with a mean of 1.81; High Feeling females

are next at a mean of 1.69; and High Thinking males are lowest with a mean of 1.59.

Once again the problem of cultural expectations and social learning can take the credit for part of this result and cognitive type the rest. First, most women care more about their appearance and body image than do men. Obviously, Thinking females would want the most useful, and therefore, the most concrete information. Thinkers appear to want details according to Science 2 data, so Thinking women are doubly predisposed to want the concrete information. They want factual information they can use to stay slim, apparently, since their mean was highest.

Next, if men tend toward objective data more so than women, then males are more likely to choose the factual and concrete information. If comparing Feeling males with Feeling females, the Feeling males would more strongly prefer the concrete information, than would Feeling females. And, Feeling females are probably less demanding of information than Thinking females.

If comparing Feeling males with Thinking males, since the Feeling types are more subjective in their thinking and are more person-centered than Thinking types, the Feeling males of the two would be most likely to care about personal appearance. And again, those who care about personal appearance and are concerned with weight gain would be most likely to want the concrete information of Article A.

Hypothesis 5: Practical/Impractical

Hypothesis 5 was confirmed with a marginal level of significance ($p < .10$) on both the High Sensing-Intuitive scale on which it was hypothesized and on the High Thinking-Feeling scale. In addition, two marginally significant main effects ($p < .10$) for gender were netted in the two-way analysis of variance on both scales.

However, results on the High Sensing-Intuitive scale were not in the expected hypothesized directions. The High Sensing types strongly preferred the impractical

information, compared with the High Intuitive types. There was a small, but significant difference between the types choosing the practical information, and between the High Sensing types choosing either the practical or impractical information.

A healthy majority of High Intuitive types preferred Article A with the practical information. Compared with High Sensing types, the High Intuitive types had a small, but significant, difference in their choice of the practical information.

Possible explanations for the Intuitive types choosing the practical information are more easily understood than those for the High Sensing types' choice of the impractical information. One explanation could lie in the characteristics of Sensing types, as compared with the nature of Intuitive types, in light of the differences of the science articles.

Article A, the article emphasizing practical information, discusses a new surgical procedure which is safer and costs about \$50,000 less than the conventional surgery. The description in Article A of the condition, which the new surgery alleviates, reports that it affects about 2000 more patients per million than the condition in Article B. And, the mythical Polk University Medical Center will treat about 300 patients over the age of 30 next year according to Article A, while Article B says the medical center will treat only 20 or so patients over the age of 65 next year. Article A obviously describes the more advantageous medical procedure.

Once again, as in Hypothesis 3, the qualities of Intuitive types may have influenced their choices. High Intuitives, being the more critical and, therefore, more discerning of the types, probably compared the differences in the articles more carefully than High Sensing types. The High Intuitive types probably noticed that Article B describes a procedure with fewer improvements than the older, conventional method, which costs the same as the old surgical method. Compared with Article

A, the procedure in Article B will help very few people, and they will be older people over age 65, who will not be a part of the workforce and culturally are seen as not contributing as much to society as younger people. Taking all this into account, which the critical and skeptical Intuitive types probably would, they would be more likely to choose Article A with the more advantageous procedure.

The fact that Intuitive types see the possibilities inherent in situations and have "an interest in patterns underlying immediate facts," indicates that the choice of Article A with the practical information is the logical choice for the High Intuitive types.

The High Sensing types had mixed choices between the practical and impractical information. According to Hypothesis 5, they should have chosen the practical information, but twice as many High Sensing, as High Intuitive types, chose the impractical information, as did the High Intuitive types. Perhaps because they tend to be fact oriented, focusing their attention on concrete situations, rather than seeing possibilities and relationships as do the Intuitive types, the High Sensing types might not have been as critical of the new, costly procedure in Article B. They might not have compared the advantages and disadvantages of the procedures in A and B as carefully as the High Intuitive types. If they are not as adept at seeing possibilities and patterns underlying immediate facts, as are Intuitive types, they probably did not understand the ramifications, i.e. the disadvantages, of the impractical procedure.

Hypothesis 5 was not only confirmed on the High Sensing-Intuitive scale, but netted a marginal level of significance ($p = .06$) on the High Thinking-Feeling scale. The majority of High Thinking types chose Article A emphasizing the practical information over Article B emphasizing the impractical information. In comparison with High Feeling types, more High Thinking types preferred the practical information.

The majority of the High Feeling types chose the impractical information and in contrast to the High Thinking types, also had more choices of Article B.

These choices would be logical in light of the characteristics of each type. The MBTI manual explains that Thinking types are more logical, are adept at solving problems such as those of finance. Intuitive-Thinking types, particularly, are good at management, forecasts and financial analysis.

Thinking types tend have these characteristics: analytical ability, objectivity and criticality. They also tend to base decisions on impersonal analysis. Thus, they would choose the more practical procedure. In addition, they make decisions by weighing the evidence and are good at analyzing what is wrong with something. Thinkers would look carefully at the advantages and disadvantages of the two procedures.

On the other hand, High Feeling types would logically be the group to prefer the impractical procedure in Article B. Feeling types tend to approach situations with personal warmth, tending to be sympathetic and friendly. They are not logical in their approach to life or situations: they make decisions based on person-centered values, rather than weighing facts. Therefore, they would be less likely to analytically compare the details of the two articles. As they are the more sympathetic of the types, they might have been drawn to the procedure which helped the elderly, rather than to the procedure which would benefit the more robust group of men and women over the age of 30.

It also could be that the number of people the medical center would treat in the next year, an estimated 15-20, seemed more manageable and personal to the Feeling types. A small group is more easily imagined and is easier to identify with than the 250 to 300 patients Article A mentioned. And, after all, Feeling types tend to be more subjective than thinking.

Main Effect for Gender on Hypothesis 5

A marginally significant ($p < .10$) main effect for gender was found on both the hypothesized High Sensing-Intuitive scale ($p = .09$) and the non-hypothesized High Thinking Feeling scale ($p = .07$). The females of both types strongly preferred the impractical information, while the males preferred the practical information.

And yet again, we can look to social expectations to explain why females of both cognitive types preferred the impractical information. Perhaps they looked at the procedure in Article B which would help the elderly, men and women over the age of 65. Or perhaps they were drawn to a medical procedure that helped a rare condition.

LIMITATIONS

Sample Size

Small sample size due to the deletion of low continuous scores on each scale probably reduced the levels of significance. As explained earlier, when a chi-square and correlation analysis were conducted on the entire sample of 174 students, two pairs of articles on both scales netted a level of significance below the .05 level.

Deleting the "slight" and "moderate" subjects leaving only "clear" and "very clear" types, increased the number of significant or marginally significant tests to eight. However, because of the small sample size, fewer significant ($p < .05$) differences were found.

Selecting only high scores, thus netting "clear" and "very clear" types, was justified. However, it would be interesting to study the results of a larger sample of cognitive types at these levels.

Student Sample

Using undergraduate students for the sample was a sample of convenience, not a sample of choice. A readership study using actual readers of scientific information would have been the first choice. In addition, some of the undergraduates had difficulty with the reading level of the questions on the Myers-Briggs Type Indicator, as well as the reading level of the articles and the Need For Cognition scale. Of course, the young age of the sample was also problematical.

Subject

The specific type of science in this study, that of medicine, could be a confounding variable in the results. Only one scientific subject was used in order to reduce the bias one might expect if several different scientific subjects were used. However, medical information would seem to be more relevant to readers in the sense that it directly affects individuals and their loved ones. Therefore, readers might take their medical information more seriously than other types of scientific information that they might read for intellectual stimulation. They probably approach reading it with a different mind set, looking for information that they can use to keep healthy and prevent illness.

Readers would more logically expect news to use from medical information, while with other scientific subjects, such as astronomy, they might welcome conjecture and theory. Speculation about dinosaurs is in the realm of fantasy and it is fun to guess about what caused those prehistoric giants to disappear. However, readers would most likely want their medical information to be useful: one's personal health and survival depend upon it.

Content

The content of several of the articles may have influenced the readers. The manner in which they were written, i.e., the way the different cognitive type characteristics were operationalized still seems a correct way to have written the articles. But the content of some of the articles may have caused problems.

For example, in the Science 2 Articles, Article A has many details about the new drug, while Article B has more general information. Intuitive types preferred the detailed information, as did the Sensing types, contrary to the Hypothesis 2B. Intuitive types might not be dependent upon facts, but want enough of them on which to base a decision.

Perhaps the articles would have been better framed if both contained detailed information, but one had the greater number of details, or if a number of questions about the subject were answered more fully. Contrasting detailed information with general information might not have been the best way to test this hypothesis.

In the Science 3 articles, the medical procedure in use is contrasted with a medical procedure being tested for future use. Again, it would be logical that a procedure presently being used and saving lives is a better choice than one which might save lives in the future. Most people of any cognitive type would probably choose Article A in the present. In addition, Article A had an element of personal warmth to it, that Article B did not. This factor alone could influence responses.

The Science 4 Articles concerned concrete and theoretical information about fat calories. Again the nature of this subject, a health-related subject, would mean that individuals will take it more seriously, wanting "proven" facts on which to base their behavior. And a weight-related subject is likely to engender the same feelings: people want "proven" facts about weight gain and the prevention of it.

The Science 5 articles are problematical because they are too long and

almost identical, except for the last two paragraphs which are full of contrasting details about the new surgical procedure.

Consistent Use

The study presumes that individuals will consistently, over a period of time, prefer a dominant emphasis in a specific type of science information. However, as the uses and gratifications research has shown, people use the media for different purposes at different times and for different purposes at the same time. Readers most probably desire practical information at one time, but theoretical information at another.

The developers of the Myers-Briggs Type Indicator emphasize in their manual that individuals can operate within both dimensions of each of the four scales. Their dominant type is the one that they prefer to use most often, but from time to time they will think and behave contrary to the characteristics of their dominant type.

The Myers-Briggs manual explains that one uses both sides of each scale or preference, but will prefer one over the other, much as one prefers to use one hand over the other. And, as with handedness in which one hand is more adept, the stronger preference will be more adept.

Thus, it seems highly probable that readers can use different types of information in varying ways from time to time, and, depending on their moods or reasons, can use the same information for different purposes at various times.

Order of Presentation

While the order of the activities in the packets was reversed, the order of presentation for the science articles in each booklet was not. Students could have

tired by the time they came to the last science article, although the Science 5 articles were marginally significant on both scales, as well as being marginally significant for gender on both scales.

Number of Activities

The average length of time that students took to complete all the items was around 45 minutes. The students read and compared 10 news articles, answered 166 questions in the Myers-Briggs, answered 18 questions on the Need for Cognition, and completed the demographic information form in that amount of time. It is possible that some of the variance in the ANOVA's and differences, or lack thereof, on the chi-squares and correlations could be due to the students being tired by the end of the class period. Perhaps, the MBTI should have been given on one day, then the other activities on another. Of course, that might be a case of trading maturation effects for history.

IMPLICATIONS AND CONCLUSIONS

Little or no research has been conducted looking at cognitive style as an indicator of preference for types information. However, several studies have been conducted looking at cognitive styles and their relation to: the acquisition of information; the amount of information managers want in making decisions; the selection of magazines; and consumption of media.

This dissertation research examining cognitive type as a predictor of preference for medical information is one of the first of its kind. The numerous significant and marginally significant results of this study support the research hypothesis, which states that cognitive type predicts preference for science information. Cognitive style can influence one's preference for a type of information, as well as the manner in

which it is presented. Given the results of previous studies and the findings of this study, ample evidence exists that cognitive style is a viable psychographic variable.

While this research has looked only at one science topic, that of medicine, its results have ramifications for other scientific subjects, as well as many other types of information in different forms, such as advertisements, photography and "infographics." The possible research along this line of preference for information substance and form is formidable.

For far too long we have collected, used and misused demographic information. While it serves its purposes and serves them well, it cannot serve all purposes. Individuals are more than the sum of their demographic parts; and the concept of cognitive styles transcends the cubby-holes of age, education, gender and income. Use of cognitive styles extends the psychographic variables available to both editors and marketers, complementing the values and lifestyles approach.

Using cognitive styles as an editorial tool can not only help writers with the substance of their works, but can also serve to direct them in what to emphasize in the information. It can show editors and publishers how to target their communication products more precisely. The inverted pyramid style of writing isn't always the manner in which readers want their information delivered. And, although they have not used cognitive styles in their readership studies, many newspapers have changed the way their writers are presenting information. They are delivering a new type of news to their readers: one that is less structured, less formal, less straitjacketed by the pyramid style. The publisher of The Tennessean, in Nashville, Tennessee, has directed his writers to use this new, more relaxed news writing style. In addition, some pilot studies have been conducted in which readers are allowed to structure their own news stories. In these the readers are given pieces of the story which they piece together into the style they prefer. The results of these as yet

unpublished studies are stories sans the inverted pyramid style.

This trend away from traditional journalistic style has implications for writers and for journalism educators as well: news writing must follow a new dictator, the reader. Using cognitive style to help in understanding readers and their news writing and information preferences is just another step in this trend.

Cognitive styles can also help to decide which medium of communication to use, whether print or broadcast, for cognitive types serve "to discriminate mass media consumption." Further research might also determine which visual medium of communication, such as charts, graphs, photography, is preferred by specific types.

Of course, editors and publishers, as well as marketing professionals, cannot administer the Myers-Briggs instrument, or any other measure of cognitive style, to every consumer and reader in the country. However, an extensive body of research has been conducted on the MBTI, principally by its developers Isabel Briggs Myers and Mary H. McCaulley. Their research and the work of many others show that specific jobs and professions attract particular cognitive types and have a preponderance of those cognitive types within their ranks. For example, research has shown that cognitive style is correlated with the theoretical and methodological orientations of different types of psychologists.

Other research, reported in various journals and the Myers-Briggs' manual, has been conducted on doctors, surgeons, nurses, ministers, engineers and scientists, among others, with similar results. Thus, if an editor wants to target his psychology magazine to clinical psychologists, he might consider that in a study of psychologists reported in the Myers-Briggs manual, 72 percent of clinical psychologists were Intuitive-Feeling types. If the target audience were to be experimental, he would do well to note that 40 percent of experimental psychologists, in that same

study, were Intuitive-Thinking.

In addition, the MBTI has been shown to correlate with other tests such as The Strong Vocational Interest Blank. Using Holland's personality typology, on which the Strong Interest Blank is based, research has found a correspondence between personality type, i.e., cognitive style, and magazine selection. This work looked at magazines already on the market with well-defined target audiences. Nonetheless, the research indicates that individuals with different cognitive styles prefer magazines whose editorial mix is congruent with their preferred manner of thinking.

This dissertation research, I believe, offers evidence that cognitive style can further discriminate between topics of articles, as well as the manner in which the articles themselves are written. The research shows that the mind set readers bring to the reading situation affects their preference for reading material.

It seems that marketing and publishing have "gone the distance" with the available demographic and psychographic information. The use of cognitive style as a marketing variable can help writers, editors and publishers provide readers with information emphasizing what is most meaningful to them. It is the epitome of the "service edit."

This research has examined the influence of cognitive style on information preference, but results of the study indicate that gender differences are important and that there is an interaction between gender and cognitive style. The use of cognitive styles in writing can not only help readers get what they want in and from reading material, it can also help editors and publishers get what they want, namely, readers. With declining readership of newspapers, particularly, editors and publishers are looking for ways to capture readers that they have heretofore overlooked. At a recent symposium on journalism education at Middle Tennessee State University, a former news editor of USA Today spoke about the need for newspapers to target

the female readers which they have not attracted. Her contention was that women will read newspapers (at this point they are the mainstay of specialized magazines) if the news is written with a specific emphasis that appeals to them. She did not say that the topics of coverage needed to change; she did not say that newspapers needed more society and lifestyles news. She told the audience that the way in which newspaper articles are written, not the content itself, needs to change. She intuitively knew what this dissertation research has empirically tested: that gender and preference for information are related. Indeed, there is an interaction between gender, preference for information and cognitive style.

This research has offered just a glimpse at the possible uses of cognitive styles: more research needs to be done before we can use this psychographic variable to its full capacity.

General Conclusions

Several general conclusions are forthcoming from this research study. It is evident that cognitive style can discern differences in preference for information, in this case that of science information. Cognitive style influences preference for science information in this study. Therefore, we can conclude that what the reader brings to the reading situation, in the form of cognitive style, has an influence upon preference for reading material.

However, to effectively use cognitive style as a marketing/writing variable, a few caveats should be heeded. An examination of the study's results indicate that the subject of medical information is taken more seriously by readers, as news to use, than are other scientific topics. For example, information concerning the disappearance of dinosaurs can serve as intellectual stimulation on which to muse, but medical and health-related subjects are taken more seriously as information to use in guarding

one's health.

Under the general heading of medical information, there seem to be emotionally-charged subjects, such as cancer, heart disease or weight gain, which can elicit responses from subjects that other "benign" medical topics might not. Thus, it seems that the topic of the information may tap something in the subconscious at an emotional level which can override one's tendency toward a particular cognitive style.

The prevalence of the main effects for gender on both scales further supports previous findings of gender differences on the Thinking-Feeling scales. The socialization processes of our society can obviously override a natural proclivity toward a cognitive style, thus influencing choices of information. So, gender differences can transcend or bypass the natural preferences of a cognitive style.

A danger also lies in over-simplifying the interpretation of the cognitive types' characteristics. For example, this study hypothesized that Intuitive types would be more likely to prefer information with fewer facts than would Sensing types. This hypothesis was based upon the description of the Sensing types' reliance on facts and details, as well as the Intuitors' tendency to "go beyond facts." The results indicate that Intuitors and Sensing types preferred the more detailed information. While Intuitors may not depend upon facts, they, as more critical thinkers, seem to want them, but will still do more with them than Sensing types. Thus, the characteristics can be taken too literally, when what they need is a broad interpretation.

However, this study was conceived as the first step in this area of research and the more literal interpretation seemed the logical place to start. This study has examined only the lowest order of thinking processes, as defined by Bloom's taxonomy of learning. Further research needs to address the higher levels of

thinking through the complexity of the writing style and information.

This dissertation research has shown that the use of cognitive styles in understanding preferences for information is possible. Cognitive style can influence one's preference for a type of information, as well as the manner in which it is presented. The next step is to add to these findings by examining this preference tendency, studying its impact in relation to other types of information.

This research has shown that what readers bring to the reading situation is just as important as the reading material itself. We have intuitively thought this in relation to pleasure reading. The concept of a "cozy read" in an armchair with an Agatha Christie mystery is well entrenched. But we have not considered readers' characteristics and tendencies, i.e., their cognitive style, in this regard to reading news stories. With the trend toward declining readership of newspapers, particularly, giving readers what they want, in the form that they want it, will be a survival tactic. For specialized magazines, using the "type theory" of Carl Jung, as defined by Myers and Briggs, can help to serve their readers better.

FURTHER RESEARCH

Additional research is necessary to further test cognitive styles and preference for other types of science information, as well as preference for other subjects. This study examined only preference for medical information, but it would be interesting and informative to see how readers prefer other less "serious" scientific information, such as the dinosaur and comet controversy or the anthropological search for the mythical Eve. In addition, preference for other topics of information, any and all topics need to be examined.

The preference of artwork accompanying those articles would be interesting to test also. If we compare the photographs in Omni as opposed to

the more conservative Scientific American, we might find that some of the cognitive types would prefer the more formal style of photography in Scientific American, as opposed to the artistic style of Omni. This research could be extended to charts, graphs and infographics.

Research on advertising copy to determine which emphasis most appeals to consumers of varying styles has yet to be done and could improve the impact of media messages. Advertising copy for prescription drug and over-the-counter drugs could also be scrutinized. In addition, testing the relationship between cognitive styles and mass media consumption is also advisable.

Not only research topics, but the research designs themselves need to be varied in future studies. This dissertation research was just the first step in investigating the uses of cognitive styles as an editorial and marketing variable. Future research should include the use of experimental designs from which we can draw conclusions to make predictions.

The possibilities for this line of research are virtually endless. Again, it goes beyond the uses and gratifications approach. And it will not replace demographics, but used in conjunction with those demographics, it can offer editors and marketers an invaluable tool to serve their customers better.

BIBLIOGRAPHY

BIBLIOGRAPHY

- Baker, D.R. (1985). Predictive value of attitude, cognitive ability, and personality to science achievement in the middle school. Journal of Research in Science Teaching, 22, 103-113.
- Blaylock, B.K. & Rees, L.P. (1984). Cognitive style and the usefulness of information. Decision Sciences, 15, 74-91.
- Bostonian, L.R. & Byrne, T.E. (1984). Comprehension of styles of science writing. Journalism Quarterly, 61, 676-678.
- Bostonian, L.R. (1983). How active, passive and nominal styles affect readability of science writing. Journalism Quarterly, 60, 635-640.
- Briggs, K. C. & Myers, I. B. (1976). Myers-Briggs Type Indicator. Palo Alto: Consulting Psychologists Press.
- Broberg, K. (1973). Scientists' stopping behavior as indicator of writer's skill. Journalism Quarterly, 50, 763-767.
- Cacioppo, J.T. and Petty, R. E. (1982). The need for cognition. Journal of Personality and Social Psychology, 45.
- Carlyn, M. (1977). An Assessment of the Myers-Briggs Type Indicator. Journal of Personality Assessment, 41, 461-473.
- Carskadon, T.G. & Knudson, M.L. (1978). Relationships between conceptual systems and psychological types. Psychological Reports, 42, 483-486.
- Champion, D. J. (1981). Basic statistics for social research. New York: MacMillan Publishing.
- Cramer, B. (1991a, May 10). Newest drug for cancer patients combats nauseating side effects of chemotherapy. VUMC Reporter, pp. 1, 2.
- Cramer, B. (1991b, September 27). From diabetics to divers, patients experience healing powers of the hyperbaric chamber. VUMC Reporter, pp. 1,3.
- Ferguson, J. & Fletcher, C. (1987). Personality type and cognitive style. Psychological Reports, 60, 959-964.

- Funkhouser, G. (1969). Levels of science writing in public information sources. Journalism Quarterly, 46, 721-726.
- Funkhouser, G. & Maccoby, N. (1973). Tailoring science writing to the general audience. Journalism Quarterly, 50, 220-226.
- Funkhouser, G. & Maccoby, N. (1974). An experimental study on communicating specialized science information to a lay audience. Communications Research, 1, 110-128.
- Furse, D.H. & Greenberg, B.A. (1975). Cognitive style and attitude as market segmentation variables: a comparison. Journal of Advertising, 4, 39-43.
- Guilford, J.P. (1980). Cognitive styles: what are they? Educational and Psychological Measurement, 40, 715-735.
- Hart, J.J. (1982). Psychology of the scientist: XLVI: correlation between theoretical orientation in psychology and personality type. Psychological Reports, 50, 795-801.
- Hall, C. S. (1973). A primer of Jungian psychology. New York: Taplinger Publishing.
- Hirschman, E.C. (1985). Scientific style and the conduct of consumer research. Journal of Consumer Research, 12, 225-239.
- Holland, J.L. (1985). Making vocational choices: a theory of vocational personalities and work environments, Englewood Cliffs: Prentice-Hall, Incorporated.
- Jaroff, L. (1987). [Unpublished transcript of discussion by science magazine editors]. Scientists' Institute for Public Information, pp. 29, 30, 55.
- Johnson, K. (1963). Dimensions of judgment of science news stories. Journalism Quarterly, 40, 315-322.
- Jung, C.G. (1971). Psychological Types. Princeton: Princeton University Press.
- Kaufman, L. (1983, June). Scorecard needed for science books. Media & Marketing Decisions, pp. 64-65, 172.
- Kendig, F. (1987). [Unpublished transcript of discussion by science magazine editors]. Scientists' Institute for Public Information, pp. 27.

- Kerin, R.A. & Slocum, J.W. (1981). Decision-making style and acquisition of information: further exploration of the Myers-Briggs Type Indicator. Psychological Reports, 49, 132-134.
- Kerlinger, F. N. (1986). Foundations of behavioral research. New York: Holt, Rinehart and Winston.
- Lewenstein, B.V. (1987). Was there really a popular science "boom"? Science, Technology and Human Values, 20, 29-41.
- Marshall, C. (1981, February 23). Who will survive science book shoot-out? Advertising Age, p. 30.
- Miller, J. Scientific Literacy in the United States. In Ciba Foundation Conference (Ed.), Communicating Science to the Public. New York: John Wiley and Sons, 1987.
- Miller, M.J. & Tobacyk, J. (1987). Would a conventional/realistic type subscribe to National Geographic? expanding Holland's typology. Psychological Reports, 60, 561-562.
- Millott, R. & Cranney, A.G. (1976). Personality correlates of college reading and study skills. Journal of Reading Behavior, 8, 335-336.
- Mitroff, I. & Kilman, R.H. (1978). Methodological Approaches to Social Science. San Francisco: Jossey-Bass.
- Myers, I.B. (1976). Introduction to type. Palo Alto: Consulting Psychologists Press, Inc.
- Myers, I.B. (1980). Introduction to type. Palo Alto: Consulting Psychologists Press, Inc.
- Myers, I.B. & McCaulley, M.H. (1985). A guide to the development and use of the Myers-Briggs Type Indicator. Palo Alto: Consulting Psychologists Press.
- Neel, T. (1991, September 20). Study weighs benefits of fat vs. calorie loss. VUMC Reporter, pp. 1, 3.
- Nunn, C. (1973). Readership and coverage of science and technology in newspapers. Journalism Quarterly, 56, 27-30.

- Oates, W. R. (1973). Social and ethical content in science coverage by news-magazines. Journalism Quarterly, 50, 680-684.
- Ott, L., Larson, R. F., and Mendenhall, W. (1987). Statistics: a tool for the social sciences. New York: Duxbury Press.
- Pfaff, F. & Canape, C. (1985, October). Science books search for the right formula. Media and Marketing Decisions. pp. 53, 57, 146, 150.
- Pion, G.M. & Lipsey, M.W. (1981). Public attitudes toward science and technology: what have the survey's told us? Public Opinion Quarterly, 45, 303-316.
- Poston, L. (1991, January 25). Researchers use MRI to diagnose high blood pressure. VUMC Reporter, p. 3.
- Reynolds, R.J. & Hope, A.G. (1970). Typology as a moderating variable in success in science. Psychological Reports, 26, 711-716.
- Robinson, E. J. (1963). Analyzing the impact of science reporting. Journalism Quarterly, 40, 306-314.
- Ross, J. (1966). The relationship between a Jungian personality inventory and tests of ability, personality and interest. Australian Journal of Psychology, 18, 1-17.
- Ryan, M. (1979). Attitudes of scientists and journalists toward media coverage of science news. Journalism Quarterly, 56, 18-25.
- Saper, Z. & Forest, J. (1987). Personality variables and interest in self-help books. Psychological Reports, 60, 563-566.
- Scientists' Institute for Public Information. (1987). [Transcript of roundtable discussion by science magazine editors]. New York.
- Simmons Market Research Bureau. (1986) Magazine audiences and readers per copy. Simmons 1986 study of media & markets.
- Sorenson, J.S. & Sorenson, D.D. (1973). A comparison of science content in magazines in 1964-65 and 1969-70. Journalism Quarterly, 50, 97-101.
- Spache, G.D. (1976a) Diagnosing and correcting reading disabilities. Boston: Allyn and Bacon.

- Spache, G. D. (1976b.) Investigating the issues of reading disabilities. Boston: Allyn and Bacon.
- Stricker, L.J. & Ross, J. (1964). Some correlates of a Jungian personality inventory. Psychological Reports, 14, 623-643.
- Tankard, Jr., J.W. & Ryan, M. (1974). News source perceptions of accuracy of science coverage. Journalism Quarterly, 51, 219-334.
- Thompson, B. and Melancon, J.G. (1987). Validity of a measure of critical thinking skills. Psychological Reports, 60, 1123-1230.
- Tichenor, P.J.; Olien, C.N.; Harrison, A.; & Donohue, G. (1970). Mass Communication systems and communication accuracy in science news reporting. Journalism Quarterly, 47, 673-683.
- Ubell, E. (1963). Science in the press: newspapers vs. magazines. Journalism Quarterly, 40, 293-299.
- Urban, C.D. (1980). Correlates of magazine readership. Journal of Advertising Research, 20, 73-84.
- Wade, S. & Schramm, W. (1969). The mass media as sources of public affairs, science, and health knowledge. Public Opinion Quarterly, 33, 197-209.
- Williams, D. (1991, April 26). Ear Tumor procedure reduces risk of partial paralysis, hearing loss. VUMC Reporter, pp. 1, 2.
- Wilson, L. (1982, June). Science wars: the publishing empire strikes back. Magazine & Bookseller, pp. 15-23.
- Woods, M. (1986, August 17). Readers forsake science magazines. Monterey, California Peninsula Herald. p. 12.

APPENDICES

APPENDIX A

STUDENT DEMOGRAPHIC SURVEY FORM

Student Demographic Survey

Q-1. Your Sex (circle number of your answer)

1. Male
2. Female

Q-2. Your Present Age: _____ Years

Q-3. Your Race: (circle the number)

1. Black
2. White
3. American Indian
4. Other _____

Q-4. Do you consider yourself to be of Hispanic origin? (circle the number)

1. Yes
2. No

Q-5. Your Major: _____

Q-6. Your Present MTSU Class Rank (circle the number)

1. Freshman
2. Sophomore
3. Junior
4. Senior

Q-7. Estimate you present grade point average _____

APPENDIX B
SCIENCE ARTICLES
TESTING INSTRUMENT

1. Read the following two articles, then fill in the bubble A or B on the scan form indicating the letter of the article whose style of writing you prefer.

1. Article A

Millions of Americans suffering from high blood pressure are having the cause of their ailment diagnosed through a procedure that requires no surgery and no pain.

These patients have a kidney condition in which blood flow to their kidneys is decreased by a narrowing of the main artery into the renal organs. This life-threatening condition, called renal artery stenosis, has been difficult to detect, usually requiring a surgical procedure and a hospital stay.

Now with a technique developed at Polk University Medical Center known as magnetic resonance imaging, doctors can watch a computer screen to diagnose the condition.

Using the MRI method, doctors can scan the blood flow into the kidneys to determine if the constricted artery is reducing the normal blood flow into the kidneys, thus causing increased blood pressure.

The procedure, which is similar to the ultra-sound technique used to examine pregnant women, can be performed on an out-patient basis.

1. Article B

A Nashville teenager suffering from high blood pressure has had the cause of his ailment diagnosed through a procedure that requires no surgery and no pain.

Robert Johnson, an Overton High School senior, has a kidney condition in which blood flow to his kidneys is decreased by a narrowing of the main artery into his renal organs. This life-threatening condition, called renal artery stenosis, has been difficult to detect, usually requiring a surgical procedure and a hospital stay.

Now with a technique developed at Polk University Medical Center known as magnetic resonance imaging, doctors merely watched a computer screen to diagnose Robert's condition.

Using the MRI method, doctors scanned the blood flow into his kidneys to determine if the constricted artery was reducing the normal blood flow into the kidneys, thus causing increased blood pressure.

The procedure, which is similar to the ultra-sound technique used to examine pregnant women, was performed on an out-patient basis.

2. Read the following two articles, then fill in the bubble A or B on the scan form indicating the letter of the article whose style of writing you prefer.

2. Article A

A new drug which combats the nauseating side effects of cancer treatments is a major improvement for cancer patients, young and old.

Zofran, the brand name for ondansetron HCl, has shown remarkable results in controlling the nausea and vomiting associated with cancer chemotherapy treatments with fewer side effects and greater positive effects than drugs currently in use.

Dr. John D. Hainsworth, associate professor of Medicine and director of the inpatient cancer unit at Polk University Medical Center, says, "Studies show that using Zofran completely controlled nausea and vomiting in 40-55 percent of patients." The most commonly used drug until now, Reglan, controlled these side effects "in only 30-35 percent of the patients."

Zofran works specifically on patients receiving cisplatin chemotherapy for cancer. Hainsworth says Zofran was tested initially for nausea and vomiting produced by cisplatin because this therapy causes the worst side effects of all chemotherapy drugs and is also the most widely used.

Without effective antiemetic drugs, which combat nausea and vomiting, many patients treated with common chemotherapy drugs tend to have bouts of vomiting that can last up to 18 hours.

Common side effects of Reglan and other antiemetic drugs include painful muscle contractions in the face and neck, and sedation for up to 24 hours after the chemotherapy treatment. The new drug is especially good news for children who cannot take Reglan because they suffer the worst side effects with this drug.

Further studies will determine if Zofran works as well with non-cisplatin chemotherapies.

2. Article B

A new drug which combats the nauseating side effects of cancer treatments is a major improvement for cancer patients, young and old.

The new drug brandnamed Zofran has shown remarkable results in controlling the nauseating effects associated with cancer chemotherapy treatments and has fewer side effects and greater positive effects than drugs currently in use.

Researchers say that studies show that using Zofran completely controlled nausea and vomiting in most patients. The most commonly used drug until now, Reglan, controlled these side effects "in only a few patients."

Zofran works specifically on patients receiving cisplatin chemotherapy for cancer. It was tested initially for nausea and vomiting produced by cisplatin because this therapy causes the worst side effects of all chemotherapy drugs and is also the most widely used.

Without effective antiemetic drugs, which combat nausea and vomiting, many patients treated with common chemotherapy drugs tend to have bouts of vomiting that can last for several hours.

Common side effects of Reglan and other antiemetic drugs include painful muscle contractions and sedation. The new drug is especially good news for children who cannot take Reglan because they suffer the worst side effects with this drug.

Further studies will determine if Zofran works as well with non-cisplatin chemotherapies as it has with cisplatin treatments.

3. Read the following two articles, then fill in the bubble A or B on the scan form indicating the letter of the article whose style of writing you prefer.

3. Article A

She smiles and waves. You can talk to Ruth Haws, but you can't touch her.

Haws, 61, is undergoing treatment in the Hyperbaric Oxygen Chamber at Polk University Medical Center.

The chamber in which Haws lays looks very much like Snow White's crystal case in which she awaited her prince's kiss. However, in this case Haws, a diabetic, will receive high pressure oxygen treatments for a non-healing wound on her left leg.

Only a microphone connects her with the nursing staff who is regulating the air pressure inside the chamber. With the assistance of registered nurse Nathan Babbitt, Haws is under oxygen pressure equal to one atmosphere more than usual.

Babbitt explains, "The chamber makes it possible to place the patient in an environment of 100 percent pure oxygen which can be pressurized up to as much as three atmospheres. A patient will usually receive one two-hour treatment a day, five days a week for about four or five weeks.

The chamber is used most often to treat non-healing wounds. If the patient has tissue perfusion problems or low blood flow to a large wound, this chamber will allow greater oxygenation to these tissues. Wound infections may be controlled with antibiotics and the bactericidal effects of the chamber," Babbitt says.

Other illnesses such as radiation necrosis, gas gangrene and crush injuries can also be treated with the chamber. In emergencies it is also used to treat "diver's bends" or decompression sickness, as well as carbon monoxide poisoning.

Polk's hyperbaric chamber is the only one in Middle Tennessee and has been in use since 1964.

3. Article B

She smiles continuously and does not move. You can talk to Darla, but you can't touch her.

Darla Dummit is a mechanized dummy used to test the Hyperbaric Oxygen Chamber at Polk University Medical Center.

The chamber in which Darla lays looks very much like Snow White's crystal case in which she awaited her prince's kiss. However, in this case Darla will receive a simulated high oxygen treatment for a supposed non-healing wound on her left leg.

Only wires connect "the patient" with the nursing staff outside who is regulating the air pressure inside the chamber.

Sensors show registered nurse Nathan Babbitt that Darla is under oxygen pressure equal to one atmosphere more than normal.

Babbitt explains, "If our tests are successful, the chamber will make it possible to place the patient in an environment of 100 percent pure oxygen which can be pressurized up to as much as three atmospheres. A patient would receive one two-hour treatment a day, five days a week for about four or five weeks."

The chamber is designed to be used most often to treat non-healing wounds. If the patient has tissue perfusion problems or low blood flow to a large wound, this chamber will allow greater oxygenation to these tissues. Wound infections would be treated with antibiotics and the bactericidal effects with the chamber."

Other illnesses such as radiation necrosis, gas gangrene, and crush injuries can also be treated in the chamber. Researchers also envision the chamber being used to treat "diver's bends" or decompression sickness, as well as carbon monoxide poisoning.

"We feel that once the chamber is in actual use, other uses will become apparent and it will be seen as a regular adjunct to more standard methods of treatment," forecasts Babbitt. The chamber will continue to be tested with Darla Dummit. Doctors hope the hyperbaric chamber will be ready for human patients at Polk Medical Center by Fall 1973.

4. Read the following two articles, then fill in the bubble A or B on the scan form indicating the letter of the article whose style of writing you prefer.

4. Article A

Is a calorie a calorie?

That's the question researchers at the Clinical Nutrition Research Unit at Polk University Medical Center are asking.

And to put it exactly: Do fat calories make you gain more weight than carbohydrate calories might? In theory, at least, they will.

The case for fat as the culprit in weight gain, and specifically in obesity, is gaining strength in scientific literature, but the jury is still out. No hard evidence exists to date to prove that they will or to show why they will.

James Hilton, Ph.D., associate professor of pediatrics at PUMC, has designed a study which he anticipates will document the role of excess dietary fat in weight gain leading to disabling obesity.

Hilton says, "Some of the more recent evidence from our lab suggests that fat and carbohydrate calories may be different."

Previous studies have shown that the body has an ability to compensate for fluctuations in carbohydrate intake, increasing its rate of carbohydrate oxidation if intake suddenly increases. But there seems to be little or no reaction to similar fluctuations in intake of fat calories.

"The fact that nothing happens means that the fat is being stored in the body," Hilton says.

Theories suggest that the body developed efficient means to regulate carbohydrate levels because there is so little of it in storage. But since there is great capacity for storage of fat, the need for tight regulation is not as immediate. And as our body stores excess fat, weight gain goes up.

Hilton's study may give us the definitive answer once and for all.

4. Article B

Is a calorie a calorie?

That's the question researchers at the Clinical Nutrition Research Unit at Polk University Medical Center have answered in a recent study.

To put it exactly: "Do fat calories make you gain more weight than carbohydrate calories will?" New evidence says they do, indeed.

The case for fat as the culprit in weight gain, and specifically in obesity, is gaining strength in scientific literature as more and more studies support this idea.

James Hilton, Ph.D., associate professor of pediatrics at PUMC, has conducted a study with which he documents the role of excess dietary fat in weight gain leading to disabling obesity.

Hilton says, "Some of the more recent evidence from our lab and others around the country says that fat and carbohydrate calories are different."

Previous studies have shown that the body has an ability to compensate for fluctuations in carbohydrate intake, increasing its rate of carbohydrate oxidation if intake suddenly increases. But there seems to be little or no reaction to similar fluctuations in intake of fat calories.

Hilton says that research demonstrates that the body developed efficient means to regulate carbohydrate levels because there is so little of it in storage. But since there is a great capacity for storage of fat, the need for tight regulation is not as immediate. And as our body stores excess fat, weight gain goes up.

Hilton's study has given us the answer once and for all: you should count calories, but they should be fat calories, not carbohydrate ones.

5. Read the following two articles, then fill in the bubble A or B on the scan form indicating the letter of the article whose style of writing you prefer.

5. Article A

A new procedure using the photon knife to remove benign tumors of the inner ear should be safer and reduce post-surgery complications, says a Polk University Medical Center surgeon.

This "radiosurgery" procedure, as it is called, will also reduce hospital stay, expense, and allow patients to return to their normal routine more quickly, says Dr. Keith Michaels, assistant professor of neurosurgery.

Benign, or non-malignant, tumors of the balance nerve in the inner ear can cause hearing loss and severe balance problems. Left untreated, these tumors can also cause serious brain complications.

"By virtue of the location, removing these tumors can be very dangerous," Michaels says. "The usual method of surgery is a major operation with a large section of the brain exposed. The surgery is a very hard one for the patient and there are serious post-surgery complications, such as meningitis."

In a significant number of cases conventional neurosurgery can leave the patient with a hearing loss and partial paralysis of the face. Recovery requires a couple of days in intensive care, then two more weeks in the hospital.

Michaels explains that use of the photon knife permits a precision not possible with conventional scalpels and damage to facial nerves is eliminated. "And with radiosurgery, the patient is in the hospital for two days and is back at work in a week."

A difference also exists in the costs of the two procedures: while conventional neurosurgery can cost as much as \$60,000, radiosurgery with the photon knife is around \$15,000.

This condition is diagnosed in 1500-2000 patients per million per year. Michaels expects between 250-300 patients with the condition to come to Polk for treatment next year. The condition generally affects men and women over the age of 30.

5. Article B

A new procedure using the photon knife to remove benign tumors of the inner ear should be safer and reduce post-surgery complications, says a Polk University Medical Center surgeon.

This "radiosurgery" procedure, as it is called, will also reduce hospital stay, and allow patients to return to their normal routine more quickly, says Dr. Keith Michaels, assistant professor of neurosurgery.

Benign, or non-malignant, tumors of the balance nerve in the inner ear can cause hearing loss and severe balance problems. Left untreated, these tumors can also cause serious brain complications.

"By virtue of the location, removing these tumors can be very dangerous," Michaels says. "The usual method of surgery is a major operation with a large section of the brain exposed. The surgery is a very hard one for the patient and there are serious post-surgery complications, such as meningitis."

In a significant number of cases conventional neurosurgery can leave the patient with a hearing loss and partial paralysis of the face. Recovery requires a couple of days in intensive care, then two more weeks in the hospital.

Michaels explains that use of the photon knife permits a precision not possible with conventional scalpels and damage to facial nerves is lessened. "With both surgeries, the patient is in the hospital for two days and is back at work in a week."

While radiosurgery is somewhat safer, little difference exists in the costs of the two procedures: both conventional neurosurgery and radiosurgery with the photon knife cost around \$60,000.

This condition is diagnosed in 15-20 patients per million per year. Michaels expects between 25-30 patients with the condition to come to Polk for treatment next year. The condition generally affects men and women over the age of 65.

APPENDIX C
SCIENCE ARTICLES PRE-TEST
AND MEANS

Read each article below and after reading each, rate the article on the scale below 11. Look at the list of adjectives at each end of the scale, then indicate to what degree this article emphasizes objective data or personal warmth.

1. Article A

Millions of Americans suffering from high blood pressure are having the cause of their ailment diagnosed through a procedure that requires no surgery and no pain.

These patients have a kidney condition in which blood flow to their kidneys is decreased by a narrowing of the main artery into the renal organs. This life-threatening condition, called renal artery stenosis, has been difficult to detect, usually requiring a surgical procedure and a hospital stay.

Now with a technique developed at Polk University Medical Center known as magnetic resonance imaging, doctors can watch a computer screen to diagnose the condition.

Using the MRI method, doctors can scan the blood flow into the kidneys to determine if the constricted artery is reducing the normal blood flow into the kidneys, thus causing increased blood pressure.

The procedure, which is similar to the ultra-sound technique used to examine pregnant women, can be performed on an out-patient basis.

OBJECTIVE DATA
IMPERSONAL
UNEMOTIONAL
UNPERSONAL
COLD

PERSONAL WARMTH
EMOTIONAL
SUBJECTIVE
PERSONAL
WARM

1 2 3 4 5 6 7 8 9 10 11

Mean = 2.25

1. Article B

A Nashville teenager suffering from high blood pressure has had the cause of his ailment diagnosed through a procedure that requires no surgery and no pain.

Robert Johnson, an Overton High School senior, has a kidney condition in which blood flow to his kidneys is decreased by a narrowing of the main artery into his renal organs. This life-threatening condition, called renal artery stenosis, has been difficult to detect, usually requiring a surgical procedure and a hospital stay.

Now with a technique developed at Polk University Medical Center known as magnetic resonance imaging, doctors merely watched a computer screen to diagnose Robert's condition.

Using the MRI method, doctors scanned the blood flow into his kidneys to determine if the constricted artery was reducing the normal blood flow into the kidneys, thus causing increased blood pressure.

The procedure, which is similar to the ultra-sound technique used to examine pregnant women, was performed on an out-patient basis.

OBJECTIVE DATA
IMPERSONAL
UNEMOTIONAL
UNPERSONAL
COLD

PERSONAL WARMTH
EMOTIONAL
SUBJECTIVE
PERSONAL
WARM

1 2 3 4 5 6 7 8 9 10 11

Mean = 5.42

2. Article A

SECRET
000000
00000000
0000000
00000000

SECRET
000000
000000
000000
000000

2. Article B

[illegible]

SECRET
REF ID: A66510
CLASS
PAGE 2

1 2 3 4 5 6 7

141

Read each article below and after reading each, rate the article on the scale below 11. Look at the list of adjectives at each end of the scale, then indicate to what degree this article emphasizes the present or the future.

3. Article A

She smiles and waxes. You can talk to Ruth Hawn, but you can't touch her.

Hawn, 61, is undergoing treatment in the Hyperbaric Oxygen Chamber at Polk University Medical Center.

The chamber in which Hawn lays looks very much like Snow White's crystal case in which she swam her prince's kiss. However, in this case, Hawn, a diabetic, will receive high pressure oxygen treatment for a non-healing wound on her left leg.

Only a microphone connects her with the nursing staff who is regulating the air pressure inside the chamber. With the assistance of registered nurse Nathan Babbitt, Hawn is under oxygen pressure equal to one atmosphere more than usual.

Babbitt explains, "The chamber makes it possible to place the patient in an environment of 100 percent pure oxygen which can be pressurized up to as much as three atmospheres. A patient will usually receive one two-hour treatment a day, five days a week for about four or five weeks."

The chamber is used most often to treat non-healing wounds. If the patient has tissue perfusion problems or low blood flow to a large wound, this chamber will allow greater oxygenation to these tissues. Wound infections may be controlled with antibiotics and the bactericidal effects of the chamber," Babbitt says.

Other illnesses such as radiation necrosis, gas gangrene and crush injuries can also be treated with the chamber. In emergency it is also used to treat "diver's bends" or decompression sickness, as well as carbon monoxide poisoning.

Polk's hyperbaric chamber is the only one in Middle Tennessee and has been in use since 1984.

Mean = 3.33

3. Article B

She smiles continuously and does not move. You can talk to Darla, but you can't touch her.

Darla Dummit is a mechanized dummy used to test the Hyperbaric Oxygen Chamber at Polk University Medical Center.

The chamber in which Darla lays looks very much like Snow White's crystal case in which she swam her prince's kiss. However, in this case, Darla will receive a simulated high oxygen treatment for a supposed non-healing wound on her left leg.

Only wires connect "the patient" with the nursing staff outside who is regulating the air pressure inside the chamber.

Sensors show registered nurse Nathan Babbitt that Darla is under oxygen pressure equal to one atmosphere more than normal.

Babbitt explains, "If our tests are successful, the chamber will make it possible to place the patient in an environment of 100 percent pure oxygen which can be pressurized up to as much as three atmospheres. A patient would receive one two-hour treatment a day, five days a week for about four or five weeks."

The chamber is designed to be used most often to treat non-healing wounds. If the patient has tissue perfusion problems or low blood flow to a large wound, this chamber will allow greater oxygenation to these tissues. Wound infections would be treated with antibiotics and the bactericidal effects with the chamber."

Other illnesses such as radiation necrosis, gas gangrene and crush injuries can also be treated in the chamber. Researchers also envision the chamber being used to treat "diver's bends" or decompression sickness, as well as carbon monoxide poisoning.

"We feel that once the chamber is in actual use, other uses will become apparent and it will be seen as a regular adjunct to more standard methods of treatment," forecasts Babbitt. The chamber will continue to be tested with Darla Dummit. Doctors hope the hyperbaric chamber will be ready for human patients at Polk Medical Center by Fall 1991.

Mean = 5.57

Read each article below and after reading each, rate the article on the scale below (1). Look at the list of objectives at each end of the scale; then indicate to what degree this article emphasizes information that is concrete or theoretical.

4. Article A

Is a calorie a calorie?

That's the question researchers at the Clinical Nutrition Research Unit at Folk University Medical Center are asking.

And to put it exactly: Do fat calories make you gain more weight than carbohydrate calories might? In theory, at least, they will.

The case for fat as the culprit in weight gain, and specifically in obesity, is gaining strength in scientific literature, but the jury is still out. No hard evidence exists to date to prove that they will or to show why they will.

James Hilton, Ph.D., associate professor of pediatrics at PUMC, has designed a study which he anticipates will document the role of excess dietary fat in weight gain leading to disabling obesity.

Hilton says, "Some of the more recent evidence from our lab suggests that fat and carbohydrate calories may be different."

Previous studies have shown that the body has an ability to compensate for fluctuations in carbohydrate intake, increasing its rate of carbohydrate oxidation if intake suddenly increases. But there seems to be little or no reaction to similar fluctuations in intake of fat calories.

"The fact that nothing happens means that the fat is being stored in the body," Hilton says.

Theories suggest that the body developed efficient means to regulate carbohydrate levels because there is so little of it in storage. But since there is great capacity for storage of fat, the need for tight regulation is not as immediate. And as our body stores excess fat, weight gain goes up.

Hilton's study may give us the definitive answer once and for all.

1.000000
0.900000
0.800000
0.700000
0.600000
0.500000
0.400000
0.300000
0.200000
0.100000
0.000000

Mean = 5.29

4. Article B

Is a calorie a calorie?

That's the question researchers at the Clinical Nutrition Research Unit at Folk University Medical Center have answered in a recent study.

To put it exactly: "Do fat calories make you gain more weight than carbohydrate calories will?" New evidence says they do, indeed.

The case for fat as the culprit in weight gain, and specifically in obesity, is gaining strength in scientific literature as more and more studies support this idea.

James Hilton, Ph.D., associate professor of pediatrics at PUMC, has conducted a study with which he documents the role of excess dietary fat in weight gain leading to disabling obesity.

Hilton says, "Some of the more recent evidence from our lab and others around the country says that fat and carbohydrate calories are different."

Previous studies have shown that the body has an ability to compensate for fluctuations in carbohydrate intake, increasing its rate of carbohydrate oxidation if intake suddenly increases. But there seems to be little or no reaction to similar fluctuations in intake of fat calories.

Hilton says that research demonstrates that the body developed efficient means to regulate carbohydrate levels because there is so little of it in storage. But since there is a great capacity for storage of fat, the need for tight regulation is not as immediate. And as our body stores excess fat, weight gain goes up.

Hilton's study has given us the answer once and for all: you should count calories, but they should be fat calories, not carbohydrate ones.

1.000000
0.900000
0.800000
0.700000
0.600000
0.500000
0.400000
0.300000
0.200000
0.100000
0.000000

Mean = 2.25

Read each article below and after reading each, rate the article on the scale below 1L. Look at the list of objectives at each end of the scale, then indicate to what degree this article emphasizes the practical or impractical.

S. Article A

A new procedure using the photon knife to remove benign tumors of the inner ear should be safer and reduce post-surgery complications, says a Polk University Medical Center surgeon.

This "radiosurgery" procedure, as it is called, will also reduce hospital stay, expense, and allow patients to return to their normal routine more quickly, says Dr. Keith Michaels, assistant professor of neurosurgery.

Benign, or non-malignant, tumors of the balance nerve in the inner ear can cause hearing loss and severe balance problems. Left untreated, these tumors can also cause serious brain complications.

"By virtue of the location, removing these tumors can be very dangerous," Michaels says. "The usual method of surgery is a major operation with a large section of the brain exposed. The surgery is a very hard one for the patient and there are serious post-surgery complications, such as meningitis."

In a significant number of cases conventional neurosurgery can leave the patient with a hearing loss and partial paralysis of the face. Recovery requires a couple of days in intensive care, then two more weeks in the hospital.

Michaels explains that use of the photon knife permits a precision not possible with conventional scalpels and damage to facial nerves is eliminated. "And with radiosurgery, the patient is in the hospital for two days and is back at work in a week."

A difference also exists in the costs of the two procedures: while conventional neurosurgery can cost as much as \$60,000, radiosurgery with the photon knife is around \$15,000.

This condition is diagnosed in 1500-2000 patients per million per year. Michaels expects between 250-300 patients with the condition to come to Polk for treatment next year. The condition generally affects men and women over the age of 30.

Practical
Impractical

Practical
Impractical

Mean = 2.24

S. Article B

A new procedure using the photon knife to remove benign tumors of the inner ear should be safer and reduce post-surgery complications, says a Polk University Medical Center surgeon.

This "radiosurgery" procedure, as it is called, will also reduce hospital stay, and allow patients to return to their normal routine more quickly, says Dr. Keith Michaels, assistant professor of neurosurgery.

Benign, or non-malignant, tumors of the balance nerve in the inner ear can cause hearing loss and severe balance problems. Left untreated, these tumors can also cause serious brain complications.

"By virtue of the location, removing these tumors can be very dangerous," Michaels says. "The usual method of surgery is a major operation with a large section of the brain exposed. The surgery is a very hard one for the patient and there are serious post-surgery complications, such as meningitis."

In a significant number of cases conventional neurosurgery can leave the patient with a hearing loss and partial paralysis of the face. Recovery requires a couple of days in intensive care, then two more weeks in the hospital.

Michaels explains that use of the photon knife permits a precision not possible with conventional scalpels and damage to facial nerves is lessened. "With both surgeries, the patient is in the hospital for two days and is back at work in a week."

While radiosurgery is somewhat safer, little difference exists in the costs of the two procedures: both conventional neurosurgery and radiosurgery with the photon knife cost around \$60,000.

This condition is diagnosed in 15-20 patients per million per year. Michaels expects between 25-30 patients with the condition to come to Polk for treatment next year. The condition generally affects men and women over the age of 65.

Practical
Impractical

Practical
Impractical

Mean = 4.40

APPENDIX D

MYERS-BRIGGS TYPE INDICATOR

SCORING SCALE

Table 2.2 Conversion table for preference scores and continuous scores

E, S, T, or J			L, N, F, or P		
Difference in Points	Preference Score	Continuous Score	Difference in Points	Preference Score	Continuous Score
1	1	99	0	1	101
2	3	97	1	3	103
3	5	95	2	5	105
4	7	93	3	7	107
5	9	91	4	9	109
6	11	89	5	11	111
7	13	87	6	13	113
8	15	85	7	15	115
9	17	83	8	17	117
10	19	81	9	19	119
11	21	79	10	21	121
12	23	77	11	23	123
13	25	75	12	25	125
14	27	73	13	27	127
15	29	71	14	29	129
16	31	69	15	31	131
17	33	67	16	33	133
18	35	65	17	35	135
19	37	63	18	37	137
20	39	61	19	39	139
21	41	59	20	41	141
22	43	57	21	43	143
23	45	55	22	45	145
24	47	53	23	47	147
25	49	51	24	49	149
26	51	49	25	51	151
27	53	47	26	53	153
28	55	45	27	55	155
29	57	43	28	57	157
30	59	41	29	59	159
31	61	39	30	61	161
32	63	37	31	63	163
33	65	35	32	65	165
34	67	33	33	67	167

Myers, I.B. & McCaulley, M.H. (1985). A guide to the development and use of the Myers-Briggs Type Indicator, Palo Alto: Consulting Psychologists Press.

Table 2.2 Conversion table for preference scores and continuous scores

E, S, T, or J			L, N, F, or P			
Difference in Points	Preference Score	Continuous Score	Difference in Points	Preference Score	Continuous Score	
Slight Preferences	1	99	0	1	101	Low Preference Scores
	2	97	1	3	103	
	3	95	2	5	105	
	4	93	3	7	107	
	5	91	4	9	109	
Moderate Preferences	6	89	5	11	111	
	7	87	6	13	113	
	8	85	7	15	115	
	9	83	8	17	117	
	10	81	9	19	119	
Clear Preferences	11	79	10	21	121	
	12	77	11	23	123	
	13	75	12	25	125	
	14	73	13	27	127	
	15	71	14	29	129	
	16	69	15	31	131	
	17	67	16	33	133	
	18	65	17	35	135	
	19	63	18	37	137	
	20	61	19	39	139	
	21	59	20	41	141	
	22	57	21	43	143	
	23	55	22	45	145	
	24	53	23	47	147	
	25	51	24	49	149	
	26	49	25	51	151	
	27	47	26	53	153	
	28	45	27	55	155	
	29	43	28	57	157	
	30	41	29	59	159	
Very Clear Preferences	31	39	30	61	161	High Preference Scores
	32	37	31	63	163	
	33	35	32	65	165	
	34	33	33	67	167	

Very Clear Preferences - 41 or higher, or 31 for F

Clear Preferences - 21-39, or 31 for F

Moderate Preferences - 11-19

Slight Preferences - 1-9

The SAS System

	SN_RAW	Frequency	Percent	Cumulative Frequency	Cumulative Percent	
Sensing	33	1	0.6	1	0.6	
High Scores	39	1	0.6	2	1.1	
	47	2	1.1	4	2.3	
	49	4	2.3	8	4.6	
	51	2	1.1	10	5.7	
	55	1	0.6	11	6.3	
	57	4	2.3	15	8.6	
	59	1	0.6	16	9.2	
	61	3	1.7	19	10.9	
	63	4	2.3	23	13.2	
	65	3	1.7	26	14.9	
	67	2	1.1	28	16.1	47
	71	5	2.9	33	19.0	
	73	4	2.3	37	21.3	High
	75	6	3.4	43	24.7	
	77	3	1.7	46	26.4	Sensing
	79	3	1.7	49	28.2	
Median = 80	81	6	3.4	55	31.6	
	83	5	2.9	60	34.5	
	85	4	2.3	64	36.8	
	87	5	2.9	69	39.7	
	89 Delete	5	2.9	74	42.5	49
	91	5	2.9	79	45.4	
	93	1	0.6	80	46.0	Low
	95	5	2.9	85	48.9	
	97	5	2.9	90	51.7	Sensing
Low Scores	99	8	4.6	98	56.3	
Low Scores	101	2	1.1	100	57.5	
	103	4	2.3	104	59.8	
	105	6	3.4	110	63.2	
	107	7	4.0	117	67.2	
	109	1	0.6	118	67.8	
	111 Delete	2	1.1	120	69.0	
	113	6	3.4	126	72.4	38
	115	3	1.7	129	74.1	
	116	1	0.6	130	74.7	Low
	117	2	1.1	132	75.9	
	119	1	0.6	133	76.4	Intuitive
Median = 122	121	3	1.7	136	78.2	
	123	4	2.3	140	80.5	
	125	1	0.6	141	81.0	
	127	4	2.3	145	83.3	
	129	1	0.6	146	83.9	
	131	4	2.3	150	86.2	
	133	5	2.9	155	89.1	
	135	2	1.1	157	90.2	
	137	4	2.3	161	92.5	38
	139	2	1.1	163	93.7	
	141	1	0.6	164	94.3	High
Intuitive	143	3	1.7	167	96.0	
High Scores	145	2	1.1	169	97.1	
	147	5	2.9	174	100.0	Intuitive

The SAS System

	TF_RAV	Frequency	Percent	Cumulative Frequency	Cumulative Percent	
Thinking	35	1	0.6	1	0.6	
	39	1	0.6	2	1.1	
High Scores	43	3	1.7	5	2.9	
	47	1	0.6	6	3.4	
	51	3	1.7	9	5.2	
	53	1	0.6	10	5.7	
	57	2	1.1	12	6.9	
	59	1	0.6	13	7.5	
	61	1	0.6	14	8.0	
	63	2	1.1	16	9.2	
	65	2	1.1	18	10.3	
	67	2	1.1	20	11.5	
	69	3	1.7	23	13.2	45
	71	2	1.1	25	14.4	
	73	4	2.3	29	16.7	High
	75	1	0.6	30	17.2	
	77	4	2.3	34	19.5	Thinking
	79	7	4.0	41	23.6	
	81	4	2.3	45	25.9	
Median = 83	83	2	1.1	47	27.6	
	85	3	1.7	51	29.3	
	87	3	1.7	54	31.0	
	89	6	3.4	60	34.5	46
	91	9	5.2	69	39.7	
	93	3	1.7	72	41.4	Low
	95	8	4.6	80	46.0	
Low Scores	97	7	4.0	87	50.0	Thinking
	99	4	2.3	91	52.3	
Low Scores	101	3	1.7	94	54.0	
	103	5	2.9	99	56.9	
	105	3	1.7	102	58.6	
	107	3	1.7	105	60.3	
	109	5	2.9	110	63.2	46
	111	6	3.4	116	66.7	
	113	5	2.9	121	69.5	Low
	115	3	1.7	124	71.3	
	117	6	3.4	130	74.7	Feeling
Median = 119	119	7	4.0	137	78.7	
	121	2	1.1	139	79.9	
	123	8	4.6	147	84.5	
	125	6	3.4	153	87.9	
	127	3	1.7	156	89.7	
	129	4	2.3	160	92.0	37
	131	3	1.7	163	93.7	
	133	5	2.9	168	96.6	High
Feeling	135	3	1.7	171	98.3	
	137	2	1.1	173	99.4	Feeling
High Scores	139	1	0.6	174	100.0	

APPENDIX E

CHI-SQUARE CONTINGENCY TABLES

FOR SCIENCE ARTICLES 1-5 ON

HIGH SENSING-INTUITIVE SCALES

HIGH S/N

TABLE OF SN_HIGH BY SCI1

SN_HIGH SCI1

Frequency Percent Row Pct Col Pct	OBJECTIV E DATA	PERSONAL WARMTH	Total
SENSING	14 16.09 28.57 48.28	35 40.23 71.43 60.34	49 56.32
INTUITIVE	15 17.24 39.47 51.72	23 26.44 60.53 39.66	38 43.68
Total	29 33.33	58 66.67	87 100.00

Frequency Missing = 87

STATISTICS FOR TABLE OF SN_HIGH BY SCI1

Statistic	DF	Value	Prob
Chi-Square	1	1.145	0.285
Likelihood Ratio Chi-Square	1	1.141	0.285
Continuity Adj. Chi-Square	1	0.707	0.401
Mantel-Haenszel Chi-Square	1	1.132	0.287
Fisher's Exact Test (Left)			0.200
(Right)			0.903
(2-Tail)			0.360
Phi Coefficient		-0.115	
Contingency Coefficient		0.114	
Cramer's V		-0.115	

Effective Sample Size = 87

Frequency Missing = 87

WARNING: 50% of the data are missing.

HIGH S/N

TABLE OF SN_HIGH BY SCI2

SN_HIGH	SCI2		
Frequency			
Percent			
Row Pct			
Col Pct	DETAILS	GENERALI TIES	Total
SENSING	23	26	49
	26.44	29.89	56.32
	46.94	53.06	
	47.92	66.67	
INTUITIVE	25	13	38
	28.74	14.94	43.68
	65.79	34.21	
	52.08	33.33	
Total	48	39	87
	55.17	44.83	100.00

Frequency Missing = 87

STATISTICS FOR TABLE OF SN_HIGH BY SCI2

Statistic	DF	Value	Prob
Chi-Square	1	3.075	0.080
Likelihood Ratio Chi-Square	1	3.106	0.078
Continuity Adj. Chi-Square	1	2.360	0.124
Mantel-Haenszel Chi-Square	1	3.040	0.081
Fisher's Exact Test (Left)			0.062
(Right)			0.976
(2-Tail)			0.088
Phi Coefficient		-0.188	
Contingency Coefficient		0.185	
Cramer's V		-0.188	

Effective Sample Size = 87

Frequency Missing = 87

WARNING: 50% of the data are missing.

HIGH S/N

TABLE OF SN_HIGH BY SCI3

SN_HIGH	SCI3	
Frequency		
Percent		
Row Pct		
Col Pct	PRESENT	FUTURE
Total		
SENSING	36	13
	41.38	14.94
	73.47	26.53
	58.06	52.00
INTUITIVE	26	12
	29.89	13.79
	68.42	31.58
	41.94	48.00
Total	62	25
	71.26	28.74
		100.00

Frequency Missing = 87

STATISTICS FOR TABLE OF SN_HIGH BY SCI3

Statistic	DF	Value	Prob
Chi-Square	1	0.266	0.606
Likelihood Ratio Chi-Square	1	0.265	0.606
Continuity Adj. Chi-Square	1	0.077	0.782
Mantel-Haenszel Chi-Square	1	0.263	0.608
Fisher's Exact Test (Left)			0.775
(Right)			0.389
(2-Tail)			0.639
Phi Coefficient		0.055	
Contingency Coefficient		0.055	
Cramer's V		0.055	

Effective Sample Size = 87

Frequency Missing = 87

WARNING: 50% of the data are missing.

HIGH S/N

TABLE OF SN_HIGH BY SCI4

SN_HIGH	SCI4		
Frequency			
Percent			
Row Pct			
Col Pct	THEORETI CAL	CONCRETE	Total
SENSING	13 14.94 26.53 59.09	35 41.38 73.47 55.38	49 56.32
INTUITIVE	9 10.34 23.68 40.91	29 33.33 76.32 44.62	38 43.68
Total	22 25.29	65 74.71	87 100.00

Frequency Missing = 87

STATISTICS FOR TABLE OF SN_HIGH BY SCI4

Statistic	DF	Value	Prob
Chi-Square	1	0.092	0.762
Likelihood Ratio Chi-Square	1	0.092	0.762
Continuity Adj. Chi-Square	1	0.003	0.957
Mantel-Haenszel Chi-Square	1	0.091	0.763
Fisher's Exact Test (Left)			0.708
(Right)			0.481
(2-Tail)			0.808
Phi Coefficient		0.032	
Contingency Coefficient		0.032	
Cramer's V		0.032	

Effective Sample Size = 87

Frequency Missing = 87

WARNING: 50% of the data are missing.

HIGH S/N

TABLE OF SN_HIGH BY SC15

SN_HIGH	SC15		
Frequency			
Percent			
Row Pct			
Col Pct	PRACTICA	IMPRACTI	Total
	L	CAL	
SENSING	23	26	49
	26.44	29.89	56.32
	46.94	53.06	
	47.92	66.67	
INTUITIVE	25	13	38
	28.74	14.94	43.68
	65.79	34.21	
	52.08	33.33	
Total	48	39	87
	55.17	44.83	100.00

Frequency Missing = 87

STATISTICS FOR TABLE OF SN_HIGH BY SC15

Statistic	DF	Value	Prob
Chi-Square	1	3.075	0.080
Likelihood Ratio Chi-Square	1	3.106	0.078
Continuity Adj. Chi-Square	1	2.360	0.124
Mantel-Haenszel Chi-Square	1	3.040	0.081
Fisher's Exact Test (Left)			0.062
(Right)			0.976
(2-Tail)			0.088
Phi Coefficient		-0.188	
Contingency Coefficient		0.185	
Cramer's V		-0.188	

Effective Sample Size = 87

Frequency Missing = 87

WARNING: 50% of the data are missing.

APPENDIX F
CHI-SQUARE CONTINGENCY TABLES
FOR SCIENCE ARTICLES 1-5 ON
HIGH THINKING-FEELING SCALE

HIGH T/F

TABLE OF TF_HIGH BY SCI1

TF_HIGH		SCI1		
Frequency	Percent			
Row Pct	Col Pct	OBJECTIV	PERSONAL	Total
		E DATA	WARMTH	
THINKING		19	26	45
		23.17	31.71	54.88
		42.22	57.78	
		79.17	44.83	
FEELING		5	32	37
		6.10	39.02	45.12
		13.51	86.49	
		20.83	55.17	
Total		24	58	82
		29.27	70.73	100.00

Frequency Missing = 92

STATISTICS FOR TABLE OF TF_HIGH BY SCI1

Statistic	DF	Value	Prob
Chi-Square	1	8.084	0.004
Likelihood Ratio Chi-Square	1	8.548	0.003
Continuity Adj. Chi-Square	1	6.757	0.009
Mantel-Haenszel Chi-Square	1	7.985	0.005
Fisher's Exact Test (Left)			0.999
(Right)			4.00E-03
(2-Tail)			6.73E-03
Phi Coefficient		0.314	
Contingency Coefficient		0.300	
Cramer's V		0.314	

Effective Sample Size = 82

Frequency Missing = 92

WARNING: 53% of the data are missing.

HIGH T/F

TABLE OF TF_HIGH BY SCI2

TF_HIGH	SCI2		
Frequency			
Percent			
Row Pct			
Col Pct	DETAILS	GENERALI TIES	Total
THINKING	24	21	45
	29.27	25.61	54.88
	53.33	46.67	
	53.33	56.76	
FEELING	21	16	37
	25.61	19.51	45.12
	56.76	43.24	
	46.67	43.24	
Total	45	37	82
	54.88	45.12	100.00

Frequency Missing = 92

STATISTICS FOR TABLE OF TF_HIGH BY SCI2

Statistic	DF	Value	Prob
Chi-Square	1	0.096	0.757
Likelihood Ratio Chi-Square	1	0.096	0.756
Continuity Adj. Chi-Square	1	0.008	0.931
Mantel-Haenszel Chi-Square	1	0.095	0.758
Fisher's Exact Test (Left)			0.466
(Right)			0.703
(2-Tail)			0.825
Pni Coefficient		-0.034	
Contingency Coefficient		0.034	
Cramer's V		-0.034	

Effective Sample Size = 82

Frequency Missing = 92

WARNING: 53% of the data are missing.

HIGH T/F

TABLE OF TF_HIGH BY SCI3

TF_HIGH	SCI3		
Frequency			
Percent			
Row Pct			
Col Pct	PRESENT	FUTURE	Total
THINKING	32	13	45
	39.02	15.85	54.88
	71.11	28.89	
	56.14	52.00	
FEELING	25	12	37
	30.49	14.63	45.12
	67.57	32.43	
	43.86	48.00	
Total	57	25	82
	69.51	30.49	100.00

Frequency Missing = 92

STATISTICS FOR TABLE OF TF_HIGH BY SCI3

Statistic	DF	Value	Prob
Chi-Square	1	0.120	0.729
Likelihood Ratio Chi-Square	1	0.120	0.729
Continuity Adj. Chi-Square	1	0.011	0.916
Mantel-Haenszel Chi-Square	1	0.119	0.730
Fisher's Exact Test (Left)			0.722
(Right)			0.457
(2-Tail)			0.811
Phi Coefficient		0.038	
Contingency Coefficient		0.038	
Cramer's V		0.038	

Effective Sample Size = 82

Frequency Missing = 92

WARNING: 53% of the data are missing.

TABLE OF TF_HIGH BY SC14

Frequency Missing = 92

Statistic	DF	Value	Prob
Chi-Square	1	0.682	0.409
Likelihood Ratio Chi-Square	1	0.687	0.407
Continuity Adj. Chi-Square	1	0.345	0.557
Mantel-Haenszel Chi-Square	1	0.674	0.412
Fisher's Exact Test (Left)			0.857
(Right)			0.279
(2-Tail)			0.479
Phi Coefficient		0.091	
Contingency Coefficient		0.091	
Cramer's V		0.091	

WARNING: 53% of the data are missing.

HIGH T/F

TABLE OF TF_HIGH BY SC15

TF_HIGH		SC15		
Frequency				
Percent				
Row Pct				
Col Pct	PRACTICA L	IMPRACTI CAL	Total	
THINKING	30	15	45	
	36.59	18.29	54.88	
	66.67	33.33		
	63.83	42.86		
FEELING	17	20	37	
	20.73	24.39	45.12	
	45.95	54.05		
	36.17	57.14		
Total	47	35	82	
	57.32	42.68	100.00	

Frequency Missing = 92

STATISTICS FOR TABLE OF TF_HIGH BY SC15

Statistic	DF	Value	Prob
Chi-Square	1	3.563	0.059
Likelihood Ratio Chi-Square	1	3.578	0.059
Continuity Adj. Chi-Square	1	2.767	0.096
Mantel-Haenszel Chi-Square	1	3.520	0.061
Fisher's Exact Test (Left)			0.983
(Right)			0.048
(2-Tail)			0.074
Phi Coefficient		0.208	
Contingency Coefficient		0.204	
Cramer's V		0.208	

Effective Sample Size = 82

Frequency Missing = 92

WARNING: 53% of the data are missing.

VITA

Jane Harrison Morgan was born November 14, 1948. She is a native of Johnson City, Tennessee, where she attended the Johnson City Public School System graduating from Science Hill High School in 1966. She earned a Bachelor of Science degree from East Tennessee State University in 1972 with a major in English and a minor in journalism.

From 1972 to 1974 she was a learning disabilities teacher at Henry Johnson Elementary in Johnson City. Beginning in 1974, she was the Public Relations Director for the Johnson City School System for 12 years; during part of that time she also served as a journalism and television production teacher at Science Hill High School.

She has worked with Tennessee Eastman Company in Kingsport, Tennessee, as a writer-producer in its audio-visual department, as well as teaching public relations courses as an adjunct at East Tennessee State University. Ms. Morgan was a reporter for the Elizabethton Star in Elizabethton, Tennessee, and was associate editor of Southern Highlands magazine in Johnson City.

She is currently in her fourth year as an assistant professor of journalism at Middle Tennessee State University where she teaches mass media research, publications design, and public relations communications, as well as a teaching a medical reporting course at Vanderbilt University Medical Center. Her research interests are issues in communicating scientific and medical information to the public and risk communications.

Ms. Morgan attended the University of Tennessee, Knoxville from 1986 to 1989, earning a Doctor of Philosophy degree in Communications in August, 1992, with a major emphasis in journalism and a minor emphasis in marketing and advertising.