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**Intelligence and the growth of intelligence in Maharishi's Vedic
Psychology and twentieth century psychology**

Cranson, Robert William, Ph.D.

Maharishi International University, 1989

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INTELLIGENCE AND THE GROWTH OF INTELLIGENCE
IN MAHARISHI'S VEDIC PSYCHOLOGY
AND TWENTIETH CENTURY PSYCHOLOGY

Robert W. Cranson

A Dissertation

Submitted to the Graduate School of
Maharishi International University in partial
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Dissertation Supervisor: Professor David Orme-Johnson

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CERTIFICATE OF APPROVAL

PH.D. DISSERTATION

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To Maharishi Mahesh Yogi

Founder of Maharishi's Vedic Psychology
Founder of the Science of Creative Intelligence
Founder of Maharishi's Vedic Science and Technology

"What as experience, its object, [and]
The experiencer, are known in the three states
[waking, dreaming, and sleeping]
Different from them, the witness,
Pure intelligence, blissful ever I am!"

Kaivalya Upanishad, 18

"We are happy to present to the world an ideal system of education where not only will the intellect be fed and satisfied, but the basis of intellect, the field of pure intelligence, the source and basis of life, will be realized by everyone."

Maharishi Mahesh Yogi

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ABSTRACT

This dissertation has three parts. Part I reviews the history of intelligence research and presents the need for a comprehensive, unified theory of intelligence.

Part II introduces a Vedic theory of intelligence, based on the Vedic Psychology of Maharishi Mahesh Yogi and the Science of Creative Intelligence. The theory views intelligence ultimately as a unified field, expressing itself as various levels of subjective and objective life including ego, intellect, mind, senses, physiology, behavior, the collective intelligence of society, and ultimately the whole universe. It is proposed that Maharishi's Vedic theory of intelligence integrates, clarifies, and completes theories of intelligence, by resolving the major theoretical issues.

In Part III, part of the Vedic theory of intelligence was operationally defined. It was hypothesized that introduction of the Transcendental Meditation (TM) and TM-Sidhi program in a university education would result in improvements in ten measures representing abilities expressed at different levels of the mind: a questionnaire on experiences of higher

states of consciousness, Tellegen's Absorption Scale (TAS), Torrance Test of Creative Thinking (TTCT), Cattell's Culture Fair Intelligence Test (CFIT), Raven's Advanced Progressive Matrices, Hick's choice reaction time, Hick's simple reaction time, slope of Hick's choice RT-simple RT, intraindividual standard deviation of Hick's choice RT, the Group Embedded Figures Test (GEFT).

The hypothesis was tested in a 2-year longitudinal design with a control group. Subjects in the experimental group were 25 male and 22 female first year students from Maharishi International University; mean age was 25.2 years. The control group consisted of 22 male and 33 female first year students from the University of Northern Iowa, mean age 19 years.

The data was subjected to principal components analysis. The groups of variables that loaded on the first and second unrotated principal components were analyzed using MANCOVA, and separate one-way ANCOVA'S. The results supported the hypothesis that practice of the TM and TM-Sidhi program in a university setting results in increased intelligence, as measured by: 1) increased reported frequency of experiences of higher states of consciousness ($p < .001$), 2) higher scores on the CFIT ($p < .005$), 3) shorter simple and choice RT ($p < .025$, $p < .00001$) 4) decreased intraindividual variability (SD) of choice RT ($p < .00001$), and 4) decreased slope of RT

($p < .00001$).

Furthermore, the results supported the following hypotheses: a) intelligence can be developed; and b) pure intelligence integrates and supports the various levels of the mind. The results also provide evidence in support of five other points of the Vedic theory of intelligence, developed in part II.

The conclusion of this dissertation is that Maharishi's Vedic theory of intelligence is the most viable theory so far to explain the diverse findings regarding the structure and development of intelligence; furthermore, the TM and TM-Sidhi program is proposed as an important component of education that unfolds intelligence.

TABLE OF CONTENTS

	Page
LIST OF TABLES	xvi
LIST OF FIGURES	xvii
PART I. INTRODUCTION: INTELLIGENCE IN TWENTIETH CENTURY PSYCHOLOGY	1
THE NEED FOR A COMPREHENSIVE THEORY OF INTELLIGENCE	2
II. KNOWLEDGE OF INTELLIGENCE IN MAHARISHI'S VEDIC PSYCHOLOGY	16
CHAPTER	
1. <u>What is Intelligence?</u>	20
The discovery of the Unified Field in Modern Physics	21
The Intelligence of Nature: The View of Quantum Physics	25
The Intelligence of Nature as Described by Modern Scientists	29
The Intelligence of Nature in Maharishi's Vedic Science, the Science of Creative Intelligence, and Maharishi's Vedic Psychology	32
The Importance of Perspective	38
Maharishi's Vedic Theory of Intelligence: a Comprehensive Perspective	39
Fundamental Qualities of Intelligence in Terms Used by Twentieth Century Intelligence Theorists	48
Objective Verification from Modern Science	50
Verification of the Source of Creative Intelligence through Direct Experience	67
Evidence of the Nature of Intelligence from Vedic literature	69
Consideration of a Summary of Twentieth Century Views of Intelligence from the Perspective of Maharishi's Vedic Theory of Intelligence	75
2. <u>The Simultaneously Unified and Multiple Structure of Intelligence</u>	83

TABLE OF CONTENTS (CONTINUED)

Evidence of the Structure of Intelligence from Vedic Literature	89
Confirmation of the structure of Intelligence from Scientific Research	95
Verification of the Simultaneously Unified and Diverse Structure of Intelligence through Direct Experience: the TM and TM-Sidhi Program	99
3. <u>Subtheory of Knowledge Acquisition</u>	101
Knowledge Acquisition and States of Consciousness	112
Verification of the Process of Knowledge Acquisition and Higher States of Consciousness, from Vedic Literature and Personal Experiences	123
Verification of Points of the Subtheory of Knowledge Acquisition and Growth of Higher States of Consciousness from Scientific Research	130
4. <u>Integrated Functioning of Intelligence on Many Levels of Nature</u>	135
Description of the Integrative Nature of Intelligence from Vedic Literature	140
Support of the Integrative Nature of Intelligence by Direct Experience Using the Subjective Means of Investigation	142
Evidence for the Integrative Nature of Intelligence from Scientific Research	143
5. <u>How and How Much Can Intelligence Be Developed?</u>	147
Explicit View of the Nature of Human Potential	149
Verification of the Nature of Human Potential by Scientific Research	150
The Nature of Human Development	151
View of Intelligence in Relation to the Purpose of Human Life	154

TABLE OF CONTENTS (CONTINUED)

Evidence from Scientific Research, of the Relationship Between Happiness and Intelligence	157
Description of the Relationship Between Happiness and Intelligence in Vedic Literature	159
Support from Personal Experiences Using the Subjective Means of Gaining Knowledge	160
How Can Intelligence Be Developed?	162
How the TM and TM-Sidhi program unfolds Intelligence, in Terms of the Qualities of Pure Intelligence, and Its Relationship with the Mind and Intellect	165
Evidence of the Relationship Between the Qualities of Creative Intelligence, the TM and TM-Sidhi Program, and the Development of Intelligence, from Scientific Research	171
Description of Prajna Aparadha and the Established Intellect in Vedic Literature	171
How the TM and TM-Sidhi Program Unfolds Intelligence from the Point of View of the Mind and Body	173
How the TM and TM-Sidhi Program Develops Higher States of Consciousness	177
Scientific Evidence of the Growth of Higher States of Consciousness	181
Improvements in Intelligence Test Scores: A Comparison of the TM and TM-Sidhi Program with Other Interventions	184
The Role of Maharishi Ayur-Ved in the Unfoldment of Intelligence	196
How and How Much Intelligence Can Be Developed: Confirmation From Vedic Literature	200
6. <u>Primacy of Heredity or Environment in the Determination of Intelligence</u>	204
7. <u>Measurement of Intelligence in Maharishi's Vedic Psychology and Twentieth Century Psychology</u>	212

TABLE OF CONTENTS (CONTINUED)

General Criteria for an Adequate Measure of Intelligence	216
Traditional Unitary Measures	218
Performance of Sidhis in Modern Times	224
Objective Verification of Partial Performance of the Sidhis	226
Verification of the Effects of Sidhis from Personal Experiences Using the Subjective Means of Gaining Knowledge	228
Specific Criteria for a Modern Measure of Intelligence	229
8. <u>Comparing Maharishi's Vedic Theory of Intelligence With Other Theories of Intelligence</u>	234
General Comparison of Maharishi's Vedic Theory of Intelligence with Twentieth Century Theories	235
<u>Qualities of Intelligence</u>	237
<u>The Basic Unit of Analysis</u>	241
Twenty-five Contemporary Theories of Intelligence in Relation to Maharishi's Vedic Theory of Intelligence	252
Comparison of Maharishi's Vedic Theory of Intelligence With Two Other Major Theoretical Viewpoints	265
<u>I. The Theory of "g"</u>	265
<u>II. Howard Gardner's Theory of Multiple Intelligences</u>	273
Summary	294
III. TESTING A HYPOTHESIS ABOUT THE GROWTH OF INTELLIGENCE	299
CHAPTER	
1. <u>Formulation of Hypothesis</u>	299
2. <u>Rationale for Choice of Dependent Variables</u>	306
Logical Thinking	308
Creativity	312
Capacity for Mental Absorption	316
Speed of Mental Processing	319
Efficiency of Mental Processing	322
Field Independence	325
Higher States of Consciousness	329

TABLE OF CONTENTS (CONTINUED)

3. <u>Method</u>	335
Subjects	335
Variables	337
Design	339
Instruments	341
Apparatus	342
Procedure	343
4. <u>Results</u>	346
Factor Analysis of Dependent Variables	346
Covarying for Demographics	349
MANCOVA for Variables Loading on First Principal Component	354
MANCOVA for Variables Loading on Second Principal Component	354
One-way ANCOVA'S for Individual Dependent Variables	355
<u>HSOC Scores</u>	357
<u>GEFT Scores</u>	358
<u>Scores on All Other Dependent Measures</u>	359
Analysis of RT Measures	363
Analysis of TTCT and TAS Scores	363
No Effects of Attrition and No Regression Towards the Mean	370
Additional Evidence of Growth of Higher States of Consciousness from Experiences of Witnessing Deep Sleep	372
5. <u>Discussion</u>	
Discussion of Results for GEFT, TTCT, and TAS Scores	382
<u>GEFT</u>	382
<u>TTCT and TAS</u>	383
Implications for Future Research on Intelligence and Consciousness	387
Consideration of Possible Criticisms of the Present Study on Methodological Grounds	391
REFERENCES	401
APPENDIX A. A CONSIDERATION OF THE HISTORICAL NOTION THAT A VALID AND RELIABLE SUBJECTIVE MEANS OF GAINING KNOWLEDGE IS IMPOSSIBLE TO ACHIEVE	440

TABLE OF CONTENTS (CONTINUED)

APPENDIX B. QUESTIONNAIRE ON HIGHER STATES OF CONSCIOUSNESS	456
APPENDIX C. REACTION TIME DATA SHEET	457

LIST OF TABLES

Table		Page
1	Loci of Intelligence	5
2	Issues in Intelligence Theory and how They are Addressed by the Vedic Theory of Intelligence	17-19
3	Fundamentals of Intelligence: Research on the Transcendental Meditation and TM-Sidhi Program Reflecting the Growth of Intelligence	53-64
4	Dependent Variables to Be Measured and Associated Levels of the mind	307
5	Loadings for Posttest Scores, Eigen Values, and Percentage of Total Variance Explained by First Three Principal Components	348
6	Results of Testing Hypothesis of Homogeneity of Slopes for Each Covariate, for Each Dependent Variable	356
7	One-Way Analyses of Covariance for Effect of Group on HSOC Measure, CFIT, Raven's APM, and Hick's RT Measures	361-362
8	Effect Sizes for HSOC, CFIT, Hick's 1- and 8-Light RT, <u>SD</u> of 8-Light RT, and Slope of 1-8 Light RT	378

LIST OF FIGURES

Figure		Page
1	Trends in Intelligence Theory and Research	3
2	The Range of Intelligence in Maharishi's Vedic Psychology	44,254
3	Sternberg's Loci of Intelligence in Relation to Maharishi's Vedic Theory of Intelligence	77,255
4	Twentieth Century Theories of Intelligence in Relation to Levels of the Mind	257
5	Change in Reported Frequency of Witnessing Sleep Over Two Years	365
6	Change in Scores on Cattell's Culture Fair IQ Test Over Two Years	366
7	Change in Hick's 8-Light Reaction Time Over Two Years	368
8	Change in SD of Hick's 8-Light Reaction Time Over Two Years	369

Intelligence and the Growth of Intelligence in
Maharishi's Vedic Psychology and Twentieth Century Psychology

PART I: INTRODUCTION

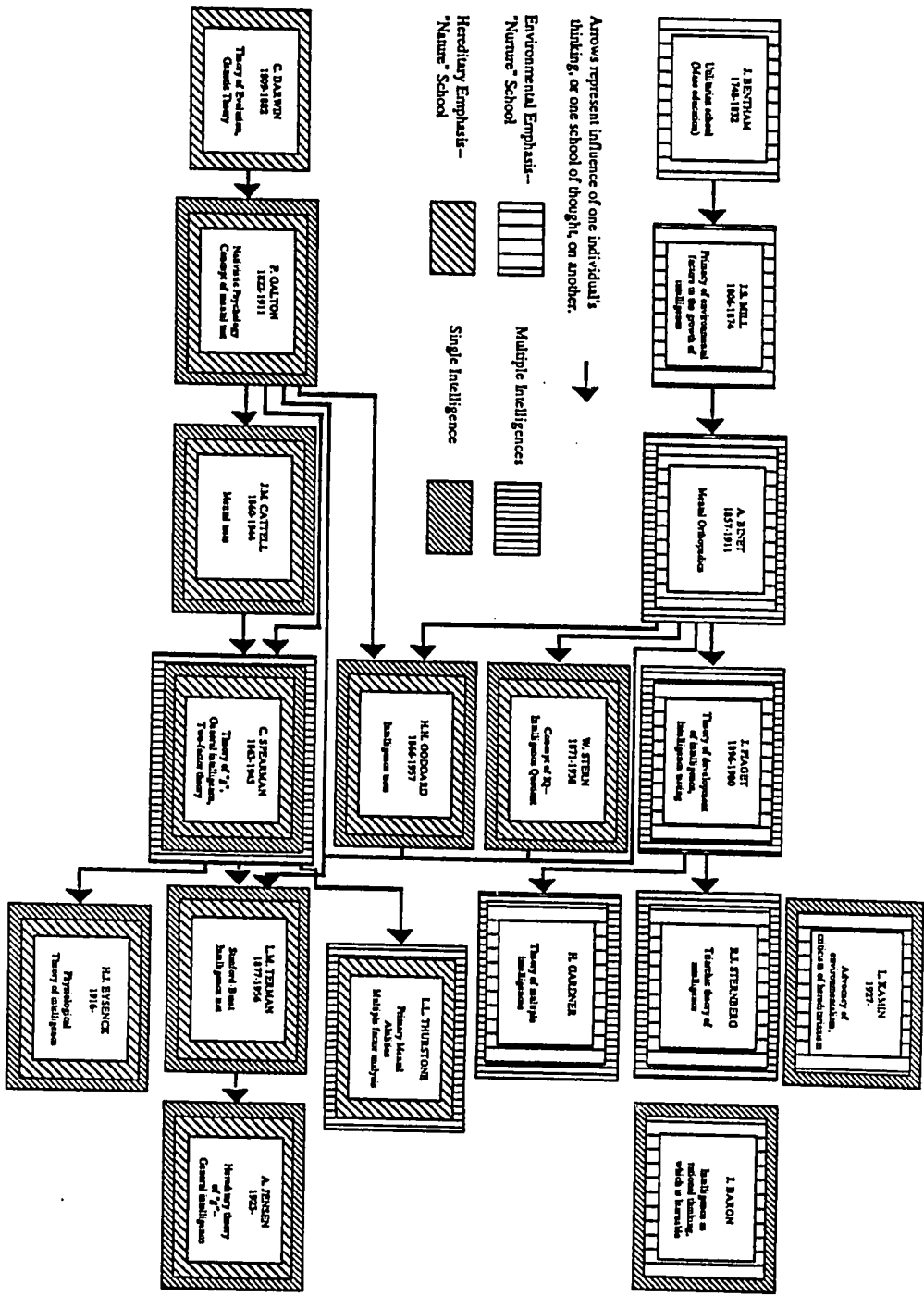
This dissertation will examine intelligence from a Vedic perspective--that is, from the point of view of the Vedic Psychology of Maharishi Mahesh Yogi (Alexander, Davies, Dixon, Dillbeck, Oetzel, Druker, Muehlman, & Orme-Johnson, in press; Maharishi Mahesh Yogi, 1963, 1967, 1972, 1985, 1986; Orme-Johnson, 1988a, 1988b; Dillbeck, 1983; 1988). The dissertation will consist of three parts: introductory, theoretical and empirical. Part I will consider the development and present state of knowledge about intelligence in psychology, including unresolved issues about intelligence. Part II will present a Vedic theory of intelligence and show how Maharishi's Vedic psychology clarifies, unifies, and extends the knowledge discovered so far by twentieth century psychology. In part III, the Vedic theory of intelligence and its growth will be operationally defined, a hypothesis will be proposed, and the results of a longitudinal study designed to test the hypothesis will be presented. In the conclusion, the theoretical and practical implications of the findings will be discussed.

THE NEED FOR A COMPREHENSIVE THEORY OF INTELLIGENCE

In the history of theory and research on intelligence in western science, two dialogues run from its beginning to the present: a) the dialogue between proponents of a single intelligence and proponents of multiple intelligences; and, b) the dialogue between those who believe heredity is primarily responsible for individual differences in intelligence and those who cite environmental factors as the primary cause. Generally, these themes run together--single intelligence with hereditarianism, or "nature," and multiple intelligences with environmentalism, or "nurture." There is some overlap between the two themes. During the past decade, for example, nearly all researchers on intelligence have agreed that explanations of individual differences in intelligence, as measured by intelligence tests, must take into account both environmental and genetic influences (Angoff, 1988; Mckean, K., 1985). Figure 1 graphically depicts the two schools of thought regarding intelligence.

FIGURE 1

Trends in Intelligence Theory and Research



Recently, a survey was conducted in which twenty-five well-known researchers on intelligence were asked the following two questions: a) "What do you conceive 'intelligence' to be, and by what means can it best be measured by group tests?" b) "What are the most crucial 'next steps' in intelligence research?" The results of this survey were published as a book, and summarized in chart form by psychologist Robert Sternberg (Sternberg & Detterman, 1986). Sternberg's chart of the various areas of research and theory is reproduced in Table 1.

TABLE 1
LOCI OF INTELLIGENCE*

-
- I. In Individual
 - A. Biological Level
 - 1. Across Organisms
 - a. Between Species (evolution)
 - b. Within Species (genetics)
 - c. Between-Within Interaction
 - 2. Within Organisms
 - a. Structure
 - b. Process
 - c. Structure-Process Interaction
 - 3. Across-Within Interaction
 - B. Molar Level
 - 1. Cognitive
 - a. Metacognition
 - i. Processes
 - ii. Knowledge
 - iii. Process-Knowledge Interaction
 - b. Cognition
 - i. Processes
 - (a) selective attention
 - (b) learning
 - (c) reasoning
 - (d) problem solving
 - (e) decision making
 - ii. Knowledge
 - iii. Process-Knowledge Interaction
 - c. Metacognition-Cognition Interaction
 - 2. Motivational
 - a. Level (Magnitude) of Energy
 - b. Direction (Disposition) of Energy
 - c. Level-Direction Interaction
 - C. Behavioral Level
 - 1. Academic
 - a. Domain-General
 - b. Domain-Specific
 - c. General-Specific Interaction
 - 2. Social
 - a. Within-Person
 - b. Between-Persons
 - c. Within-Between Interaction
 - 3. Practical
 - a. Occupational
 - b. Everyday Living
 - c. Occupational-Everyday Living Interaction
 - D. Biological-Molar-Behavioral Interaction
 - II. In Environment
 - A. Level of Culture/Society
 - 1. Demands
 - 2. Values
 - 3. Demands-Values Interaction
 - B. Level of Niche Within Culture/Society
 - 1. Demands
 - 2. Values
 - 3. Demands-Values Interaction
 - C. Level × Sublevel Interaction
 - III. Individual-Environment Interaction
-

* From Sternberg and Detterman, 1986, pp.4-5

On the basis of twenty-five theories of intelligence, Sternberg organizes "loci of intelligence" into the following broad categories: the individual, the environment, and the interaction between the individual and the environment. According to Sternberg, within these general loci of intelligence are specific loci. In the individual, these loci are: a) the biological level, b) the molar level, c) the behavioral level, and, d) the biological-molar-behavioral interaction. Sternberg further subdivides the biological level into "across organisms" and "within organisms," and within these subcategories, shown in the table, he makes further divisions, which he explains as follows (1986):

Across organisms, one can view intelligence within the context of the evolution of species, within the context of genetics of a single species, or within the interaction between interspecies evolution and intraspecies genetics...

Within organisms, one can view intelligence in terms of structural aspects of the organism (e.g., hemispheres of the brain), or in terms of process aspects (e.g., the neuronal processes that give rise to evoked potentials). Furthermore, it is possible to look at the interaction between structure and process, considering, for example, how certain regions of the brain generate particular evoked potentials....

An integrated biological viewpoint would take into account the interaction of biological factors across and within organisms. For example, one might seek to understand the evolution of the brain and its aspects, or the genetic bases for brain development (p.5).

Sternberg's next general category, the molar level,

includes the cognitive and motivational aspects of mental functioning. Under "cognitive," Sternberg includes metacognition, ordinary cognition, and the interaction between these two. Cognition he defines as processes, knowledge, and process-knowledge interactions involved in thinking. Cognitive processes he identifies as learning, decision making, selective attention, problem solving, and reasoning. Sternberg defines metacognition as "knowledge about and control of one's cognition." As with cognition, he subdivides metacognition into processes, knowledge, and process-knowledge interactions.

Sternberg includes motivation as a locus of intelligence because, "much cognition is motivated (some might argue that it all is), and one's motivation to cognize may determine both the quality and the quantity of cognition." Distilling theories of intelligence, Sternberg conceives two principal properties of motivation--the level or magnitude of motivation, and its direction, shown in Table 1. In addition, Sternberg posits a third category, the interaction between level of motivation and direction of motivation, which he explains as follows: "Level and direction of motivation interact with each other, of course, in that one may have high motivational levels in some directions, but low ones in others."

On the basis of the theories he summarizes, Sternberg locates three domains of behavior in which intelligence

supposedly resides: academic, social, and practical. Within each of these categories, Sternberg posits subcategories, as shown in Table 1. Under academic, he locates domain-general intelligence--processes and structures underlying behavior that generalize to several domains, e.g., language and mathematics--and domain-specific intelligence, which does not generalize. He also posits an interaction between these two kinds of intelligence.

In the social domain, Sternberg locates behavioral intelligence within people, between people, and in the within-between interaction:

How does a person use intelligence to facilitate interactions with other people, but also, how does a person use intelligence to facilitate interaction with (or understanding of) himself or herself?...the distinction [of within-from between-person interactions] seems to be a viable one. People know that their understanding of themselves often seems to match their understanding of others. The two kinds of understanding may, of course, interact: Getting to know oneself better may help one understand others better, and vice versa (p.7).

In what he calls the practical domain, Sternberg includes behavior exhibited in one's occupation, in one's everyday living, and in the interaction between these two.

With regard to the what he calls the biological-molar-behavioral interaction, Sternberg observes that practically all intelligence theorists view the biological, molar, and behavioral domains as interdependent. He also points out that the relationship between them is not yet clearly

understood by contemporary intelligence theorists,

Certainly, the three work together in ways that are not yet totally understood. Our lack of understanding sometimes leads to theoretical disagreement. For example, most molar theorists would agree that molar structures and processes are capable, ultimately, of being understood at the biological level. But they might not agree that such understanding is the most desirable at this time, or for all purposes. An analogy often used is that of the automobile: One does not best understand the malfunctions of an automobile at the level of the atoms or molecules that contribute to the parts of that automobile (p.8).

Proceeding from the individual as a locus of intelligence, to the environment, Sternberg observes that, "...not all theorists view intelligence as residing within the individual. Some view it as residing within the environment, either as a function of one's culture and society, or as a function of one's niche within the culture or society, or both." Accordingly, as Table 1 shows, Sternberg includes these two categories--culture/society and niche within culture/society--, as well as a category for the interaction between the level of the culture or society and the niche within the culture or society. Within each category--culture and niche--Sternberg distinguishes further categories, which he explains as follows:

What the culture, society, or niche within culture and society deems to be intelligent will generally be a function of the demands of the environment in which people live, the values that are held by the people within that environment, and the interaction between demands and values. For example, societal functions that are in high demand but that are not easily filled may come to

be valued highly (p.8).

Finally, Sternberg's chart comes to the third major locus of intelligence, the interaction between the individual and the environment. He explains this distinction as follows:

...it may be difficult to understand intelligence fully without first considering the interaction of the person with one or more environments, and recognizing the possibility that a person may be differentially intelligent in different environments, depending upon the demands of these various environments (p.8).

Most of the theories summarized by Sternberg apply in some measure to more than one area. For example, psychologist Howard Gardner's theory of multiple intelligences suggests the need to understand intelligence in terms of the interaction between the individual and the environment (level III in the table), and also in terms of the cognitive aspects of intelligence (I-B-1-b). Sternberg's chart will be considered again in Chapters 1 and 8.

Reviewing literature on intelligence, it is possible to see forces that shaped the history of intelligence theory and research. One of these forces is the spirit of scientific inquiry. A second is the current scientific paradigm guiding intelligence research and theory (Kuhn, 1962). For example, today the information-processing paradigm, in which the human mind is compared to a computer system, strongly influences intelligence research and

theory. A third force is the prevailing world view of the time. World view includes: a) the current, culturally shared view of intelligence, its range, and the degree to which it can be actualized by human beings during a lifetime; b) the prevailing epistemological view-- explicit or implicit theory of how knowledge is gained by human beings; c) the current view, explicit or implicit, of human development; and, d) and the current view of the purpose or goal of human life.

A fourth major force which has shaped theory and research on intelligence in modern history is the view, either explicit or implicit, of whether intelligence can be improved, and, if so, by what means? Fifth, a powerful, though often unrecognized influence may be called the "pragmatic" aspect--that is, practical needs which have inspired intelligence research and generated support for research. To date, this pragmatic aspect has taken two forms: a) the need for a method of classifying people for placement in scholastic, occupational, and other environments; b) the presumed requirement for discrete measurement of performance along some dimensions of behavior, or "output", e.g., solving mathematical problems, remembering things, choosing an appropriate logical answer for an analogy, etc.

Sixth, theory and research on intelligence have been shaped by the degree to which theorists and researchers

have had conscious access to their own intelligence--how clearly they could actually experience or intuit what intelligence is and how it functions.

Although there have been some brilliant achievements in the field of intelligence research and theory, today many researchers recognize the need for a comprehensive, unified approach to the study of intelligence. To be truly comprehensive, a theory of intelligence should address the following issues:

1. The theory should address the question, "What is intelligence?", and the related questions, "What is the relationship between intelligence and our self," and "What is the self?"

2. The theory should be able to reconcile two apparently contradictory viewpoints: 1) that intelligence seems to have a unified structure; 2) that intelligence has a diversified, or multiple structure. For example, the phenomenon of the "positive manifold", discovered by Charles Spearman (1905), points toward a unified structure. The positive manifold is the finding that diverse mental tests show high intercorrelations, and always yield a common factor (Jensen, 1978, 1981, 1983, 1985; Schoneman, 1972). At the same time, many intelligence researchers have observed distinctly different talents or competencies within and across individuals, and each of these competencies appears to have its own integrity. Consequently,

Psychologist Howard Gardner of Harvard University has developed a theory of "multiple intelligences", which posits seven intelligences in each individual: logical-mathematical, linguistic, musical, spatial, bodily-kinesthetic, and two forms of personal intelligence (Gardner, 1983), while psychologist Robert Sternberg of Yale University has developed a "triarchic theory of intelligence", which posits three: analytic, innovative, and practical (Sternberg, 1985). We propose that a comprehensive theory should reconcile these divergent views regarding the nature of intelligence.

3. A theory should provide an explicit subtheory of knowledge acquisition which logically supports its claims, since knowledge acquisition is an important function of intelligence;

4. A theory of intelligence should account for the observation of integrated functioning of intelligence on the many different levels mentioned in Sternberg's chart, from biological to motivational, to cognitive, to behavioral, to environmental.

5. A theory should explain whether human intelligence can be developed, and if so, how. As corollaries of this point:

A. A theory should provide an explicit view of the nature of human potential which logically supports its statements;

B. A theory should explain the nature of human development and its relationship to intelligence;

C. Since intelligence, goals, and values are related empirically, a theory should provide an explicit view of the purpose and goal of human life-- a view which logically supports the theory;

6. An adequate theory of intelligence should account for findings which suggest a hereditary factor in individual differences in intelligence (Bouchard & McGue, 1981; Bouchard & Segal, 1985; Jensen, 1969, 1978, 1981, 1985; Herrnstein, 1973; Plomin, 1988) as well as findings which suggest a strong environmental factor (Gould, 1981; Kamin, 1974, 1981; Scarr, 1981).

7. An adequate theory of intelligence should be operationally definable such that it can be confirmed or disconfirmed, i.e., it should propose how intelligence can be measured.

In Part II of this dissertation, the view of intelligence from Maharishi's Vedic Psychology will be presented, and it will be shown how it addresses each of the aforementioned points. In the process of addressing these points, Maharishi's Vedic theory of intelligence will be compared with points of contemporary theories of intelligence. Chapter 8, "Comparing the Vedic Theory of Intelligence with Other Theories of Intelligence", briefly compares Maharishi's Vedic theory with the twenty-five

theories summarized by Sternberg in Table 1, then makes a detailed comparison of the Vedic theory with two contemporary theories of intelligence. These theories represent diverse views with regard to heredity vs. environment and multiple intelligences vs. unitary intelligence.

Maharishi's Vedic Psychology uses three methods of verification of theory: 1) objective observation of behavior predicted by the theory (scientific research); 2) direct subjective experience, or cognition of the nature of intelligence; 3) comparison of findings from 1) and 2) with knowledge recorded in ancient texts of Vedic literature. These methods will be applied in chapters 1-5. Chapter 7 discusses the three methods of verification in detail. Verification of the Vedic theory of intelligence is limited to chapters 1-5 because the hypothesis to be tested is derived from the points in these chapters.

PART II: KNOWLEDGE OF INTELLIGENCE IN
MAHARISHI'S VEDIC PSYCHOLOGY

The thesis of Part II of this dissertation is that the knowledge about intelligence contained in Maharishi's Vedic Psychology fulfills the need for a comprehensive theory of intelligence. This view of intelligence is based his Vedic Science, which involves comprehensive experience and understanding of the nature of life, its range, and its development or evolution.

Each chapter from 1 through 8 of Part II considers one issue in intelligence theory and research from the point of view of Maharishi's Vedic theory of intelligence. As the issues are addressed in the text, reference will be made to Table 2, which summarizes the issues raised and corresponding points of the Vedic theory.

TABLE 2

**ISSUES IN INTELLIGENCE THEORY AND HOW THEY ARE ADDRESSED
BY MAHARISHI'S VEDIC THEORY OF INTELLIGENCE**

ISSUES IN INTELLIGENCE THEORY	POINTS OF VEDIC THEORY
1. What is intelligence?	1. Intelligence is expressed in levels of creation, subjective and objective. At the deepest level of its nature, it is the unified field, the source and sustainer of all of nature. This is also the deepest level of our Self.
2. Does intelligence have a unified or a multiple structure?	2. The fundamental nature of intelligence is simultaneously unified and diverse. It has a unified basis (pure intelligence or the unified field--Samhita in Maharishi's Vedic Science), which through self-interaction becomes diversified through three streams of creation: knower (subjectivity), known (objectivity), and process of knowing connecting the two.
3. Subtheory of knowledge acquisition.	3. Knower, known, and process of knowing are contained in the nature of intelligence. The self-interacting dynamics of this structure gives rise to diverse levels of the mind, each of which instantiates this basic structure of knowledge acquisition in a different way.
4. How can the integrated functioning of intelligence on many different levels of manifestation be explained?	4. The simultaneously unified and diversified structure of intelligence with its qualities of self-referral, self-sufficiency, infinite organizing power, integration, infinite creativity and infinite dynamism, activates and integrates all the diverse levels of mind, physiology, collective intelligence.

TABLE 2 (CONT.)

5. How and how much can intelligence be developed?	5. Intelligence can be naturally developed by regularly transcending thought and allowing the awareness to identify itself completely with pure intelligence, the unified field of natural law. This together with other techniques of Maharishi Ayur-Ved progressively refines the physiology to express pure intelligence, until unity consciousness is attained, in which human intelligence is consciously identified with the all-powerful intelligence of nature.
6. Which is more important in the determination of intelligence, heredity or environment?	6. Heredity (structure of DNA) sets the individual pattern of expression of intelligence; heritability, however, is not synonymous with immutability. Through Maharishi's Vedic Science and Technology, the functioning of the mind and the material and functioning of the physiology can be nurtured, so that the full potential of intelligence can be realized.
7. Can the theory be operationally defined, i.e., can intelligence be measured, and if so, how?	7. Maharishi's Vedic theory of intelligence holds that it can be operationally defined and, in principle, confirmed or disconfirmed; it also affirms that intelligence can be measured. It proposes a convergent approach that uses both holistic and partial measures, and both subjective and objective means of gaining knowledge. Research confirming points of the theory is presented, and the research study presented in Part III of this dissertation presents additional evidence in support of the theory.

TABLE 2 (CONT.)

8. How does Maharishi's Vedic theory of intelligence compare with other theories of intelligence?

8. Maharishi's Vedic theory of intelligence is a holistic theory that covers the full range of intelligence, from its unmanifest nature as pure intelligence at the source of thought, to its role as human intelligence, to its role as the infinite organizing power governing the entire universe. Maharishi's Vedic theory integrates, clarifies, completes and expands other theories of intelligence.

Chapter 1

What is Intelligence?

The first issue, "What is intelligence?", with the response from the Vedic theory of intelligence, is presented in Table 2.

The meaning of "intelligence" in Maharishi's Vedic Psychology, although it encompasses the definition of intelligence expressed in twentieth century psychology, is much broader and has its roots deeper in the structure of nature. It is based on what modern physics knows as the unified field, and what Maharishi's Vedic Psychology knows as the cosmic psyche, the Self, the field of pure intelligence, or pure consciousness.

In the early history of intelligence theory and research in western psychology, the scientific definition of "intelligence" corresponded rather closely with lay usage. Words such as "quickness", "rationality", "sensitivity" were often used (Fancher, 1985). Since then, the trend has been towards more precision in definition, but also more fragmentation and specialization, so that today, as can be seen in Sternberg's chart (Table 1), and Sternberg and Detterman's book (1986), theorists and researchers are far from agreement on a definition of intelligence. Some psychologists view intelligence as a general capacity for performance on mental tests, while others view it as a set of abilities for processing information in order to make

adaptive responses to environmental demands (Sternberg, 1985). Currently, the most popular paradigm in intelligence theory and research is the "information processing" paradigm, in which the human mind is compared to a computer system.

According to Maharishi's Vedic Psychology, how we define intelligence depends on how we see the world, in a very fundamental sense. From the point of view of Maharishi's Vedic Psychology, theories of intelligence in twentieth century psychology are products of a world view that has already been left behind by the physical sciences, especially physics, in their progress toward a unified field theory of matter. We shall now examine how the world view of modern physics has changed, how modern physics conceives the role of intelligence in the material universe, then we shall consider how this world view is comprehended by Maharishi's Vedic Psychology with reference to intelligence in particular.

The Discovery of a Unified Field in Modern Physics

In physics, the classical Newtonian model of a universe composed of inert, solid particles interacting in billiard ball fashion, has been replaced by a more fluid, fieldlike, model of the physical universe. According to quantum physics, the inert, solid, discrete objects which make up

the world we see are really excitations or fluctuations of formless, underlying quantum fields. To quote John Hagelin (1987), prominent unified field theorist and author of the "flipped SU-5" supersymmetric unified field theory,

Beneath the macroscopic, inert, classical world of billiard ball mechanics there exist more fundamental layers of physical existence that possess greater energy, intelligence, and subtlety...

There are three distinct modes of activity of a quantum field: 1) the stable "particle" states of a field, which possess well-defined energies and lend themselves naturally to an interpretation in terms of particles; 2) transient field configurations that do not propagate and do not have well-defined energy, which appear as internal lines in Feynman diagrams and play the role of forces between particles; 3) vacuum fluctuations--the continuous, purely quantum mechanical activity of a quantum field present in the vacuum state as well as all the excited states.

Quantum field theory thereby represents a simple and profound view of nature in which the previously unrelated concepts of particle and force are naturally unified within a single theoretical construct: "particle" and "force" simply correspond to different modes of activity of an underlying quantum field (p.5).

Successfully probing progressively more fundamental layers of matter, physicists have discovered the structure of nature to be increasingly unified at finer time and distance scales. The electro-weak unification, announced in 1967, represented the discovery of a common field underlying weak and electromagnetic forces. Subsequently, a deeper symmetry was located which united the weak, electromagnetic, and strong interactions. And recently the introduction of

supersymmetric unified field theories have shown force fields, represented by grand unification, and matter fields, to be instantiations or expressions of a superfield, a unified field. With each successive discovery of a deeper unifying principle in nature, the previous unifying principle was shown to be an expression of the deeper symmetry.

The discovery of quantum mechanics and the more recent supersymmetric unified field theories in physics have resulted in a profoundly different view of the physical world, a much deeper understanding of the laws of nature governing the physical universe, and more rapid technological progress with substantial benefits for society in the form of improved quality of life--more comforts, more efficient production and distribution of goods and services, instant electronic communication, faster and more comfortable transportation, etc. For the centuries in which the strictly Newtonian view prevailed in physics, these benefits were, of course, unrealized.

Turning to psychology, Hagelin points out that throughout its history, psychology in general has not kept pace with the advances in knowledge made in the physical sciences, and, with the exception of certain schools of thought (e.g., Jungian [1956, 1960, 1980], and transpersonal psychology [Grof, 1983]), has maintained an essentially classical, Newtonian view of the world. Hagelin argues that

this outdated view of the world has prevented any significant advance in Psychologists' knowledge about the laws of nature governing consciousness and intelligence (Hagelin, 1987b):

Since the foundation of psychology as an independent discipline over a century ago, its theories of consciousness and human behavior have been modeled entirely on classical concepts derived from physics of the nineteenth century. Meanwhile, developments in the fields of molecular biology and neuroscience have demonstrated that relatively few processes involving the central nervous system can actually be understood on the basis of classical models. Yet the emergence of more fundamental theoretical frameworks within the discipline of physics has had almost no impact on the field of psychology. This may be due to the fact that few psychologists (and few lay physicists in general) have been educated beyond the Newtonian era.

The quantized theory of fields is the most profound and successful framework to emerge within the field of science. In addition to the fact that the entire universe is believed to be fundamentally built out of quantum fields, the same basic field theoretic framework has been successfully applied to complex physical systems outside the domain of elementary particle physics. In light of the apparent failure of current ideas within the domain of psychology to account for consciousness in a satisfactory and compelling way (Hilgard, 1980; Niesser, 1976; Natsoulas, 1978, 1983), it makes sense to seek a more fundamental, field theoretic framework for consciousness, particularly in light of evidence for field effects of consciousness and the widespread experience of states of consciousness that do not fit the current psychological paradigm (P.73)

The Intelligence of Nature: The View of Quantum Physics

Having briefly considered the new world view of modern physics, we shall now consider how leading physicists regard the relationship between intelligence and the physical universe. We shall do so because, ironically, of the western sciences it is the field of physics that is moving toward a view of intelligence or consciousness as a unified field, a common source of man's mental abilities and the immense organizing power of nature.

As was discussed in the previous section, progress in physics has led to the formulation of supersymmetric unified field theories capable of uniting the four fundamental forces comprising force fields-- the strong force, the weak force, electromagnetism, and the gravitational force-- with the matter fields, which are observed as quarks. As physicists approach this level of nature, the level of "superunification", the qualities of fundamental quantum fields appear more subjective in nature than material, or mechanical.

John Hagelin (1987), observes that several physicists have noted at fundamental scales the emergence of qualities such as dynamism, intelligence, and "attributes of self-awareness" (Davies, 1984; Llewellyn Smith, 1981; Pagels, 1982). Hagelin (1987) notes,

Dynamism, for instance, results from the fact that quantum-mechanical operators associated with

position and momentum do not commute, leading to a reciprocal relationship between distance and momentum known as the uncertainty principle, which results in the fact that nature becomes increasingly energetic at more fundamental space-time scales. The vastly greater energy associated with nuclear transitions compared with chemical transformations provides a practical demonstration of the increasing dynamism intrinsic to more fundamental scales... Hence the historically inert view of the universe resulting from the investigation of macroscopic matter is a poor characterization of nature at macroscopic scales.

It may also be said that 'intelligence' is more concentrated at fundamental scales. This can be seen, for instance, in the context of grand unified theories, in which the strong, electromagnetic and weak interactions become unified components of a single field whose behavior is governed by a single compact expression. Since the laws of nature formally express the order and intelligence governing the behavior of natural phenomena, as the laws of nature become more compact and concentrated, intelligence can be said to become more concentrated. If, as particle theorists are inclined to believe, all the laws of nature have their ultimate origin in the dynamics of the unified field, then the unified field must itself embody the total intelligence of nature's functioning (p.58).

Hagelin proceeds to explain why the property of "self-awareness" can be attributed to elementary quantum fields (Hagelin, 1987):

From a field theorist's perspective, an attribute of 'self-awareness' can be seen in the non-abelian property of self-interaction present in unified, non-Abelian gauge fields. An example of an Abelian field is electromagnetism, which governs most phenomena at macroscopic scales. Because the equations governing the electromagnetic field are linear in the field strength, the electromagnetic field does not possess the self-interacting property of a non-Abelian field. As a consequence, two rays of light pass through each other with no interaction and hence no 'awareness' of the

other's presence. A non-Abelian field, such as the gluon field of quantum chromodynamics, a grand unified field or a super-unified field, possesses the nonlinear property of self-interaction which is not found in an Abelian field. As a consequence, a non-Abelian field responds dynamically to its own presence (pp. 58-59).

Hagelin (1984) has subsequently shown that 26 qualities can be derived from the Lagrangian of $n=8$ supergravity theory, formulated by mathematicians de Wit and Nicolai (1984), and he has derived those same qualities from his flipped SU-5 supersymmetric unified field theory. The Lagrangian is a concise mathematical expression that describes the unified field. Among the qualities derived are: self-referral (or self-interaction), infinite dynamism, infinite creativity, infinite organizing power, pure knowledge, self-sufficiency, perfect orderliness, harmonizing, integrating, unboundedness, and the total potential of natural law. The quality of self-referral has already been discussed above. To take four more examples: the quality of infinite organizing power is derived from the observation that "the Hamiltonian operator, derived from the Lagrangian by a Legendre transformation, governs all activity in the universe." The quality of integrating can be observed the fact that "the gravitino fields dynamically uphold local supersymmetry, which integrates the different spin components of the supermultiplet¹ maintaining the

1 The supermultiplet is an arrangement (depicted in a diagram) that describes the supersymmetric structure of the Lagrangian. The $N=8$ gauge supermultiplet shows the unified field as a

unbroken wholeness of the superfield." The quality of self-sufficiency can be derived from the observation that, "The graviton does not participate in the activity of preon binding and is a singlet with respect to the internal $SO(8)$ and $SU(8)$ symmetries of the Lagrangian." The quality of infinite creativity is derived from observation that the unified field is "The fountainhead of natural law-- from this unified source all the particles and forces of nature are generated through the process of sequential dynamical symmetry breaking (Hagelin, 1984)."

A leading physicist, then, has come to view the deepest level of the material world as a unified field which has properties of intelligence, or consciousness, and several others have acknowledged that understanding consciousness and how it functions is essential for understanding matter (Bohm, 1980; Capra, 1975, 1982; Chew, 1968; Jeans, 1930; Walker, 1970; Wigner, 1967). The unified field is said to be self-sufficient, and is seen as capable of self-interaction, or self-awareness, and as having infinite organizing power, integrating ability, and infinite creativity (International Assn. for the Advancement of the Science of Creative Intelligence, 1983).

balanced coexistence of 256 fundamental components or "preons." Comprising 128 bosonic and 128 fermionic degrees of freedom, the supermultiplet represents the balanced coexistence of all the fundamental fields of nature, and is said to express the total potential of natural law.

The unified field is also described as holistic, a field which pervades the universe, and which, while unbounded, can be located at any given point. Transcending the objective world, the unified field is understood to be the source of all of nature. Since the unified field is described as the source of nature's intelligence, it is logical to conclude that it is also the source of man's intelligence, since man is certainly a part of nature. Thus modern science has discovered that there is a continuity between man's intelligence and the vast intelligence of nature.

The Intelligence of Nature as Described by Modern Scientists

Since Albert Einstein and even earlier, many of the most brilliant and accomplished scientists, on the basis of a lifetime investigation of the laws of nature, have stated their conviction of the existence of a vast intelligence at the basis of man and nature. Einstein wrote (1931),

"It is enough for me to contemplate the mystery of conscious life perpetuating itself through all eternity, to reflect upon the marvelous structure of the universe, which we can dimly perceive, and try humbly to comprehend even an infinitesimal part of the intelligence manifest in nature (p.58)."

Eugene Wigner, Nobel Laureate and author of measurement theory, expressed the same conviction (1967):

When the province of physical theory was extended to encompass microscopic phenomena, through the creation of quantum mechanics, the concept of consciousness came to the fore again: it was not possible to formulate the laws of quantum mechanics in a fully consistent way without reference to the consciousness...It may be premature to believe that the present philosophy of quantum mechanics will remain a permanent feature of future physical theories; it will remain remarkable, in whatever way our future concepts may develop, that the very study of the external world led to the conclusion that the content of the consciousness is an ultimate reality... physicists have found it impossible to give a satisfactory description of atomic phenomena without reference to the consciousness (p.172).

James Jeans, a British physicist and a contemporary of Einstein, wrote in the same vein (in Guillemin, 1968):

Thirty years ago, we thought, or assumed, that we were heading toward an ultimate reality of a mechanical kind... Into this wholly mechanical world.. .life had stumbled by accident. Today there is a wide measure of agreement, which on the physical side of science approaches almost to unanimity, that the stream of knowledge is heading toward a non-mechanical reality; the universe begins to look more like a great thought than a great machine. Mind no longer appears as an accidental intruder into the realm of matter....

The new knowledge compels us to revise our hasty first impression that we had stumbled into a universe which either did not concern itself with life or was actively hostile to life. The old dualism of mind and matter, which was mainly responsible for the supposed hostility, seems likely to disappear... through substantial matter resolving itself into a creation of and manifestation of mind (p.96).

The French Physicist Bernard D'Espagnat reached the same conclusion as his colleagues (1979):

"The doctrine that the world is made up of objects whose existence is independent of human consciousness turns out to be in conflict with quantum mechanics and with facts established by experiment (p.88)."

The conviction of a universal intelligence in nature has never been limited to physicists. Teilhard de Chardin, the 20th-century French paleontologist wrote (1951):

...life can no longer be regarded as a superficial accident in the universe: we must look on it as (under pressure everywhere in the universe), ready to seep through the narrowest fissure at any point whatsoever in the cosmos-- and, once it has appeared, obliged to use every opportunity and every means to reach the furthest extremity of everything it can attain: the ultimate, externally, of complexity, internally of consciousness (p.253).

Mathematicians have also acknowledged the existence of a source of intelligence in nature from which the laws of mathematics arise. Georg Cantor (in Dauben, 1979), creator of set theory and widely considered one of the greatest mathematicians of modern history, spoke of a "Divine intellect (p.290)," in which mathematical laws exist as "eternal ideas (p.290)." He spoke of this level of nature as, "the first infallible cause of all created things (p.298)."

Observing this relationship between mathematics and

intelligence or consciousness, the editors of Age of Enlightenment News (1979) observed,

Until now one of the greatest mysteries of science has been the question as to why mathematical truth so accurately predicts and reflects external objective reality. Mathematics is purely abstract. Its reality is purely in the mind, in the field of consciousness. Yet mathematical formulae and laws of transformation turn out to be perfect models to predict the behavior of everything in nature, from the flight of birds to the motion of planets.

This striking fact, that the laws of the thought process correspond perfectly to the laws of change in outer physical reality, is a direct indication that there is a profound connection between the human mind and objective reality. No longer are we to look at the mind as some private inner area which is unconnected with outer life. Instead we must now see our inner thoughts and our outer perceptions as both reflecting the operation of a profound, universal field of natural law which governs both inner and outer reality as their common source (No.11, pp.27-28).

We now consider how Maharishi's Vedic Science, the Science of Creative Intelligence, and Maharishi's Vedic Psychology address the issue of intelligence in relation to the totality of nature.

The Intelligence of Nature in Maharishi's Vedic Science,
The Science of Creative Intelligence,
And Maharishi's Vedic Psychology

The unity of man's intelligence and the intelligence of nature is acknowledged by ancient Vedic Science, and the discovery of the unified field by modern science is being

welcomed by Vedic Science, which has realized the existence of a unified field for thousands of years. This level of nature was discovered by seers of ancient India through exploration of the silent levels of awareness. They described it as a field where all the laws of nature are found together in a unified state, a state of wholeness. As Kenneth Chandler (1987) expresses it,

This unity of nature was directly experienced to be a self-referral state of consciousness which is unbounded, all-pervading, unchanging, and the self-sufficient source of all existing things. They experienced and gave expression to the self-interacting dynamics through which this unified field sequentially gives rise to the diversity of all laws of nature. That experience is expressed in the ancient Vedic literature (p.5).

In our age, Maharishi Mahesh Yogi has brought to light this ancient science and technology, and presented it in such a way that it can be understood and expressed in the language of modern science. The procedures and language of Maharishi's Vedic Science and Technology are precise and rigorous. Its methodology relies on direct subjective experience, gained when the conscious mind, having become completely quiet, is identified with the unified field of pure intelligence. In contrast to the objective methodologies of modern science, this method of investigation does not rely on knowledge gained on the surface level of the senses only, and is an effective means of exploring the unified field and gaining complete knowledge of it. With this approach to gaining knowledge

available, it is possible to know the unified field both subjectively through Maharishi's Vedic Science and Technology, and objectively through the investigative procedures of modern science.

Using the procedures of Maharishi's Vedic Science and Technology, it is possible for anyone to experience the unified field of pure intelligence in the simplest, least-excited state of his or her own awareness, transcendental consciousness. According to Maharishi's Vedic Science, in the state of transcendental consciousness, individual intelligence is completely identified with pure intelligence. The science based on this experience links the objective method of modern science with the subjective method of Vedic Science in a single unified body of knowledge while maintaining the integrity of both. It is called the Science of Creative Intelligence. Ancient Vedic Science is the common source of both Maharishi's Vedic Science and the Science of Creative Intelligence.

The profound principles and applied programs of Maharishi's Vedic Science and the Science of Creative Intelligence, verified by a large body of scientific research, form the foundations of a new psychology of enlightenment based on a complete understanding of consciousness. This new Psychology is Maharishi's Vedic Psychology, referred to earlier in this chapter.

Much of the scientific research that is considered in

this study investigates the Transcendental Meditation and TM-Sidhi program, aspects of Maharishi's Vedic Science and Technology. The TM and TM-Sidhi program is a set of procedures which can improve many abilities of the individual, including what has been described and measured as "intelligence" by twentieth century psychology and by popular consensus. The discussion is being confined to the TM and TM-Sidhi program and its incorporated procedures for the following reasons (Hagelin, 1987):

1. The TM and TM-Sidhi program are practiced throughout North America and most of the world. As a result, subjects are available with experience ranging from several months to more than 30 years;

2. The TM and TM-Sidhi program are taught in a highly standardized manner throughout the world. This ensures that all subjects are practicing the identical mental procedures;

3. There exists a large body of published scientific research on the psychological, physiological, sociological, and ecological effects of the TM and TM-Sidhi program. No comparable body of scientific literature is connected with other mental techniques, and analyses of what literature is available finds little evidence that other meditative practices influence basic psychological or physiological variables to the same degree (e.g., Eppley, Abrams, & Shear, 1984; Dillbeck & Orme-Johnson, 1987; Ferguson, 1981).

The Transcendental Meditation (TM) technique is a

systematic procedure that allows the conscious mind to become more quiet and experience progressively less excited, more abstract states of thought until the individual mind becomes identified with the simplest state of awareness, the unified field of all the laws of nature, or pure intelligence. Maharishi comments (1976a),

It is not necessary for any man today to remain only partially exposed to the value of life, to be caught up either on the outside or the inside. With the Transcendental Meditation technique, the mind naturally settles down deep within and gains that field of pure consciousness. This is that field of pure intelligence which permeates all aspects of life. It is possible now for that pure value of consciousness, that field of pure intelligence, to be established as an all-time reality in the awareness...(p.46).

The TM-Sidhi techniques lead to the ability to experience the self-interacting dynamics of pure intelligence at the basis of the universe. Specifically, these procedures enable one to project thought from the unmanifest level of the unified field and experience the mechanics of transformation of pure intelligence into specific activities to achieve desired results. The TM program is designed to unfold the full creative intelligence of the individual and his environment; the TM-Sidhi program is designed to accelerate the development fostered by the TM program.

Maharishi's Vedic Science and the Science of Creative Intelligence point out the existence of vast creative

intelligence in nature, and its inseparability from human intelligence (Maharishi Mahesh Yogi, 1972a):

Our observation of creation has led us to postulate the existence of creative intelligence. Physics, we have seen, informs us that there are layers of creation one within the other: molecules, atoms, electrons and finer particles. These high energy particles are the building blocks of creation. Astronomy informs us of the multitudes of galaxies and their activities. The galaxies do not just run about here and there at random; they function according to definite laws, their movements are orderly and systematic. And we ourselves behold that all life around us, trees, animals, birds, man, grows and progresses. This observation of the phenomenal world leads us to postulate the existence of intelligence functioning at every level of creation. Without this fundamental value of intelligence, all the readily observable order and growth throughout the universe would not be found. This intellectual conclusion is validated by our experience during Transcendental Meditation. During meditation one has the direct experience of the pure nature of creative intelligence as transcendental awareness, and greater creativity in life is the result. This verifies the truth of our postulation that creative intelligence exists.

...Through intellectual analysis and personal experience, therefore, we can establish a principle that creative intelligence underlies all existence, all progress, and all phenomena. There is definitely something which is the basis of all creation and is the fundamental value of the process of evolution. This something at the very basis of all existence, which carries out all progress and growth, is creative intelligence...From the activity of the universe to the activity of an atom to the non-activity of the pure state of intelligence, from a state of deep rest in the unmanifest pure nature of intelligence to the great dynamic activity which maintains this pulsating universe, from individual life to universal life, we find the range of creative intelligence (Lecture 5).

Ultimately, then, both the objective approach of

contemporary science and the combined subjective and objective approach represented by Maharishi's Vedic Science describe a unified field as the origin of the universe, which gives rise to all possible expressions of the field. Both approaches describe the unified field as lying beyond the boundaries of time and space, and in both approaches the various states of matter and thought respectively are seen as fluctuations of the underlying unified field. Several physicists (Hagelin, 1987; Wigner, 1967) have proposed that this extremely close parallel in the description of the origin and progressive manifestation of mind and matter is most simply explained by assuming that both are true and represent observations from two different approaches, of the same reality.

The Importance of Perspective

The metatheoretical perspective of Maharishi's Vedic Psychology is expressed in two fundamental principles: 1) "Knowledge is structured in consciousness" (Maharishi Mahesh Yogi, 1972a); and, 2) "Knowledge is different in different states of consciousness" (Maharishi Mahesh Yogi, 1972a). These two principles are essential for understanding the Vedic view of intelligence. According to Maharishi's Vedic Psychology, when these principles are completely known on the basis of both intellectual understanding and direct

experience, they illuminate how the Vedic perspective on intelligence incorporates, unifies, and completes the knowledge about intelligence embodied in 20th century psychology.

Essentially the two principles say that knowledge of anything is always based on the consciousness of the knower or observer, and that, depending upon the state of consciousness of the observer, the knowledge gained will be different. Applied to the field of intelligence, this means that one's definition of intelligence will depend upon one's capacity to experience. In one state of consciousness, the ordinary waking state, intelligence is perceived in a frozen, particulate way, and in another more developed level of consciousness, transcendental consciousness for example (to be described later in this chapter), intelligence is perceived in a fluid, unbounded way. Exactly what this means experientially is described in the section entitled, "Verification of the source of creative intelligence through direct experience," which appears later in this chapter. A detailed explanation appears in the descriptions of higher states of consciousness in Chapters 3 and 5.

Maharishi's Vedic Theory of Intelligence:

A Comprehensive Perspective

The relationship between the 20th century psychological

view of intelligence and Maharishi's Vedic theory of intelligence is analogous to the relationship between the particulate view of the material world from classical physics and the field-like view of the world described by quantum field theory.

Just as the Newtonian perspective views and measures the world as if it were composed of discrete particles, psychologists have heretofore considered intelligence a phenomenon of the waking state, in which man sees his world in a discrete, particulate way. As a consequence, psychologists have developed models of intelligence based on the limited cognitive abilities of the average person, whose range of experience is restricted to that state. To model this limited range of experience and cognitive ability, psychologists have used analogies to more simple, inert systems such as computer programs.

Operating from a materialist perspective, many psychologists have come to consider consciousness or intelligence to be an epiphenomenon of neural processes. Intelligence is viewed entirely in terms of isolated behavioral performances that are presumed to be generated by a capacity for successful interaction of parts of a cognitive system.

Maharishi's Vedic Psychology, having its source in a tradition of knowledge which predates 20th century physics and psychology by thousands of years, transcends the



limitations of a world-view based on the waking state alone. At the deepest level of its structure, Maharishi's Vedic theory of describes intelligence as a transcendental, unmanifest, unified field of pure intelligence, the source and the essence of the human mind, the body, and the environment as well.

According to Maharishi's Vedic theory of intelligence, intelligence is structured in layers, from the unmanifest, unified field of pure intelligence through successively more expressed or manifest values: ego, intellect, feeling, mind, desire, and senses, extending to the physiology and the environment at the most expressed level, the objective, material level. At the level ordinarily perceived by the senses, the subtle nature of intelligence is as if hidden within the solid, particulate world of classical physics. At each level of manifestation, pure intelligence is present, yet shrouded by its own expressions, just as the unified field described by modern physics is present at each level of its expression, from fundamental force and matter fields to the macroscopic world seen with the naked eye.

Even though unmanifest and unified in its essential nature, pure intelligence is described by Maharishi's Vedic Psychology as self-sufficient and lively, as mentioned earlier in this chapter. It is said to possess qualities of self-referral or self-awareness, infinite creativity, infinite dynamism, integration, infinite organizing power,

bliss, and others (International Assn. for the Advancement of the Science of Creative Intelligence, 1983). In short, intelligence is seen as holistic, universal, and all-pervading, expressing itself in localized values such as mind, senses, etc., rather than being essentially localized in processes of human cognition and limited in scope, as asserted by 20th century psychology. For this reason pure intelligence is also referred to as the cosmic psyche (Orme-Johnson, 1988a, 1988b; Dillbeck, 1988).

Maharishi's Vedic theory of intelligence is summarized in Figure 2. Since Figure 2 presents the entire Vedic view of intelligence in compact form, to explain Figure 2 in full detail is to lay out all the details of Maharishi's Vedic theory of intelligence. Rather than presenting all the details in a lengthy description, each part of the theory is presented in relation to Figure 2, in the context of an issue to which it is directly related. Each chapter of Part II discusses one of the issues, in relation to Figure 2. The overall meaning of Figure 2 is summarized here.

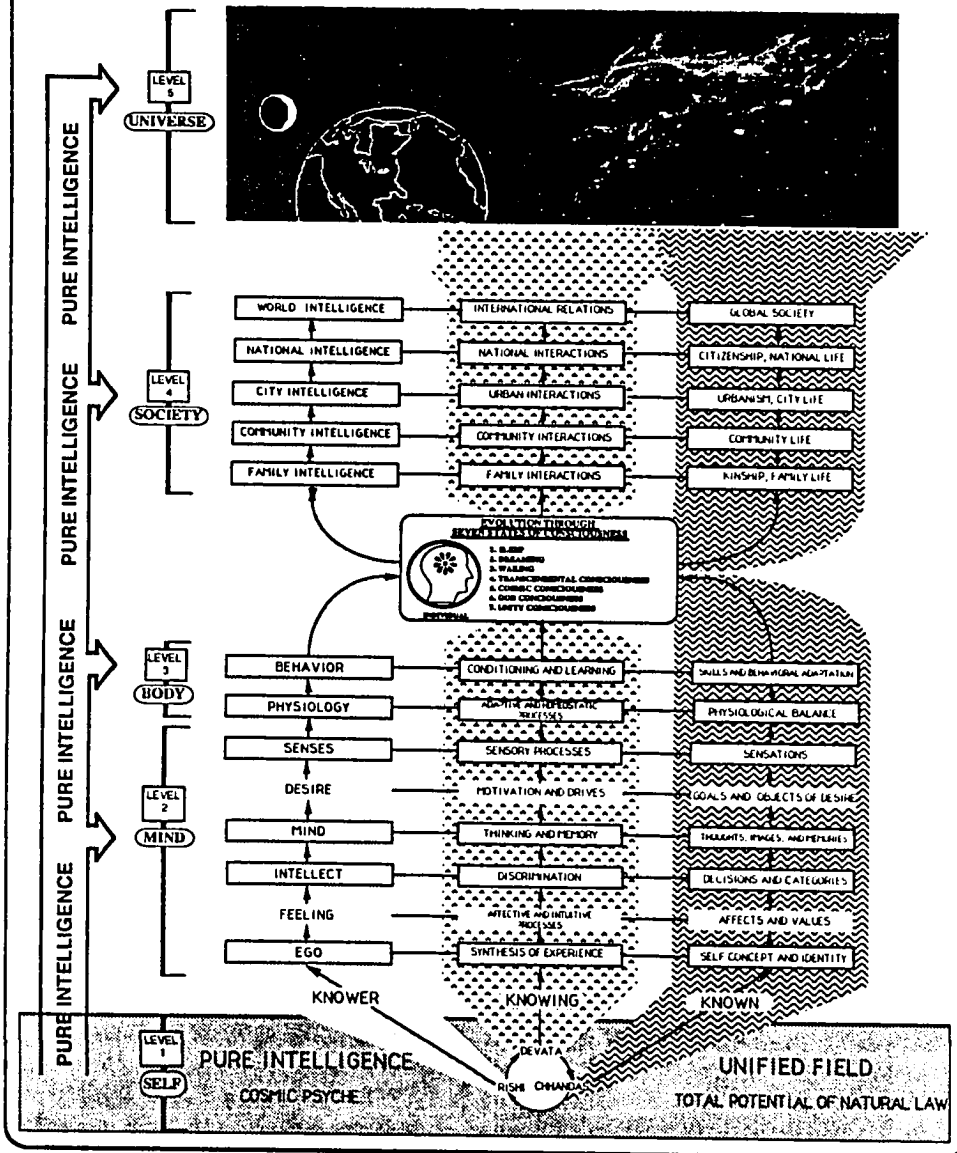
In Figure 2, "The Range of Intelligence," pure intelligence, synonymous with pure consciousness or the cosmic psyche, is shown at the bottom of the chart as level 1, the Self. According to Vedic psychology, pure intelligence is naturally dynamic by virtue of the fact that it is intelligence. Because it is intelligence, or consciousness, it can be conscious of itself. In being

conscious of itself, it spontaneously creates within itself the divisions of knower, process of knowing, and known. Hence it has within its nature the threefold structure of knower, process of knowing, and known, or "Rishi", "Devata", and "Chhandas" in Vedic terms. This phenomenon is explained in detail in Chapter 2. Chapter 2 explains that the self-interacting dynamics of this three-in-one structure of pure intelligence is an eternally creative process which gives rise to and sustains the various levels of the mind, depicted in level 2, "Mind", as well as the most surface level of expression of intelligence, level 3, the physiology. Levels 2 and 3 comprise the range of intelligence in the individual.

Figure 2

The Range of Intelligence in Maharishi's Vedic Psychology

THE RANGE OF INTELLIGENCE IN MAHARISHI'S VEDIC PSYCHOLOGY



The levels of the mind can be equated with what twentieth century psychology refers to as faculties or structures. Each structure embodies a threefold substructure of knower, known, and process of knowing.

For example, at the level of the intellect, the mode of intelligence called intellect is the knower; decisions, concepts, and plans are the known; and discrimination, decision making, and planning constitute the process of knowing. Each level of the mind represents a different structure and function, from the most abstract level, ego, to progressively less abstract levels--feeling, intellect, mind, desire, senses--to the most concrete level, the physiology.

It should be noted that "feeling," the level between "Ego" and "Intellect," and "Desire," the level between "Mind" and "Senses," are not defined by borders as are the other levels. This is because "feeling" and "desire" are more appropriately characterized as processes than structures. They are, however, distinct in their nature from other processes. For example, we feel feelings rather than think or decide them; similarly, desiring is something different than thinking or perceiving.

The chart illustrates that the different levels of the mind are all intimately connected with each other and with their unmanifest source, pure intelligence. This point is explained in detail in chapter 4, "The Integrated

Functioning of Intelligence at Many Levels."

According to Maharishi's Vedic Psychology, the different levels of mind are nothing but different modes of the same pure intelligence. Just as the various forces and particles that comprise the material world are ultimately nothing but different modes of excitation of abstract quantum fields, the ego, intellect, mind and senses are just different modes of excitation of pure intelligence. Viewing intelligence from this perspective, Maharishi's Vedic theory of intelligence is not in conflict with the perspective of 20th century psychology, or any of the current theories of intelligence. Rather, the Vedic theory integrates and completes all of them (see Chapter 8).

Just as the intelligence of the individual can be described, the intelligence of a collection of individuals can be described as "collective intelligence", which is lively in the various levels of collective life, from family, to community, to city, to national life, and ultimately the collective intelligence of all the individuals in the world, or "world intelligence". These levels are depicted within level 4 in Figure 2, "Society."

Progressing to an even larger perspective, we can consider the grand scales on which the intelligence of nature operates: the level of the solar system, the galaxy, clusters of galaxies, and ultimately the whole universe. This is level 5, "Universe".

As the issues in intelligence theory are successively considered in the chapters that follow, frequent reference is made to Figure 2, and the details of the chart are elaborated as they relate to the issue under consideration.

Granted, it may not be easy for psychologists to accept such a view of intelligence without specific evidence that it can be characterized in this way. This evidence will be considered shortly, but first, we will consider how this view of intelligence relates to twentieth century theories of intelligence in their own terms. That is to say, we shall consider which elements of a definition of intelligence are generally agreed upon by twentieth century intelligence theorists, and attempt to construct a definition in these terms.

Fundamental Qualities of Intelligence
In Terms Used by Twentieth Century Intelligence Theorists

As mentioned earlier in this chapter, and as can be seen from contemporary reviews of intelligence theory (Sternberg, Ed., 1982; Sternberg, 1985; Sternberg & Detterman, 1986, Jensen, 1987), intelligence theorists appear to be far from agreement on a definition of intelligence. However, there are a few elements which are generally found in the many definitions of intelligence (Sternberg, 1982, p. 978; 1985, p.xi). These elements are really partial descriptions of the functioning of intelligence, rather than a complete definition of its nature. They are: adaptability, orderliness, efficiency, the ability to integrate parts with a wholeness, to create new solutions to problems, and thereby to progress, or evolve. "Evolution" is not used here in the sense of the Darwinian theory of evolution of species across generations, but rather in the sense of progress and development of life to higher levels of intelligence and more optimal functioning within the individual, as well as across generations.

From this point of view, intelligence may be defined as the ability to detect and create order in the environment and in oneself, resulting in progress toward more optimal functioning of the individual and/or the environment.

The above definition includes the notion of

adaptability, since the ability to detect order in the environment and create it in oneself is the essence of adaptability. The concept of integration is included, since detecting and creating order must necessarily involve integration of parts with a whole, as in recognition of a pattern through the senses, solution of a problem through abstract analysis and synthesis by the intellect, or creation of social order among a collection of individuals. Detection and creation of order necessarily imply efficiency, since more orderly functioning of an organism or collection of organisms is less wasteful of energy and hence more efficient.

The above definition of intelligence implies that intelligent thought and behavior means thinking and acting in accord with the laws of nature, for the following reasons: The laws of nature are generally held to be responsible for order in the universe; hence, the ability to create order in oneself and the environment necessarily implies thinking and acting in accord with the laws of nature.

In addition to individuals and collections of individuals, the above definition may also be applied to pure intelligence, the source of the intelligence of nature. With reference to the previous discussion of pure intelligence, it may be described this way: pure intelligence, becoming aware of the perfect order of

diversity in itself (knower, process of knowing, and known in the wholeness of pure intelligence), creates the order of the universe and the progress of life everywhere. This point is explained in detail in Chapter 2. Having identified adaptability, orderliness, efficiency, integration, and progress as fundamental qualities of intelligence, we will shortly turn to interpreting the scientific research on the TM and TM-Sidhi program as enhancing the expression of these qualities in all areas of life. First, however, we shall consider scientific evidence for the first point of Maharishi's Vedic theory of intelligence.

Objective Verification from Modern Science

Objective verification using the method of modern science is the first method of verification of the nature of intelligence used by Maharishi's Vedic Psychology. In this section we will interpret the scientific research on the TM and TM-Sidhi program as verifying the first point of Maharishi's Vedic theory of intelligence--the definition of pure intelligence as an all-pervading field of intelligence and a source of creativity and intelligence in man. This body of research can be divided into two parts: 1) physiological research on the state experienced during practice of the TM technique, and, 2) physiological, psychological, sociological, and ecological effects of TM

outside the period of meditation itself. The importance of the research conducted during the technique is that it verifies that the state of transcendental consciousness, as objectively seen through its physiological correlates, is a unique fourth major state of consciousness as postulated by Maharishi's Vedic Psychology. A number of studies have confirmed this hypothesis from various approaches.

In particular, several studies have shown that the state of transcendental consciousness is accompanied by unique physiological changes, including suspension of breath and EEG coherence (Badawi, Wallace, Orme-Johnson, & Rouzere, 1984; Farrow & Hebert, 1982; Orme-Johnson, Clements, Haynes, & Badawi, 1977). Other physiological indicators of this state include changes in blood chemistry indicative of reduced stress (Bevan, Symons, Beng, & Welby, 1979; Jevning, Wilson, & Davidson, 1978; Jevning, Wilson, & Smith, 1978); increased skin resistance (Dillbeck & Orme-Johnson, 1987); and reduced metabolic rate as evidenced by whole blood cell metabolism (Jevning, Wilson, Pirkle, O'Halloran, & Walsh, 1983; Jevning, Wilson, & Guich, 1985). These physiological changes are documented at length in several books and review articles (Alexander, Boyer, & Alexander, 1987; Alexander, Cranson, Boyer, & Orme-Johnson, 1987; Dillbeck & Orme-Johnson, 1987; MERU Press, 1984; Wallace, 1986, 1971).

Maharishi's Vedic theory of intelligence postulates that the experience of pure intelligence, the intelligence

of nature, as transcendental consciousness by the human mind will increase the expression of the fundamental qualities of intelligence in all aspects of life, physiological, psychological, sociological, and ecological. Table 3, entitled, "Fundamentals of Intelligence" summarizes research on the effects of the Transcendental Meditation and TM-Sidhi program outside of meditation according to levels of the mind described in Figure 2, and in terms of the fundamental qualities of intelligence discussed in the previous section. Research studies relating to the experience of pure intelligence during the practice of TM are listed under the level called "Transcendental Consciousness."

TABLE 3

FUNDAMENTALS OF INTELLIGENCE:
RESEARCH ON THE TRANSCENDENTAL MEDITATION
AND TM-SIDHI PROGRAM
REFLECTING THE GROWTH OF INTELLIGENCE

This table presents a conceptual meta-analysis of research on the Transcendental Meditation and TM-Sidhi program, interpreting the results in terms of increased expression of pure intelligence in all areas of life: physiological, psychological, sociological, and ecological. The research cited in this table has been published in referred journals and dissertations, and has also been collected in five volumes: Scientific Research on the TM and TM-Sidhi program, Collected papers, Orme-Johnson and Farrow (Eds.), (1977), Vol. 1; Chalmers, Clements, Schenklun, and Weinless (Eds.), (in press), Vols. 2-4; and Maharishi International University (in preparation), Vol. 5. The qualities of intelligence referred to here--orderliness, efficiency, adaptability, integration, and progress--have been discussed in the context of the definition of intelligence presented earlier in the previous section.

PHYSIOLOGICAL INTELLIGENCE

Through the Transcendental Meditation and TM-Sidhi program, direct experience of pure intelligence increases physiological intelligence--orderly, efficient, adaptive, and progressive functioning of all the parts of the physiology, and integration of the parts with the whole.

The physiological state corresponding to the experience of pure intelligence is a state of low activation, high efficiency, integration and orderliness--restful alertness--as indicated by:

* decreased metabolic rate (Farrell, 1979; Garnier, Cazabat, Thebault, & Gauge, 1984; Wallace, 1970; Wallace et al., 1971; Wallace et al., 1972).

* decreased glucose metabolism in red blood cells (Jevning, Wilson, Pirkle, Guich, & Walsh, 1985).

* decreased respiration rate; and minute ventilation (Wallace, 1970; Wallace et al., 1971; Wallace et al., 1972).

* decreased breath rate and respiratory quotient, respiratory suspension and hypo-ventilation, changed sensitivity to blood gases (Kesterson, 1986).

* physiological indications of higher states of consciousness (respiratory suspension, slowing of respiratory frequency, drop in expiratory exchange) correlated with psychological health (Gelderloos, Lockie, & Chuttoorgoon, 1987).

TABLE 3 (Continued)

* deep relaxation as indicated by increased basal skin resistance (Wallace, 1970; Wallace et al., 1971; Wallace et al., 1972; Orme-Johnson, 1973; see Dillbeck & Orme-Johnson, 1987, for a review).

* redistribution of blood flow and increased cerebral blood flow (Jevning & Wilson, 1978; Jevning, Smith, Wilson, & Morton, 1976; Jevning, Wilson, Smith, & Morton, 1978; Jevning, Wilson, O'Halloran, & Walsh).

* decreased plasma cortisol (Bevan, 1980; Jevning, Wilson, & Davidson, 1978; Jevning, Wilson, & Smith, 1978).

* increased serotonin metabolite (5-HIAA) (Bujatti & Riederer, 1976).

* increased EEG synchrony and correlation (Banquet, 1972, 1973; Banquet & Sailhan, 1974; Herbert & Lehmann, 1977; Krahne & Taneli, 1975).

* increased EEG coherence (Dillbeck & Bronson, 1981; Gaylord, Orme-Johnson, & Travis, 1988; Gaylord, Orme-Johnson, Willbanks, & Travis, 1988; Levine, 1976; Travis 1988b).

* unique physiological states as indicated by biochemical changes, including reduction of stress hormones (Jevning, Wells, Wilson, & Guich, 1987; Jevning, Pirkle, & Wilson, 1977; Jevning, Wilson, & Vanderlaan, 1978; McCuaig, 1974; O'Halloran, Jevning, Wilson, Skowsky, & Alexander, 1985).

Pure intelligence is experienced most distinctly during periods of transcendental consciousness, the state of complete rest and perfect orderliness that occurs during the TM technique. Its physiological correlates are:

* respiratory suspension (Farrow & Hebert, 1982; Badawi, Wallace, Orme-Johnson, & Rouzere, 1984; Kesterson, 1986; Travis, 1988b; Wolkove, Kreisman, Darragh, Cohen, & Frank, 1984).

* increased EEG coherence (Farrow & Hebert, 1982; Badawi et al., 1984; Travis, 1988b).

* increased basal skin resistance indicative of deep relaxation and reduced stress (Dillbeck & Orme-Johnson, 1987; Farrow & Hebert, 1982; Wallace et al., 1971; Wolkove et al., 1984).

During the practice of the TM-Sidhi program, increased physiological intelligence--orderliness, efficiency, adaptability, integration, and progress of the physiology--is indicated by:

TABLE 3 (Continued)

- * Increased EEG coherence at the moment of lift-off of yogic flying (Orme-Johnson, Clements, Haynes, & Badawi, 1977; Travis, 1988b).
- * maintenance of alpha rhythm, an indication of restful alertness, during yogic flying (Orme-Johnson & Gelderloos, 1988).
- * distinctive EEG feature of 9.5 Hz peaks in global power (all leads) and higher frontal-central coherence (theta and beta) during yogic flying (Travis, 1988b).
- * longitudinal increases in frontal EEG coherence (Dillbeck & Bronson, 1981), a correlate of:
 - * greater creativity (Dillbeck and Vesely, 1986; Orme-Johnson & Haynes, 1981).
 - * flexibility of concept learning (Dillbeck, Orme-Johnson, & Wallace, 1981; Dillbeck and Vesely, 1986).
 - * neurological efficiency (Wallace, Mills, Orme-Johnson, Dillbeck, & Jacobe, 1982).
 - * high levels of principled moral reasoning, and intelligence (S. Nidich, Ryncarz, Abrams, Orme-Johnson, & Wallace, 1983; Orme-Johnson, Wallace, Dillbeck, Alexander, & Ball, 1982).
 - * better utilization of subtle cues--enhanced semantic facilitation (Sheppard, 1988).
 - * improved academic performance (Wallace, Mills, Orme-Johnson, & Jacobe, 1982).

Increased physiological intelligence outside the practice of the TM and TM-Sidhi program is indicated by:

1. Increased orderliness, efficiency, adaptability, and integration of the central nervous system;
 - * improved information transfer in the brain (Kobal, Wandhofer, & Plattig, 1975; Wandhofer, Kobal, & Plattig, 1976).
 - * greater adaptability of brain functioning (greater lateralization appropriate to right or left hemisphere task) (Bennett & Trinder, 1977).
 - * Shorter latency of cortical evoked potentials, a correlate of intelligence (Kobal, Wandhofer, & Plattig, 1975; Wandhofer, Kobal, & Plattig, 1976).
 - * faster H-reflex recovery (Wallace, Silver, Mills, Dillbeck, & Wagoner, 1983), a correlate of academic achievement (Wallace, Orme-Johnson, Mills, & Dillbeck, 1984), EEG coherence, and concept learning (Dillbeck, Orme-Johnson, & Wallace, 1981).
2. Improved autonomic functioning:
 - * Increased autonomic stability (Brooks and Scarano, 1985; Dillbeck & Orme-Johnson, 1987; Orme-Johnson, 1973).
 - * lower resting metabolic rate (Garnier et al., 1984).

TABLE 3 (Continued)

* lower resting heart rate (see Dillbeck & Orme-Johnson, 1987, for a review)

* lower resting respiration rate (Allison, 1970; Wallace, 1970; Wallace, et al., 1971, 1972; see Dillbeck & Orme-Johnson, 1987, for a review).

* longitudinal indications of deep relaxation-- decreased heart rate, decreased systolic and diastolic blood pressure, decreased amplitude of radial and carotid pulse, decreased EMG, increased basal skin resistance (Bagga & Gandhi, 1983).

* reduced blood pressure in hypertensive patients (Blackwell et al., 1975; Cooper & Aygen, 1978; Doner, 1976; Alexander, Langer, Davies, Chandler, & Newman, 1986).

* reduction of blood pressure to more ideal level in normotensive subjects (Cooper & Aygen, 1978; Wallace, Silver, Mills, Dillbeck, & Wagoner, 1983).

* reduced airway resistance in bronchial asthma patients (Honsberger & Wilson, 1973a, 1973b; Wilson, Honsberger, Chiu, & Novey, 1975).

* normalization of reactivity to stress indicated by reduced cardiovascular reactivity under acute mental and physiological stress, lower levels of epinephrine, and reduced beta-adrenergic receptor sensitivity (Mills, Schneider, Hill, Watson, & Wallace, 1987).

3. Improved biochemical regulation:

* increased stability and sensitivity of control of hormone levels (Werner et al., 1986).

* decreased biochemical stress markers.

* lower urinary free cortisol (Bevan, Young, Welby, Nenadovich, & Dickens, 1976).

* lower plasma lactate (Wallace et al., 1971, 1972; Jevning, Wilson, Smith, & Morton, 1978; Jevning, Wilson, O'Halloran, & Walsh, 1983; Jevning, Wilson, Pirkle, O'Halloran, & Walsh, 1983; see Dillbeck & Orme-Johnson, 1987, for a review).

* decreased serum cholesterol levels in normal and hypercholesterolemic patients (Cooper & Aygen, 1978, 1979).

* improved glucose tolerance (Tabogi, 1983).

* increased serotonin metabolite, indicating normalization of the dysrhythmic effects of stress (Bujatti & Riederer, 1976; Walton, Lerom, Salerno, & Wallace, 1981; Walton, Francis, Lerom, & Tourenne, 1983; Walton et al., 1987).

* normalization of neurotransmitter metabolites in patients with aggressive behavior, mental retardation, and epilepsy (Subrahmanyam & Porkodi, 1980).

TABLE 3 (Continued)

* normalization of biochemical rhythms--altered periodicity of metabolic turnover of 5-hydroxyindoles (Walton et al., 1983).

* changes in excretion of neuroactive "substance M" (Walton et al., 1987).

* reduced physiological correlate (luteinizing hormone) of type A coronary prone behavior (Schneider, Mills, Schramm, & Wallace, 1987).

4. Improved orderliness, efficiency, adaptability, integration, and progress of the entire physiology as indicated by improved general health (Farinelli, 1981; Orme-Johnson, 1987b; Overbeck, 1982).

5. Increased physiological intelligence in subjects at a distance from the subjects practicing the TM and TM-Sidhi program:

* increased serotonin metabolite (5-HIAA) correlated with increased size of group practice of TM and TM-Sidhi program at a distance from the subjects (Pugh, Walton, & Cavanaugh, 1988).

* increased EEG coherence produced by other individuals practicing yogic flying at a distance (Orme-Johnson, Dillbeck, Wallace, & Landrith, 1982; Travis, 1988a, 1988b).

These physiological changes find expression in psychological changes.

PSYCHOLOGICAL INTELLIGENCE

Through the regular practice of the Transcendental Meditation and TM-Sidhi program, direct experience of pure intelligence at the basis of the mind increases psychological intelligence--orderly, efficient, adaptive, integrative, and progressive functioning of all levels of the mind from the most unmanifest or abstract level to the most expressed or concrete:

Level 1: TRANSCENDENTAL CONSCIOUSNESS: The cosmic psyche, field of pure intelligence

* increased experiences of stabilization of pure consciousness (Alexander, Swanson, Rainforth, Carlisle, & Todd, 1987).

* increased frequency of experiences of higher states of consciousness (Jedrczak & Alexander, 1986; Jedrczak, Clements, & Alexander, 1986)

TABLE 3 (Continued)

Level 2: EGO: Sense of self; ability to synthesize diversity of experience

* increased self-actualization (Ferguson & Gowan, 1976; Hjelle, 1974; Nidich, et al., 1973; Seeman, et al., 1972)

* Enhanced self-concept and self-esteem (Hanley & Spates, 1978; Nystul & Garde, 1977; Shecter, 1978; Turnbull & Norris, 1982)

* increased inner-directedness, inner locus of control, spontaneity, and self-supportiveness (Hjelle, 1974; Nidich, et al., 1973; Seeman, et al., 1973).

* Decreased negative personality traits (Abrams & Spigel, 1978, 1979; Aron & Aron, in press; Berg & Mulder, 1976; Brooks & Scarano, 1985; Dillbeck, 1977; Ljunggren, 1977; Shecter, 1978)

* Decreased drug and alcohol abuse, indicating improved self-concept and increased well-being of the individual as a whole (Aron & Aron, 1983; Geisler, 1978, Monahan, 1977; Shafii, Lavelly, & Jaffee, 1974, 1975)

* Improved general health, indicating increased well-being of the individual as a whole (Cooper & Aygen, 1979; Orme-Johnson, 1987; Wallace, Silver, Mills, Dillbeck, & Wagoner, 1983)

* increased feeling reactivity (sensitivity to one's own needs and feelings) (Berg & Mulder, 1976; Ferguson & Gowan, 1976; Hjelle, 1974; S. Nidich, Seeman, & Dreskin, 1973; Seeman, Nidich, & Banta, 1972).

* greater inner locus of control (Hjelle, 1974).

* enhanced self-concept (Nystal & Garde, 1977).

* stronger self identity (Turnbull & Norris, 1982).

* increased level of ego development (Alexander et al., in press).

Level 3: FEELING: Affective and Motivational Systems

* increased feeling reactivity (sensitivity to one's own needs and feelings) (Berg & Mulder, 1976; Ferguson & Gowan, 1976; Hjelle, 1974; S. Nidich, Seeman, & Dreskin, 1973; Seeman, Nidich, & Banta, 1972).

* increased capacity for warm interpersonal relationships (Huelle, 1974; Nidich, Seeman, & Dreskin, 1973).

* less anxiety, less depression, less need for acceptance, and more affectionate (Handmacher, 1978).

* decreased anxiety and somatic neurotic instability (Dillbeck, 1977; Kniffki, 1979; Ljunggren, 1977; Tjoa, 1975).

* Increased resistance to stress (Orme-Johnson, 1973; Mills and Farrow, 1981).

TABLE 3 (Continued)

- * greater autonomic stability, a physiological correlate of emotional stability (Orme-Johnson, 1973).
- * less neuroticism, greater ego strength, greater satisfaction, less sensitivity to criticism (Van den Berg and Mulder, 1976).
- * decreased tendency to dominate (Handmacher, 1978).*
- greater marital satisfaction (Aron, E. and Aron, A., 1982).
- * greater intimacy and happiness in marriage (Suarez, 1976).
- * greater admiration for one's spouse (Suarez, 1976).*
- greater work satisfaction (Frew, 1974).
- * improved relations with co-workers and supervisors (Frew, 1974).
- * Increased self-actualization: greater freshness of appreciation and richness of emotional reaction (Hjelle, 1974; Nidich, Seeman, & Dreskin, 1973).
- * greater altruism, and greater respect for traditional values (Penner, Zingle, Dyck, & Truch, 1974).
- * improved moral judgment (Kotchabhakdi et al., 1982).

Level 4: INTELLECT: Discrimination, decision processes

- * increased fluid intelligence (A. Aron, Orme-Johnson, & Brubaker, 1981; Dillbeck, Assimakis et al., 1986; Eyerman, 1981; Jedrczak et al., 1985; Kotchabhakdi, Pipatveravat, Kotchabhakdi, Tapanya, & Pornpathkul, 1982; Shecter, 1978; Tjoa, 1975),
- * increased learning ability (Kotchabhakdi et al., 1982)
- * improved efficiency of concept learning (Dillbeck, Orme-Johnson, & Wallace, 1981).
- * increased moral reasoning (Kotchabhakdi et al., 1982; S. Nidich, 1975)
- * improved academic performance (Kember, 1985; S. Nidich, R. Nidich, & Rainforth, 1986).
- * improved holistic, synthetic thinking as indicated by enhanced tonal memory (Pagano & Frumkin, 1977), higher creativity (Jedrczak, Beresford, & Clements, 1985), and increased originality of figural creativity (Travis, 1979).
- * shorter choice reaction time, a correlate of intelligence (Holt, Caruso, & Riley, 1978)
- * Greater intellectual orientation (Penner, Zingle, Dyck, & Truch, 1974).

Level 5: MIND: Thinking and Memory

- * improved memory (Kotchabhakdi et al., 1982; Miskiman, 1977).

TABLE 3 (Continued)

* increased visual memory positively correlated with length of time practicing TM-Sidhi program (Jedrczak et al., 1986).

* increased performance on right hemisphere tasks as indicated by enhanced tonal memory (Pagano & Frumkin, 1977) and increased originality of figural creativity (Travis, 1979).

* improved performance on left hemisphere tasks as indicated by increased fluency of verbal creativity (Travis, 1979).

* increased learning ability (Kotchabhakdi et al., 1982).

* improved efficiency of concept learning (Dillbeck, Orme-Johnson, & Wallace, 1981).

* growth of a stable internal frame of reference as indicated by tests of field independence (Dillbeck, Assimakis, Raimondi, Orme-Johnson, & Rowe, 1986; Gelderloos, Lockie, & Chuttooroon, 1987; Jedrczak, 1984; Pelletier, 1974).

* growth of a stable internal frame of reference as indicated by reduced need for external stimulation (Friend & Maliszewski, 1978).

* growth of a stable internal frame of reference as indicated by improved efficiency of visual perception (Dillbeck, 1982).

* improved mind-body coordination and efficiency of information processing-- shorter choice reaction time (Holt, Caruso, & Riley, 1978).

* improved spatial localization (Harrison et al., 1976; Pelletier, 1974).

* improved cognitive ability and cognitive style (Dillbeck, Assimakis et al., 1986).

* higher levels of cognitive development in meditating children (Warner, 1986).

Level 6: DESIRE: Motivation and Drives

* increased sensitivity to one's own needs and feelings and increased spontaneity; increased capacity for warm interpersonal relationships (Nidich, Seeman, & Dreskin, 1973; Seeman, Nidich, & Banta, 1972)

* increased inner satisfaction, greater marital satisfaction (Aron & Aron; Berg & Mulder, 1976)

* increased work satisfaction, improved relationships with co-workers and supervisors (Frew, 1974)

* reduced need for external stimulation (friend & Maliszewski, 1978)

* holding values of self-actualized people (Nidich et al., 1973; Seeman, et al., 1972)

TABLE 3 (Continued)

Level 7: SENSES: Perceptual and motor processes

- * improved efficiency and flexibility of visual perception (Dillbeck, 1982).
- * increased field independence: Growth of perceptual acuity and a stable internal frame of reference (Dillbeck, Assimakis, Raimondi; Jedrczak, 1984; Orme-Johnson, & Rowe, 1986; Pelletier, 1974)
- * shorter simple reaction time (Appelle & Oswald, 1974)
- * enhanced neuromuscular efficiency; faster reflexes, faster recovery of the paired H-reflex (Wallace, Mills, Orme-Johnson, Dillbeck, & Jacobe, 1983; Warshal, 1980)

Level 8: BEHAVIOR: Conditioning, Learning, Behavioral adaptation

- * increased learning ability (Kotchabhakdi et al., 1982).
- * improved efficiency of concept learning (Dillbeck, Orme-Johnson, & Wallace, 1981).
- * increased social maturity (A. Aron et al., 1981; Geisler, 1978; Hanley & Spates, 1978; Penner, Zingle, Dyck, & Truch, 1974).
- * greater adjustment (E.N. Aron & A. Aron, 1982; Suarez, 1976).
- * increased ability to cooperate with others (Jonsson, 1975).
- * improved relations with co-workers and supervisors, and improved personal and work relations (Alexander, Swanson et al., 1987; Frew, 1974).
- * greater work satisfaction (Frew, 1974).
- * reduced recidivism among prison inmates (Alexander, 1982; Bleick & Abrams, 1987)

These psychological changes find expression in sociological changes.

SOCIOLOGICAL INTELLIGENCE

Through the regular practice of the Transcendental Meditation and TM-Sidhi program, direct experience of pure intelligence increases sociological intelligence--orderly, efficient, adaptive, integrative, and progressive thinking and behavior in all areas of society--as indicated by:

1. General changes indicating increased sociological intelligence:

- * more positive conception of human nature, less pronounced feelings of social inadequacy, and higher levels of tolerance (Hanley & Spates, 1978).

TABLE 3 (Continued)

* increased social maturity (A. Aron et al., 1981; Geisler, 1978; Hanley & Spates, 1978; Penner, Zingle, Dyck, & Truch, 1974).

* improved perception of others & improved ability to appreciate others (Holeman & Seiler, 1979).

* increased consideration of others (Penner et al., 1974).

* decreased tendency to dominate (Handmacher, 1978).

* increased capacity for intimate contact (capacity for warm interpersonal relationships) (Hjelle, 1974; Geisler, 1978; S. Nidich et al., 1973; Seeman et al., 1972).

* less interest in superficial social contacts (Handmacher, 1978).

* greater respect for traditional religious values and greater altruism (Hanley & Spates, 1978; Penner et al., 1974).

2. Changes indicating increased sociological intelligence in education.

* higher level of moral reasoning in college students (S. Nidich; 1975; S. Nidich et al., 1986; S. Nidich et al., 1983).

* high level of moral atmosphere in a high school setting (R. Nidich & S. Nidich, 1985).

3. Changes indicating increased sociological intelligence in business.

* increased ability to cooperate with others (Jonsson, 1975).

* improved relations with co-workers and supervisors, and improved personal and work relations (Alexander, Swanson et al., 1987; Frew, 1974).

4. Changes indicating increased sociological intelligence in marriage.

* greater acceptance of one's spouse (Suarez, 1976).

* greater agreement on conduct and recreation (Suarez, 1976).

* greater adjustment (E.N. Aron & A. Aron, 1982; Suarez, 1976).

These sociological changes find expression in ecological changes.

TABLE 3 (Continued)

ECOLOGICAL INTELLIGENCE

Through the regular practice of the Transcendental Meditation and TM-Sidhi program, direct experience of pure intelligence increases ecological intelligence--orderliness, efficiency, adaptability, integration, and progress of all aspects of the ecology--indicated by:

1. Increased intelligence in the ecosystem on the city level--increased orderliness and progress in society.

* an immediate drop in crime rate in U.S. cities and a reduction in crime trend when 1% of the population participates in the TM program (Borland & Landrith, 1976; Dillbeck, Landrith, & Orme-Johnson, 1981).

* decreased crime rate in metropolitan areas (Union Territory of Delhi, Metro Manila, and Washington, D.C.) during experimental periods in which the number of participants practicing the TM and TM-Sidhi program in a group exceeded the square root of 1% of the population (Dillbeck, Banus, Polanzi, & Landrith, 1988; Dillbeck, Cavanaugh, Glenn, Orme-Johnson, & Mittlefehldt, 1987).

2. Increased expression of intelligence in the ecosystem on the state level--increased orderliness, efficiency, adaptability, integration, and holistic progress of society.

* improved quality of life on the state level on a composite index--crime rate, motor vehicle fatalities, auto accidents, deaths, alcoholic beverages and cigarette consumption, unemployment, pollution--when the number of participants practicing the TM and TM-Sidhi program in a group exceeded the square root of 1% of the population (Dillbeck, Cavanaugh et al., 1987).

3. Increased expression of intelligence in the ecosystem on the national level--increased orderliness, efficiency, adaptability, integration, and holistic progress of society .

* decreased inflation and unemployment in the U.S. and Canada when the number of participants practicing the TM and TM-Sidhi program in a group exceeded the square root of 1% of the national population (Cavanaugh, 1987).

* improved quality of life in the U.S. on a composite index--crime rate, notifiable disease rate, hospital admissions rate, infant mortality rate, suicide rate, cigarette consumption per capita, alcohol consumption per capita, GNP per capita, patent application rate, divorce

TABLE 3 (Continued)

rate, and traffic fatalities rate--when the number of participants practicing the TM and TM-Sidhi program in a group exceeded the square root of 1% of the national population, taking into account the number of TM meditators in the population (Orme-Johnson, Gelderloos, & Dillbeck, in press).

* improved quality of life in Israel--decreased crime, decreased traffic fatalities, decreased fires, improved national mood, and increased stock market--when the number of participants practicing the TM and TM-Sidhi program in a group exceeded the square root of 1% of the national population (Orme-Johnson, Alexander, Davies, Chandler, & Larimore, 1989).

4. Increased expression of intelligence in the ecosystem on the world level--increased orderliness, efficiency, adaptability, integration, and holistic progress of the whole world.

* decreased war intensity and fewer war deaths in Lebanon when the number of participants practicing the TM and TM-Sidhi program in a group exceeded the square root of 1% of the population of Israel and Lebanon, taking into account the number of TM meditators in the population (Orme-Johnson, Alexander, Davies, Chandler, & Larimore, in press).

* increased progress towards peace and reduced injuries and war deaths during three experimental periods in which the number of participants practicing the TM and TM-Sidhi program in a group exceeded the number predicted to be necessary to influence the war (Alexander, Abou Nader et al., 1987).

* decreased international conflicts and increased economic prosperity during three experimental periods in which the number of participants practicing the TM and TM-Sidhi program in a group approached or exceeded the square root of one percent of the world population (Orme-Johnson, 1987a; Dillbeck, 1987).

* improved U.S. Soviet relations as a result of the group practice of the TM and TM-Sidhi program (Gelderloos, Frid, Goddard, Xue, & Loliger, in press).

The field nature of pure intelligence has been verified by sociological research which measured the effects of collective practice of the TM and TM-Sidhi program on a number of social indicators including international and national conflict (Alexander, Abou Nader, Cavanaugh, Davies, Kfoury, Dillbeck, & Orme-Johnson, 1987; Dillbeck, 1987; Gelderloos, Frid, Goddard, Xue, & Loliger, in press; Orme-Johnson, 1987a; Orme-Johnson, Alexander, Davies, Chandler, & Larimore, 1989); crime (Borland & Landrith, 1976; Dillbeck, Landrith, & Orme-Johnson, 1981; Dillbeck, Cavanaugh, Glenn, Orme-Johnson, & Mittlefehldt, 1987; Orme-Johnson, Alexander et al., 1989; Orme-Johnson, Gelderloos, & Dillbeck, in press); accident rates (Dillbeck, Cavanaugh et al., 1987; Orme-Johnson, Gelderloos, & Dillbeck, in press); economic indicators (Cavanaugh, 1987; Dillbeck, Cavanaugh et al., 1987; Orme-Johnson, 1987a; Orme-Johnson, Alexander et al., 1989); and general quality of life including sickness rates (Orme-Johnson, Gelderloos, & Dillbeck, in press) and others. Each research study documented the effects of an intervention or a number of interventions, the effects of which were predicted beforehand.

For example, in December, 1983 a study was conducted to test the theory that pure intelligence is the universal source of all the laws of nature and the source and substrate of the collective consciousness of the world's population, as well as the source of the individual mind. As

has already been stated in this chapter, according to the Vedic theory of intelligence all thoughts and actions of individuals everywhere are impulses or excitations of the same unbounded field of pure intelligence, and therefore, individuals who know how to enliven this field in specific ways can have a coherent influence on the thinking and actions of a large population.

Before the experiment began, the following hypothesis was publicly stated: The unified field of pure consciousness experienced through practice of the TM and TM-Sidhi program and the unified field glimpsed by modern quantum physics are identical, and therefore it should be possible to produce measurable changes in social trends throughout the world by using the TM and TM-Sidhi program to create a positive influence in collective consciousness from the level of the unified field. Specifically, it was hypothesized that a group of 7,000 experts (equal in size to the square root of one percent of the world's population) practicing the TM and TM-Sidhi program together in one place and stimulating the unified field in the least excited state of their own consciousness, could utilize the power of natural law present in the unified field to produce an immediate, statistically significant decrease in international conflict, terrorist acts, and an increase in economic prosperity as measured by an increase in the World Stock Index. The hypothesis was confirmed during the two week

period of the experiment; significant improvements occurred in all the above social indicators.

Prior to and since the experiment mentioned above, the observed phenomenon, known as the "Maharishi effect" has been verified repeatedly on city, state, national, and international levels (Assimakis & Dillbeck, 1987; Cavanaugh, 1988; Davies, 1988; Dillbeck, 1987; Dillbeck, Cavanaugh, Glenn, & Orme-Johnson, 1987; Dillbeck, Banus, & Landrith, 1989; Orme-Johnson, Gelderloos, & Dillbeck, 1988; Orme-Johnson, Alexander, Davies, Chandler, & Larimore, 1988). Hence there is strong objective support for the theory that the field of pure intelligence, experienced through the subjective means of gaining knowledge provided by the TM and TM-Sidhi program does exist and does influence human behavior everywhere.

Verification of the Source of Creative Intelligence Through Direct Experience

For many scientists the idea of unmanifest creative intelligence, and the idea of continuity between man's intelligence and the intelligence of nature, remain intuitive feelings, or convictions--in many cases, the result of life-long study of nature's laws--but nonetheless, incapable of confirmation by direct experience. According to Maharishi's Vedic Psychology, the existence of the pure

field of creative intelligence and the continuity of our intelligence, or consciousness, with the intelligence of nature, can indeed be verified through direct experience as well as through observation and inductive logic.

We shall now cite some personal experiences of practitioners of TM and the TM-Sidhi program, which subjectively confirm the identity of pure consciousness, or pure intelligence, as one's Self, the simplest state of one's own awareness, which transcends thought. These accounts were reported by subjects in response to a questionnaire on experiences of Transcendental Meditation:

During the TM technique my mind settles down, thoughts become less and then suddenly all thought activity ceases and I slip into an unbounded ocean of awareness which is pure, quiet, unexcited and infinitely extended beyond space and time. In this state, I am not aware of any thought or any thing; I am just aware of awareness, you could say, wide awake inside but not thinking. Simultaneously my body settles down, breathing becomes less and I feel relaxed (Gackenbach, Cranson, & Alexander, 1986).

Another subject writes,

As I spontaneously become aware of more fundamental and abstract levels of the object of attention during meditation, the rigid boundaries of the object begin to fade. As the object becomes more and more unlocalized and the focus of attention continues to spread, comprehension becomes more and more unbounded. When the faintest impulse of the [object] dissolves and there is no localized content to experience, my awareness is completely unbounded. I am left with the experience of a pure, abstract, universal field of consciousness, unlocalized by specific content or activity of the mind-- just the Self wide awake within its own unbounded nature (Maharishi Mahesh Yogi, 1977).

Relating an experience of continuity between his consciousness and the rest of nature, another subject wrote,

The sense that now prevails is that I am the entire universe. I happen to see and speak from here, but that seems almost incidental, just a reference point for the sake of perception. When I look at anything, I see consciousness...I see subjectivity which has taken a form, which has adopted an appearance of matter. The boundaries of the objective, material world I perceive, but I see them as boundaries on the surface of a more significant underlying reality--that consciousness, my own consciousness, comprises all that there is (Cranson, 1989).

Such experiences are common to those who practice the TM program; in fact, they are the expected result of proper practice of the technique. The first two examples represent a stage of experience that is usually achieved during the first few days of instruction, while the third example represents a more advanced stage of the practice. Together, they provide subjective evidence for the theoretical description of pure intelligence as an unbounded, unified field, aware of itself, and of our identity with it.

Evidence of the Nature of Intelligence from Vedic Literature

In addition to observation and direct experience, Maharishi's Vedic Science uses a third method of verification--comparison of experience and logical

conclusions with the knowledge about intelligence that is recorded in the ancient texts of the Vedic literature. Before we explore this evidence, a word about the Vedic literature.

Maharishi's Vedic Science brings to light that when the unified field interacts with itself, that activity in the unmanifest field of pure intelligence generates a sound or vibration, and the form of that primordial sound is heard as the Ved, the script of nature:

"...the Ved in its original script is just the whisper of the unified field to itself, and human awareness, settling down to its own self-referral state, very clearly cognizes its own self-interacting activity.

"The four aspects of the Veda-- Rig Ved, Sama Ved, Yajur Ved, and Atharva Ved-- these are a beautiful, sequentially available script of nature in its own unmanifest state, eternally functioning within itself and, on that basis of self-interaction, creating the whole universe and governing it (Maharishi Mahesh Yogi, 1985a, 64)."

All the knowledge in the Vedic tradition, known as the Vedic literature, is said to sequentially emerge from the fundamental self-interacting dynamics of pure intelligence that is experienced as the four Vedas. This knowledge has been maintained by oral tradition since before recorded history. Having been put into written form, the texts of the Vedic literature comprise over 2,000 volumes and refer to many areas of human concern, including what are known today as the sciences, the arts, medicine, law, engineering,

architecture, etc. Some of the Vedic literature is directly concerned with the knowledge and experience of the unified field, its nature, its range, and the practical benefits of this knowledge for mankind. Among these texts, the Upanishads; the texts of the Itihasa, which include the Bhagavad Gita, the Ramayana, and Yoga Vasistha; and the Yoga Sutras, which belong to the branch of Vedic literature known as the Upangas, are central. In the study and practice of Vedic Science, these texts are used as fundamental references or guides on the path of progress toward living the knowledge of the Veda in practical life. Hence, these texts will be referenced here to support theoretical statements, along with objective confirmation by modern psychology and direct experience gained through the TM and TM-Sidhi program.

In the Bhagavad Gita, the Upanishads, and Yoga Vasistha, support can be found for the foregoing statements about the nature of pure intelligence, the unified field-- that it is our Self, that it is self-referral or self-aware, self-sufficient, unified, transcendental, all-pervading, and the source of all life. First, in the Bhagavad Gita (Maharishi Mahesh Yogi, 1967), Lord Krishna, considered the embodiment of the unified field, or pure intelligence, describes the self-referral nature of transcendental consciousness as:

"That (state) in which thought, settled through the practice of Yoga [Transcendental Meditation],

retires, in which, seeing the Self by the Self alone, he [the practitioner] finds contentment in the Self (VI,20);"

The Taittiriya Upanishad identifies pure intelligence as the Self, the cosmic psyche, and points to meditation as the way to discover it:

"He performed meditation; having performed meditation,

"He knew that intelligence is Brahman [the Self, the unified field, the cosmic psyche] (III,4,1; III,5,1, in Radhakrishnan, 1953, 555-556)."

The Taittiriya Upanishad states that pure intelligence is the source of all life (and therefore infinitely creative):

"For truly, beings here are born from intelligence, when born, they live by intelligence ... (III,5,1; III,6,1-- Radhakrishnan, 1953, 556-557)."

The Bhagavad Gita refers to the transcendental, all-pervading nature of pure intelligence:

"The all-pervading Intelligence...(V, 15-- Maharishi Mahesh Yogi, 1969, p.334)."

With regard to the unbounded, unified, holistic nature of pure intelligence, the Svetasvara Upanishad states,

"I (the Self) am the intelligence in the intelligent; I am consciousness in the conscious; I am the one among the many (VI, 13)."

Yoga Vasistha (1984) describes the unified nature of

the Self and our ability to know it in the least excited state of our own awareness:

Having thus reflected, Bali, [meditating] remained quiet. Freed from all doubts, from perception of objects and without the division between thinker, thought and thinking (meditator, the object of meditation, and meditation) [knower, known, and process of knowing], with all intentions and concepts quietened, Bali remained firmly established in the supreme state with a mind in which all movement of thought had ceased, like a lamp in a windless place (p.186).

To summarize: Maharishi's Vedic theory of intelligence views intelligence as a unified field at the basis of all of nature. Modern physics has glimpsed what appears to be this same unified field, and has described it in supersymmetric unified field theories. Some physicists have stated that the unified field is by definition the source of intelligence in nature. Since man is certainly a part of nature, Physicist John Hagelin and others have concluded that the unified field is the source of intelligence in man as well as in the rest of nature.

This view from modern physics is paralleled by Maharishi's Vedic Psychology, whose source predates modern physics by thousands of years. In Maharishi's Vedic theory of intelligence, the unified field of pure intelligence is described as self-sufficient and self-referral, or self-aware. By virtue of being self-aware, the unified field of intelligence is lively, self-interacting, infinitely

dynamic, and infinitely creative, expressing all the natural laws governing the universe. In short, pure intelligence is seen as holistic, creating, supporting and integrating everything in the universe.

In this view, intelligence is not confined to an unmanifest, inactive realm, disconnected from the diversity and interaction of mental life, nor is it seen as simply a set of cognitive processes or a general cognitive ability as in 20th century psychology. Rather, its nature is seen as holistic, incorporating both unmanifest unity and its manifest, diverse expressions in the form of mental faculties and their operations-- both infinite silence and infinite dynamism.

Knowledge of the nature of pure intelligence is confirmed from three approaches: 1) direct experience of the nature of pure intelligence, provided by practice of the TM and TM-Sidhi program; 2) descriptions of the nature and experience of pure intelligence provided by the Vedic literature, which is said to be the expression of the unmanifest self-interaction of pure intelligence, the Veda, and correspondence of these descriptions to the most recent view of the fundamental level of natural law described by modern physics; 3) objective verification of states of consciousness associated with the experience of pure intelligence and the resulting growth of intelligence in the life of the individual and society, from the fields of

psychology, physiology, psychophysiology, and sociology.

Addressing issue number 1 from the Maharishi's Vedic theory of intelligence: "What is intelligence?"-- intelligence in its most unified, universal form has been defined and, using subjective means of investigation, the TM and TM-Sidhi program, it has been discovered to be identical with transcendental consciousness, the least excited state of our own awareness, our Self. All the various functions of intelligence-- knowing, feeling, deciding, thinking, desiring, perceiving--are seen to arise from the fundamental nature of consciousness to know itself. This point is summarized in a statement of Maharishi Mahesh Yogi, "When consciousness becomes conscious, intelligence becomes intelligent (1972a, lecture 8, p.3)."

Consideration of a Summary of
Twentieth Century Views of Intelligence
From the Perspective of Maharishi's
Vedic Theory of Intelligence

In light of what has been discussed so far regarding the nature of intelligence, it is informative to reconsider Sternberg's chart entitled "Loci of Intelligence," presented earlier in this chapter. Figure 3 illustrates how Maharishi's Vedic theory of intelligence, the view of intelligence from Maharishi's Vedic Psychology shown earlier

in Figure 2, incorporates the structure of intelligence presented in Sternberg's chart, Table 1. As can be seen from Figure 3, Maharishi's Vedic theory encompasses and extends the view of intelligence proposed by Sternberg.

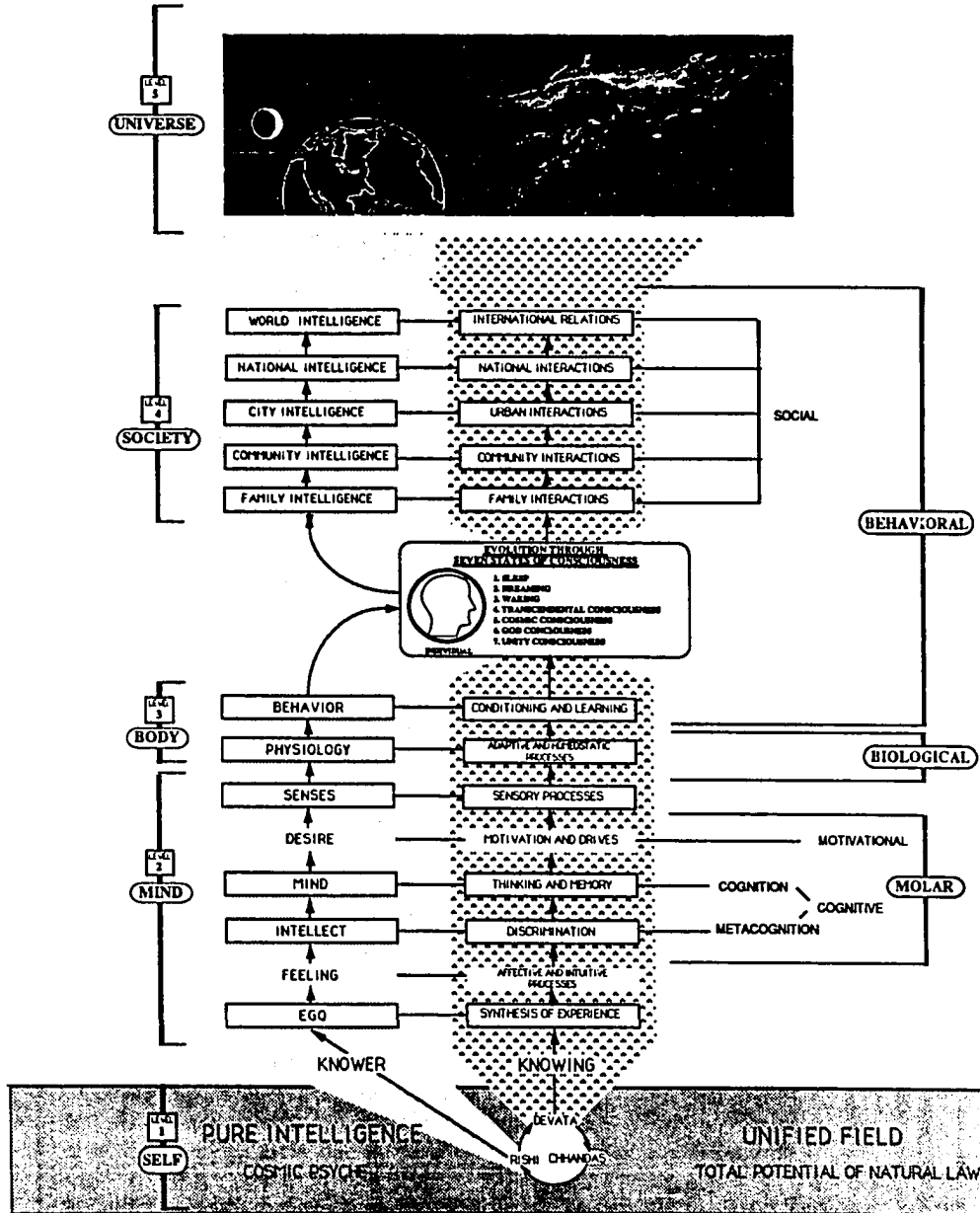
Figure 3

Sternberg's Loci of Intelligence
In Relation Maharishi's Vedic Theory of Intelligence

Sternberg's Loci of Intelligence in Relation To Maharishi's Vedic Theory of Intelligence

Vedic Theory

Sternberg



In Figure 3, the structure of intelligence described by Maharishi's Vedic theory of intelligence is shown on the left side of the chart, and the structure of intelligence described by Sternberg's chart (Table 1) is shown on the right third of the chart. The structure described by Maharishi's Vedic theory includes 5 main levels: 1) Self, 2) Mind, 3) Body, 4) Society, and 5) Universe. As discussed earlier, the structure described by Sternberg includes three main levels: Individual, Environment, and individual-Environment interaction, and, within the individual: 1) Molar, 2) Biological, 3) Behavioral, and, 4) Molar-biological-behavioral interaction. Within the molar level there are two sublevels, cognitive and motivational, and within the cognitive level there are two further subcategories, metacognition and cognition.

Not all of Sternberg's categories are included in Figure 3. Sternberg's scheme cannot be meaningfully compared category by category with the Vedic view of intelligence, for the following reasons: First, for the three main divisions of his chart, Sternberg makes a distinction between intelligence in the individual, the environment, and the individual-environment interaction, while the Vedic theory of intelligence considers this distinction to be less important than the distinction between the various modes or functions of intelligence, e.g. intellect, ego, senses, etc. This is because Maharishi's Vedic theory sees intelligence

as essentially a holistic, unified field at the basis of both the individual and the environment; both are viewed as expressions of pure intelligence.

Second, Sternberg takes essentially the same position as most other twentieth century psychologists in viewing intelligence as a phenomenon of the ordinary waking state. When viewed from this perspective, intelligence appears to have a limited, horizontal range of functioning, rather than a vertical (from pure intelligence through the layers of expressed values of intelligence) as well as a horizontal (association within a level) structure, as Maharishi's Vedic Psychology views it.

As a result, in locating intelligence, Sternberg emphasizes individual thinking, actions, and interactions of people with each other and with other organisms on the level of thinking and expressed behavior, even though he appears to make some degree of "vertical" distinction, e.g., between cognition and metacognition. His chart reflects the emphasis on individual thinking, actions, and interactions in the subcategories within individual intelligence. The biological level is subdivided into "Across Organisms," "Within Organisms," and the "Across-Within Interaction." There are further subdivisions within these categories, e.g., "Between Species," "Within Species," etc.

Similarly, at the Behavioral level, Sternberg makes further distinctions-- Academic, Social, Practical--and

makes subcategories within these three categories. On the whole, this structure reflects a view of intelligence that emphasizes the level of individual action and social interaction, the level of expressed behavior, rather than a subtle level at the basis of thought and behavior, or modes of intelligence within the individual.

The horizontal range of intelligence described by Sternberg and the theories he summarizes, is reflected in the fact that Sternberg's chart (reflecting twentieth century psychology as a whole) includes no concept of a Self, or pure intelligence, at the basis of the functioning of intelligence. This level is represented in Maharishi's Vedic theory of intelligence as Level 1 at the bottom of the chart, and an arrow extends up the left-hand side of the chart, indicating that pure intelligence pervades all its expressed levels. Nor does Sternberg's chart include the concept of intelligence extending throughout the universe, a concept that is represented as Level 5, "Universe," at the top of Figure 3.

Finally, Sternberg's chart and the theories it represents, conceive that society is organized by interactions between individuals on the level of thinking and behavior, while Maharishi's Vedic theory of intelligence conceives that society is organized by its collective consciousness or intelligence. As has been discussed, in the Vedic theory the most fundamental level of collective

consciousness or intelligence is pure intelligence.

According to Maharishi's Vedic theory, pure intelligence is a field of infinite correlation. This means that the field of pure intelligence, present everywhere in nature, connects all members of society at the deepest level of their intelligence. Infinite correlation is described by Maharishi in his Absolute Theory of Information (1978) as follows:

"This level of absolute pure consciousness [or pure intelligence] underlies and interconnects all possible information. It is a field of infinite correlation in which an impulse anywhere is an impulse everywhere (p.348)."

As was discussed earlier in this chapter, when individuals, and especially when large groups of individuals consciously stimulate this field of infinite correlation through the TM and TM-Sidhi program, a coherent influence can be created in society as a whole. Again, Maharishi comments,

"When this level of infinite correlation is enlivened by individual awareness, every thought and feeling creates a thrill on all levels of collective consciousness. This is the basis of the Maharishi Effect (p.348).

When the group awareness is brought in attunement with that level, then a very intensified influence of coherence radiates and a great richness is created. Infinite correlation is a quality of the transcendental level of nature's functioning from where orderliness governs the universe (1986, p.75)."

Chapter 8, "The Vedic theory of Intelligence in

relation to Twentieth Century Theories of Intelligence," describes in greater detail the relationship between the twenty-five theories of intelligence summarized by Sternberg, and Maharishi's Vedic theory of intelligence. Chapter 8 also makes a detailed comparison between two twentieth century theories of intelligence and Maharishi's Vedic theory of intelligence. We turn now to a second issue that should be addressed by any viable theory of intelligence, the question of whether intelligence has a unified or multiple structure.

Chapter 2

The Simultaneously Unified and Multiple Structure of Intelligence

Maharishi's Vedic theory of intelligence brings a new perspective to the question of a unified intelligence versus multiple intelligences, by looking deeply into the structure of natural law. Just as physics locates the basis of all the diversity of the universe in the unified structure of the superfield, Maharishi's Vedic Psychology locates all the diversity of subjective and objective existence in the unified structure of pure intelligence. As was briefly mentioned in the discussion of Figure 2, by virtue of being intelligence or consciousness, intelligence can be self-aware, and therefore it contains the three elements of knower, known, and process of knowing within itself. As Maharishi puts it,

Today quantum physics is peeping into the details of the unified field and is locating its three-in-one structure. This is precisely the three-in-one of the self-referral state of consciousness. This structure is very simple to understand. The awareness is open to itself, and therefore the awareness knows itself. Because the awareness knows itself it is the knower, it is the known, and it is the process of knowing. This is the state of pure intelligence, wide-awake in its own nature and completely self-referral. This is pure consciousness, transcendental consciousness (Maharishi Mahesh Yogi, 1986a, p.29).

Because there are three components of knowledge contained in the unified structure of intelligence, intelligence has a simultaneously unified and multiple

structure:

"In that pure consciousness we have three values--observed, observer and observation--and we have one unified state of the three. Here we have one and three at the same time (Maharishi Mahesh Yogi, 1985a, p.65)."

As mentioned in chapter 1, in Vedic terms, of the three values the knower is called Rishi, the known is called Chhandas, and the process of knowing which connects them is called Devata. The completely simple, unified, undifferentiated state of pure intelligence is called Samhita, togetherness of Rishi, Devata and Chhandas, in which the knower, known and process of knowing are one wholeness of intelligence. Maharishi's Vedic Psychology points out that the three values of knower, known, and process of knowing are only an intellectually conceived distinction, created by intelligence within itself--a notion of diversity imagined by intelligence. According to Maharishi and the tradition of Vedic knowledge, from the interactions and transformations of these three intellectually conceived values of Rishi, Devata, and Chhandas in the wholeness of intelligence, all the diverse laws of nature, and ultimately all the diversity of the material universe emerge, while pure intelligence remains unmanifest, nonchanging.

From this perspective it can be seen that there are two tendencies or aspects of pure intelligence: the unified,

silent, witnessing Self and the active, discriminative intelligence. The whole display of the interactions of knower, known, and process of knowing, or Rishi, Devata, and Chhandas in the Samhita, has its basis in the discriminative aspect, which, being related to the witnessing value of the Self, and being lively under that influence, continues to discriminate. The discrimination starts with discrimination between knower, known, and process of knowing, and then creates innumerable combinations and permutations of the three, thereby giving structure to the sequential flow of the Samhita, pure intelligence, until all possible transformations of its own nature are expressed and the infinite diversity of the universe emerges from all the fundamental values contained in the Samhita and its expression, the whole Vedic literature. Thus, the sequential emergence of the Vedic literature is said to be the expression of the sequential unfoldment of all the laws of nature, which also generates the diversity of forms and phenomena in nature, including mind. In Maharishi's Vedic Science this unfoldment is called the Ved Lila, the play of the Ved, or pure knowledge, within itself.

The sequential progression of manifestation of pure intelligence on the subjective level takes the form of levels of subjectivity, or levels of the mind. The word "mind" as used here has two different meanings. It is used to refer to a particular level of subjectivity, the faculty

of thinking, and also to all the levels of subjectivity together. These different levels of subjectivity are ego, feeling, intellect, mind, desire, and senses. Each level is an instance of the triad of knower, known, and process of knowing in a different mode. For example, on the level of mind, that mode of intelligence called mind is the knower; thoughts, images, and memories are the known; thinking, memory and attention constitute the process of knowing. On the level of the intellect, that mode of intelligence called intellect is the knower; decisions and categories represent the known; discrimination is the process of knowing.

The various levels of the mind are explained in greater detail in the following lecture (Maharishi Mahesh Yogi, 1972a):

Mind is the expression of creative intelligence, but at the same time it becomes the organ for creative intelligence to further express itself in creation, in different qualities, different activities, and different manifestations... So the mind is the organ of creative intelligence, and it is also the expression of creative intelligence. Similarly the senses are the projection of the mind, and they are also the organs through which the mind expresses itself. Creative intelligence, expressing itself in different layers, one within the other, manifests in the entire diversity of the universe: the mind, and then the senses, and then the entire creation to serve as the objects of the senses. Proceeding toward the subtler layers of the expression of creative intelligence within the mind, we experience a tender field of feeling. Deep within the tenderness of feeling we experience the "myness" of feeling. We say, "I feel like this"; "I feel." "I feel my feelings." So the I in the seat of all myness is more tenderly located within the feeling. Deep within the I is a more tender level of creative intelligence which is "I-ness". The "I-ness" is

almost the abstract value of individual existence, intelligence. And deep within that individual "I-ness" is that which is boundless-- the unmanifest, non-changing, immortal, eternal reality...

In one word, mind, we can include the entire range of expression of creative intelligence from that universal, unbounded eternal to the individual ego, to feelings, to the thinking ability, and to the senses. (Lecture 19, pp.3-4).

The levels of the mind are further explained in the following passages:

When we say "I", we mean the inner value of the speaker, and that is an expressed value, a wave of cosmic life. Individual life, individual ego, is a wave of cosmic life. Just as a wave on the ocean is an expression of the ocean, the individual is an expression of the infinite value of life... The ego is that value of life which is most refined in its character. The ego experiences; it is the experiencer in the individual life. The ego feels; the ego enjoys--feeling touches the ego, understanding touches the ego. That faculty of the ego which thinks is called the mind. That faculty... which understands, discriminates, and decides is called the intellect...

The intellect filters the information which comes to it through the mind. Useful things are accepted, useless things are rejected. The mind is like an open camera; it receives all the impulses from everywhere. The mind takes in everything that comes in through the senses... the intellect evaluates... the [capacity of feeling] and intellect are almost on the same level of delicacy. the mind is a little less refined than the heart and intellect; the senses are yet on a more crude level (Lecture 19, pp. 8-12).

Maharishi includes the body and the environment as parts of the continuous range of expression of intelligence in this analogy to a plant:

There is no part of the plant which is not permeated by sap. The sap is present everywhere. In some places it manifests as flat, in other places as round; in some places as deep green, in other places as pale green. At different stages,

the sap expresses itself differently; the differences are only due to different manifestations of the sap.

In the same way, the same intelligence is present everywhere, only its expressions are different... Objects, senses, mind, intellect, ego-- they are all different expressions of intelligence. The subtle expression of intelligence is the mind. The gross expressions of intelligence are the body and objects of perception, the whole environment. So the same intelligence is everywhere, but its expressions are different (1972a, Lecture 8).

The range of intelligence described here is illustrated in Figure 2. The unmanifest, unlocalized nature of pure intelligence is depicted at the bottom of the chart with its self-interacting dynamics, and, moving up the chart, the simultaneous yet sequential emergence of all its expressed, or localized values is depicted, beginning with the interactions of Rishi (knower), Devata (process of knowing), and Chhandas (known) and the Samhita (wholeness of pure intelligence), which is expressed as laws of nature and the Vedic literature in the Veda lila (in the interactions of Rishi, Devata, and Chhandas).

In this process of sequential expression, the levels of subjective creation emerge: ego, feeling, intellect, mind, desire, and senses. Proceeding on, the manifest objective levels of the individual emerge: the physiology and behavior. The collective intelligence or collective consciousness of groups of individuals give rise to the levels of collective intelligence: family intelligence,

community intelligence, national intelligence, and world intelligence. Proceeding to an even greater scale, we see the intelligence of nature, or universal intelligence, operating on the level of the world, the solar system, the galaxy, clusters of galaxies, and the whole manifest universe. It should be noted that according to Maharishi's Vedic Psychology, the intelligence of nature, which is most evident on the grandest scale in the perfect order of the vast universe, is the same intelligence that can be directly known by anyone at the deepest level of his or her own awareness.

The entire process of sequential expression of intelligence depicted in the chart is supported and guided by the intelligence of nature, pure intelligence, with its infinite organizing power, at every level. This is depicted by the large arrow rising up the left side of the chart and the small arrows emerging from it on each level of expression of pure intelligence.

Evidence of the Structure of Intelligence From Vedic Literature

The three-in-one structure of pure intelligence and its creative dynamics are described by various texts of Vedic literature. For example, the Bhagavad Gita (Gambhirananda, 1984) states,

"Knowledge, the object of knowledge and the knower form the threefold incitement to action..."

(XVIII,18, p.870)."

"He [pure intelligence] is undivided and yet He seems to be divided in beings. He is to be known as the supporter of beings. He ... generates (XIII,16, p. 694)."

Yoga Vasistha (1984) also describes this simultaneously unified and diverse structure and its generative dynamics:

"Infinite consciousness regards its own intelligence in its own heart, as it were, though it is not different from it, even as wind is not different from its own movement (pp.71-72)."

"This consciousness creates and maintains all the movable and immovable beings in the universe. The...consciousness alone exists, nothing else exists. Consciousness alone has arisen in consciousness. Even as there is no oil in a rock, the diversity of sight, seer and scene, or of doer, act and action, or of knower, knowledge and known, does not exist in pure consciousness (p.294)."

The Upanishads (Radhakrishnan, 1953) describe this structure as well:

"Sakshi (the witness) is that conscious one that is aware of the appearance and disappearance (of the three states) of the knower, the knowledge and the known, who is himself without (or not affected by) this appearance and disappearance, and who is self-radiant (Sarvasara-Upanishad, 7)."

This phenomenon of the self-interacting dynamics of the unified field and its sequential expressions is summarized by two verses from the Bhagavad Gita (Maharishi Mahesh Yogi, 1986):

"Prakritim Svam Avastabhya visrjami punah-punah."
 "Curbing back on myself I create again and again
 (IX,8)."

"Mayadhyakshena prakritih suyate sacaracaram."
 "Under my presidentship, my nature [intelligence]
 creates the moving and unmoving (IX,10)"
 (bracketed expression from Maharishi Mahesh Yogi,
 1986).

According to Maharishi's Vedic Science, the sequential unfoldment of pure knowledge can be cognized directly by individuals who, through the practice of the Maharishi's Vedic Science and Technology, have cultured the ability to maintain their awareness in the completely settled, unified, unbounded state of intelligence, the Samhita. This point is concisely expressed in the Rig Veda, which, according to Vedic Science, is the first expression of the unified field in the sequence of unfoldment of Vedic literature:

Richo akshare parame vyoman
 Yasmin deva adhi vishve nisheduh
 Yastanna veda kimricha karishyati
 Ya ittadvidusta ime samasate

The richa-- the verses of the Veda-- exist in Akshara, the imperishable transcendental field [pure intelligence] in which reside all the impulses of creative intelligence, the laws of nature responsible for the whole manifest universe. He whose awareness is not open to this field, what can the verses accomplish for him? Those who know this level of reality are established in evenness, wholeness of life (Rig Veda I. 164.39, Maharishi Mahesh Yogi, 1984).

The layered structure of intelligence proposed by Maharishi's Vedic Psychology is also found in the Vedic literature. In the Bhagavad Gita, Lord Krishna, said to be

the personification of pure intelligence, the unified field, describes this structure (Chidbhavananda, 1984, VII, 4-5):

Earth, water, fire, air, space, mind, intellect, and ego-- these are the eight-fold divisions of my nature. Know my other nature, undivided and transcendental, by which this universe is sustained."

"Earth, water, fire, air, and space" are known in Vedic Science as the five tanmatras, or "subtle elements" (Maharishi Mahesh Yogi, 1967; Maharishi Patanjali, 1978). Not to be confused with material objects, they are modes of intelligence, the precursors of the five senses in the sequence of expression of intelligence into matter. Maharishi describes them in this way (Maharishi Mahesh Yogi, 1969):

The principle of intellect...further manifests as ... the principle of mind, which in its turn manifests as the five 'tanmatras', from which arise the five senses. Then, as the process of manifestation continues, the five tanmatras manifest into the five elements, which combine to constitute the entire objective creation (pp.424-425)."

Two other verses from the Bhagavad Gita describe the levels of the mind with relation to the Self (pure intelligence):

The senses they say are subtle; more subtle than the senses is the mind; yet finer than the mind is the intellect; that which is beyond the intellect is he [the Self].

Thus, having known him who is beyond the intellect, having stilled the self by the Self... (in Maharishi Mahesh Yogi, 1969, ch.3, vs.

42,43)."

The Vedic literature details the sequential yet simultaneous transformations of intelligence into mind and matter. It may seem paradoxical that a number of transformations can be sequential and simultaneous. However, this principle is found throughout nature. Taking an example from mathematics, there is an infinite sequence of numbers, and yet they all exist simultaneously; otherwise the sequence of numbers would never be complete. Similarly, supersymmetric unified field theories in physics discuss "spontaneous, dynamical, sequential symmetry breaking," a process by which the fundamental forces and particles of the universe are said to emerge sequentially, yet simultaneously from the unified field.

According to Maharishi's Vedic Science and the Vedic literature, in the sequential transformation of pure intelligence into mind and matter, the unified nature of pure intelligence is never lost or transformed, yet, by virtue of its inherent qualities of dynamism and creativity, various levels of subjectivity and associated human faculties emerge. These faculties include all the abilities commonly associated with intelligence by modern psychology, e.g., sensory acuity, memory, mental speed, creativity, reasoning ability, verbal ability, mathematical ability, capacity to love, moral judgment, etc. These faculties are illustrated in Figure 2. Since, as has been discussed, unity

and diversity are inherent in the nature of pure intelligence, it is not difficult to understand how such diverse human mental abilities can be integrated and sustained by a unified field of pure intelligence, which has generated the laws of nature governing these abilities.

The model of multiple abilities supported and integrated by a unified field of pure intelligence is supported by the texts of Vedic literature. In addition to the above example, the last few verses of the Rig Veda state,

"Go together, speak together, know your minds to be functioning together from a common source, In the same manner as the impulses of creative intelligence, in the beginning, remain united near the source. (Rig Veda, X,12,40,191)".

The Upanishads express the relation of some of the various aspects of mental ability to the Self, pure intelligence:

The Self feeds on objects by the five rays [senses]. Who is the Self? He who has been defined as pure, clean, void, tranquil and of other marks. He is to be apprehended by his own marks... speech, hearing, sight, mind, breath; others say that it is understanding, steadfastness, memory, wisdom. Now, verily, these are the marks of him even as the sprouts here are the mark of a seed, as smoke, light and sparks are the marks of a fire. On this point they quote: As indeed the sparks from fire, and likewise as the rays from the sun, living creatures and the rest in proper order again and again proceed from him here on earth (Maitri Upanishad, VI,31, in Aiyar, K.N., 1914).

Confirmation of the Structure of Intelligence
From Scientific Research

The hypothesis of a unified field of pure intelligence underlying multiple abilities is supported by a large body of modern psychological research using objective means of investigation. This research is listed in Table 3, "Fundamentals of Intelligence."

The research in Table 3 shows that the regular experience of the unified field, through practice of the TM and TM-Sidhi program, results in improvements in many diverse mental abilities, for example: perception (Dillbeck, 1982; Dillbeck, Assimakis, Raimondi, Orme-Johnson, & Rowe, 1986; Pelletier, 1974; Appelle & Oswald, 1974), logical thinking (Aron, Orme-Johnson, & Brubaker, 1981; Dillbeck, Assimakis et al., 1986; Eyerman, 1981; Jedrczak et al., 1985; Kotchabhakdi, Pipatveravat, Kotchabhakdi, Tapanya, & Pornpathkul, 1982; Shecter, 1978; Tjoa, 1975), moral judgment (Kotchabhakdi et al., 1982; S. Nidich, 1975), creativity (Orme-Johnson & Granieri, 1977; Shecter, 1978; Travis, 1979), and mental and physical well-being on the individual level (Aron, E., & Aron, A., 1982; Dillbeck, 1977; Farinelli, 1981; Frew, 1974; Orme-Johnson, 1987b; Overbeck, 1982; Van den Berg & Mulder, 1976).

Furthermore, as discussed in Chapter 1, group practice of the TM and TM-Sidhi program, by enlivening the unified

field of pure intelligence, creates a coherent, orderly influence on society as a whole, resulting in decreases in negative social trends such as political violence (Alexander et al., 1987; Davies, 1988; Orme-Johnson, Alexander et al., 1989), crime (Borland & Landrith, 1976; Cavanaugh, 1987; Cavanaugh et al. 1987; Dillbeck, 1987, 1988; Dillbeck, Cavanaugh et al., 1987; Dillbeck, Landrith et al., 1981; Orme-Johnson, Alexander et al., 1989), holistic indices of the quality of life including accidents (Dillbeck, 1988; Dillbeck, Cavanaugh et al., 1987), and sickness (Orme-Johnson, Gelderloos, & Dillbeck, in press).

Improvements have also been observed in social and economic indicators such as international cooperation (Davies, 1988; Orme-Johnson, Alexander et al., 1989; Alexander, Abou Nader et al., 1987; Orme-Johnson, 1981; Dillbeck, 1987), stock market indices (Orme-Johnson, Dillbeck, Alexander, Chandler, & Cranson, in press; Orme-Johnson, Alexander et al., 1989), employment (Cavanaugh, 1987), and holistic indices of quality of life, including gross national product (Orme-Johnson, Gelderloos et al., in press) as a result of group practice of the TM and TM-Sidhi program.

Lastly, as will be discussed in Chapters 5 and 9, practice of the TM and TM-Sidhi program results in growth of higher states of consciousness (Alexander, 1978, 1979, 1982; Alexander, Cranson, Boyer, & Orme-Johnson, 1986; Alexander,

Langer, & Oetzel, in press; Alexander, Davies, Dixon, Dillbeck, Oetzel, Drucker, Muehlman, & Orme-Johnson, in press.) For additional references on specific changes in each area of life indicating growth of higher states of consciousness, see Table 3.

Considering the total body of knowledge of intelligence from Maharishi's Vedic Psychology, in the context of all levels of expression of intelligence described in Figure 2, and taking into account individual intelligence, collective intelligence, and development of higher states of consciousness, the hypothesis of a unified field which supports and integrates all these diverse areas is, so far, the best explanation of simultaneous improvements in all of them.

According to Maharishi's Vedic theory of intelligence, by allowing the mind to become completely identified with pure intelligence in the quietest state of human awareness, the individual is increasingly nourished and supported by the unified field, resulting in simultaneous unfoldment of all mental faculties. Maharishi explains this holistic development by using the analogy of a tree (Maharishi Mahesh Yogi, 1963, 1967, 1972a). The tree has many diverse aspects - the hard trunk, the round branches, the flat, green leaves, the soft, brightly colored flowers, the fruits. All of these are connected and nourished by colorless sap, which, though hidden, pervades all aspects of the tree. In

fact, it is the same sap that has expressed itself and created all the diverse aspects of the tree. The sap, in turn, draws its vitality from nutrients in the soil, which are connected with the sap by the roots.

Any gardener knows that if a tree appears dry, it is possible to improve the condition of all aspects of the tree simultaneously by the single action of watering the roots. By watering the roots, contact is strengthened between the sap and the nutrients in the soil, so that the sap can nourish and enrich all the diverse parts of the tree. According to Maharishi's Vedic Psychology, the individual can be compared to a tree, where all the diverse faculties of the individual are like the different parts of the tree. The mind is like the root, which connects the inner and outer aspects of the individual (Maharishi Mahesh Yogi, 1982a). The mind is capable of making contact with the hidden support of the individual, the unified field of pure intelligence. Transcending through the TM and TM-Sidhi program is like watering the root, in the sense that it allows the mind to come into contact with pure intelligence, thus providing support and enrichment to all the diverse human faculties.

Verification of the Simultaneously Unified and Diverse
Structure of Intelligence through Direct Experience:
the TM-Sidhi Program

The self-interacting dynamics of pure intelligence within itself can be verified by direct experience, as predicted by the texts of ancient Vedic Science. This is most easily accomplished through practice of the TM-Sidhi program. Maharishi describes the TM-Sidhi program as projecting impulses of thought from the completely silent, unified state of pure consciousness, and observing the transformations of pure intelligence into various specific results. The following is an example of such an experience (Orme-Johnson & Haynes, 1981):

During the TM-Sidhi performance, established in the state of pure, unbounded consciousness, the most delicate and fundamental impulses of activity within the field of consciousness are projected one by one. These delicate modes of vibration of consciousness are themselves universal and unbounded. It is as though my Self is simply reverberating within certain set patterns or frequencies, with the result that consciousness, which was previously abstract and self-contained, assumes various "flavors." These basic impulses of consciousness are seen as the building blocks of the whole subjective and objective existence. Matter itself appears to me to be a highly precipitated form of these vibrations.

Every experience involves the acquisition of knowledge; understanding and explaining the acquisition of knowledge is central to any theory of intelligence. The next chapter

considers how Maharishi's Vedic theory of intelligence addresses this issue.

Chapter 3

Subtheory of Knowledge Acquisition

As was discussed in Chapter 2, Maharishi's Vedic Psychology views the process of knowledge acquisition as fundamentally inherent in the nature of pure intelligence, or Samhita. By virtue of the fact that it is intelligence or consciousness, intelligence can be conscious of itself, and hence the tripartite structure of knower, known, and process of knowing is contained in it. We now turn to a description of knowledge acquisition from Maharishi's Vedic theory of intelligence and a comparison of this description with the description from twentieth century theories of intelligence.

Regarding knowledge acquisition, there are fundamental ways in which Maharishi's Vedic theory of intelligence and twentieth century theories of intelligence differ, and some ways in which they are similar. The most fundamental difference between the theories is that, in Maharishi's Vedic theory of intelligence, pure intelligence or pure consciousness is central and causal to the process of knowledge acquisition, while most other theories consider consciousness or intelligence to be a product of interactions within the information processing system, or one of the elements in the system. In fact, few twentieth century theorists even agree on what they consider intelligence to be, as Sternberg's summary (Table 1) attests.

Second, since pure consciousness or pure intelligence plays such a central role in Maharishi's Vedic theory of intelligence, the theory puts less emphasis on the detailed mechanics of information processing than contemporary psychological theories do.

According to Maharishi's Vedic Psychology, the acquisition of knowledge involves an object of thought or perception making an impression upon pure intelligence, which takes on its qualities (Maharishi Mahesh Yogi, 1979):

What is the structure of knowledge? We have been saying that knowledge is structured in consciousness...We have been saying consciousness is the content in which knowledge is structured. We can understand this from an example: supposing we see a rose, the impression of the object falls on the screen of consciousness, and it is as if it makes consciousness colored or toned in its quality, in the value of this object. so it is consciousness which in its own structure receives an impression, and that is the experience. This we call knowledge of the rose.

So knowledge is just a mode of consciousness, awareness, or intelligence. Intelligence is a very innocent level of existence. We could call it a pure level of existence, which in its changing modes plays the role of or receives knowledge; it is knowledge. Knowledge is born in the junction point between pure intelligence, the simplest form of intelligence, or pure awareness, and its changing modes.

In the experience of transcendental consciousness during Transcendental Meditation, the awareness is unlocalized, unbounded-- it knows itself. It is completely self-referral. But when through the senses the awareness flows and falls on objects, the objects become imprinted on consciousness; then consciousness assumes a different character-- the unbounded simplest awareness assumes a new color, a new tint or a new flavor, and that flavor is a localized status.

...This is how we gain the knowledge of the rose from the imprint of the rose on consciousness...The form of the rose is nothing other than a mode of consciousness on the ground of unbounded consciousness, on the ground of the unbounded value of its own existence. In this we see a general state of awareness and a specific state of awareness in the junction of the generality and specificity, which comprise the structure of pure knowledge... The settled state of consciousness or transcendental consciousness [pure intelligence] is the state of singularity of consciousness. In this singularity, however, we have the principle of non-singularity. Because it is awareness, it is both the observer and the observed, and in this observer-observed relationship in the nature of consciousness [intelligence] is the structure of knowledge (p.74).

"Pure knowledge" is defined in this context as the self-interacting dynamics of pure intelligence, referred to earlier in this chapter. The ending of this passage is familiar by now; it reveals that, according to Maharishi's Vedic Psychology, the structure of knowledge and the process of knowledge acquisition essentially arise within the nature of intelligence or consciousness, regardless of whether the knowledge is gained through the senses, or through the state of pure intelligence directly knowing itself without any object of thought or perception present. The three-in-one structure of intelligence as a mechanism of knowledge acquisition is repeated at every level of experience, whether it be on the level of the ego, the intellect, the mind, or the senses.

For example, in the case of the rose mentioned above, the process of knowledge acquisition takes place on the sensory level; we see the rose, and on this level of knowledge acquisition, that mode of intelligence called the sense of sight is the knower, the rose is the known, and the process of sensory perception is the process of knowing. Now we may close our eyes and entertain the thought of the rose. In this case, that mode of intelligence called the mind is the knower, the thought of the rose is the known, and thinking is the process of knowing. At a more abstract level of the structure of mind, we may have a feeling of the rose. In this case, that mode of intelligence called feeling is the knower, the feeling of the rose is the known, and the flow of feeling is the process of knowing. The central point is that it is pure intelligence, or pure consciousness, that functions in different modes, and that is essentially how knowledge is acquired, on any level of mental activity.

It may seem contradictory to say that it is consciousness or intelligence that plays the role of knower, and at the same time to say that the sense of sight, or, alternately, the mind is the knower. However, there is no contradiction if it is remembered that the various levels such as mind, senses, etc. are just names for different modes of intelligence or consciousness, i.e., consciousness functioning in slightly different ways.

An example from the physical world is the energy

spectrum, well known to scientists and engineers. All the colors of light, for example, are just different frequencies of excitation, or modes of vibration of the quantum field we call light. White light is the totality of all these frequencies, and each color may be said to be an aspect of it. Different wave lengths of light can exhibit quite different properties in the physical world, e.g. ultraviolet frequency or infrared frequency. However, any physicist would agree that all the different frequencies are just different modes of excitation of the same quantum field. Red light is nothing but the quantum field; white light is nothing but the quantum field, ultraviolet light is nothing but the quantum field, etc. In like manner, the various levels of mind, or the various levels of the "knower", are nothing but pure consciousness or pure intelligence in different modes.

We now consider a more detailed picture of the mechanics of knowledge acquisition in Maharishi's Vedic theory of intelligence. Maharishi describes how an impression interacts with consciousness as follows,

Experience results when the senses come in contact with their objects and an impression is left on the mind. The impulse of this new impression resonates with an impression of a similar past experience already present in the mind and associates itself with that impression. The coming together of the two gives rise to an impulse at the deepest level of consciousness, where the impressions of all experiences are stored. This impulse develops and, rising to the conscious level of the mind, becomes appreciated as a thought. This thought, gaining the sympathy of the

senses, creates a desire and stimulates the senses to action (Maharishi Mahesh Yogi, 1969, p.284).

This description of the mechanics of knowledge acquisition has much in common with twentieth century theories of knowledge acquisition. Most contemporary theories are based on the information-processing paradigm, in which the mind is likened to a computer system. Virtually all contemporary theorists in the field of intelligence agree that knowledge acquisition involves interaction between new information and information stored in memory. For example, intelligence theorist Robert Sternberg (1985) notes, in his discussion of "Knowledge-acquisition components,"

Knowledge-acquisition components are processes used in gaining new knowledge... Selective comparison [one of the components] involves relating newly acquired or retrieved information to information acquired in the past. In the case of newly acquired information, a relation is seen between something just encoded and something that was encoded in the past. In the case of newly retrieved information, an item already stored in memory is related to some other item and thereby comes to be understood in a new way (p.107).

Similarly, in a review of knowledge-acquisition theories in their book, Cognitive Psychology and Information Processing (1979), Lachman, Lachman, and Butterfield remark,

To recognize a pattern in the here and now as being equivalent to one from the past, people must compare the here and now with their memory of the past. The comparison must be made centrally, and to work, the compared representations must have similar forms. Pattern-recognition theories differ

primarily in the forms they attribute to the representations that are compared (p.490).

Maharishi's Vedic theory of intelligence and twentieth century theories of intelligence differ in their treatment of knowledge acquisition, in the following ways.

First, as discussed in Chapter 1 of this dissertation, they differ on what they consider intelligence to be. In general, twentieth century theories of intelligence consider it to be an emergent property of the information-processing system, which has no existence independent of the system. They separate the concept of consciousness from intelligence, and consider consciousness as well to be an emergent property of the information-processing system, although they also see consciousness as playing a limited role in the system, as a part of attentional mechanisms. In this view there is no concept of pure consciousness or pure intelligence, i.e., consciousness or intelligence as self-sufficient, without any object of consciousness other than itself.

Second, in twentieth century theories, there is no concept that consciousness or intelligence can be known by the individual. This concept of consciousness or intelligence is based on the experience of the ordinary waking state, in which pure intelligence or pure consciousness is not available to conscious experience. As a result of this approach to the study of knowledge

acquisition, twentieth century theories of intelligence have difficulty explaining how knowledge acquisition is related to intelligence or consciousness. To use an analogy, it is like trying to understand and explain what makes an electrically powered machine run, by studying and making detailed models of the mechanical parts of the machine without knowing that electricity exists.

Maharishi's Vedic theory, on the other hand, views pure intelligence or pure consciousness as the central element of knowledge acquisition, rather than an emergent property of the information processing system; it is like the electricity that runs the machine. Maharishi remarks on this point (1979),

We see that knowledge, after all, can be considered in terms of consciousness, because it is just a mode, a new color of consciousness. We see a rose, but the knowledge of the red is only when our consciousness assumes that red tone. If our awareness does not associate with it and does not assume the red color, then the red does not exist. Thus consciousness is transformed into different structures of knowledge, it assumes different roles of perception, and this transforms the knower into different modes of knowledge. All the different modes of knowledge, all the different structures of knowledge could be talked about in terms of the knower, in terms of pure consciousness. This all-comprehensive, holistic structure of pure knowledge in the field of pure consciousness is wide-awake within its own structure, and is the source of the structure of knowledge...(p.76).

Third, as mentioned in chapter 1, in this theory pure consciousness and pure intelligence are understood to be

identical. Fourth, as mentioned in the quotation above, pure knowledge, pure consciousness, or pure intelligence is viewed as self-sufficient, existing independent of the individual mind, just as electromagnetism, which runs an electrically powered machine, exists independent of any particular machine.

Fifth, according to Maharishi's Vedic theory of intelligence, intelligence can be known by the individual in the simplest state of his or her own awareness. This view is based on knowledge gained in higher states of consciousness, as distinct from the ordinary waking state of consciousness.

As a result of this approach, the process of knowledge acquisition is explained as lively, self-sufficient, and not purely mechanical or inert. In this view, consciousness, or intelligence has the innate ability of knowing and organizing. In its various modes of functioning, it operates the process of knowledge acquisition by recording, storing and retrieving the knowledge that is coming in. In addition, Pure intelligence plays the role of the recording medium on which information is recorded and stored, the storehouse of impressions referred to earlier in this chapter.

This last point may seem rather abstract--that pure consciousness or pure intelligence can play the role of a storage medium for information in the form of mental impressions. However, since, according to Maharishi's Vedic Psychology, pure intelligence is a field, like an

electromagnetic field or other quantum field, it is not difficult to understand how it could serve as a medium to store and convey information.

To help clarify this point, the author proposes the following explanation. It is well known in physics that fields can serve to propagate information. For example, a radio or television transmitter uses an electromagnetic field to broadcast information. Furthermore, quantum fields have a very precise memory in the sense that they "remember" how electron shells are structured in complex shapes around the nucleus of an atom. According to quantum field theory, these electron "shells" are not really shells at all, in a concrete sense, since they are non-material. Rather, they are precise and complex patterns of vibration that spontaneously arise in the field in the same invariant way under appropriate conditions. There are numerous other examples of how abstract fields can store and propagate information.

In considering how intelligence or consciousness functions as a knowledge-acquisition system, we need to distinguish between intelligence or consciousness as an element of the information processing system and conscious experience of the individual. In Maharishi's Vedic theory, as has been discussed, intelligence plays the role of information, storing mechanism, storage medium, and retrieval mechanism. At the same time, it plays the roles of

knower, known, and process of knowing. According to Maharishi's Vedic theory, when pure intelligence functions in a human nervous system, the process of knowing becomes a conscious experience. For the process of knowledge acquisition to be personally experienced, requires the presence of an individual human physiology.

As has been discussed in Chapter 1, according to Maharishi's Vedic Psychology, the omnipresent field of pure intelligence and the intelligence within man are not two different entities. However, they are found to be different because of the different individual nervous systems. In Maharishi's Vedic Psychology, this principle is explained by the following analogy (Maharishi Mahesh Yogi, 1969),

As the same sun appears different when shining on different media, such as water and oil, so the same omnipresent Being [pure intelligence], shining through different nervous systems, appears as different and forms the...subjective aspect of man's personality (p.96).

According to Maharishi's Vedic Psychology, as in twentieth century theories of cognition, cognitive processes are not consciously experienced by the individual in the sense that they are not in the awareness of the thinker. Rather, the contents of cognition are experienced at different levels of subtlety according to the quality of the individual's mind and nervous system, i.e., how refined the machinery of experience is in that individual. This is explained in greater detail in chapter 5, "How and How Much

Can Intelligence Be Developed?"

With regard to the processes and structures involved in knowledge acquisition, there can be no doubt that the human nervous system is integrally involved in the acquisition, storage, retrieval, and comparison of information. In this respect, Maharishi's Vedic Psychology is accord with the most of theory and empirical findings of modern psychophysiology. There is growing agreement today that in order to support the processes and the conscious experiences involved in knowledge acquisition, the nervous system must be capable of operating at a quantum level. It is well known, for example, that the visual apparatus in the retina is sensitive enough to detect a single quanta of light.

Knowledge Acquisition and States of Consciousness

A key principle of knowledge acquisition in Vedic Psychology is, "Knowledge is different in different states of consciousness (Maharishi Mahesh Yogi, 1972a)." According to Maharishi's Vedic Psychology, there are seven states of consciousness. Three states of consciousness are commonly experienced by everyone: waking, dreaming, and deep sleep (to be precise, we would say that deep sleep is not ordinarily experienced, since it is a state of no experience!). According to Vedic Psychology, in addition to these three there are four higher states of consciousness

that can be lived by any human being.

These higher states of consciousness have traditionally been referred to individually or collectively as states of "enlightenment" by various traditions of knowledge throughout the world. These states develop naturally when the process of transcending is regularly experienced by the individual. The TM and TM-Sidhi techniques are designed to facilitate the unfoldment of these higher states of consciousness. The seven states of consciousness are described briefly below. For detailed descriptions of higher states of consciousness, see: Alexander, Boyer, & Alexander (1987); Alexander, Cranson, Boyer, & Orme-Johnson (1986); Alexander, Davies, Dixon, Dillbeck, Oetzel, Drucker, Muehlman, and Orme-Johnson, (in press); Dillbeck (1983a, 1983b); Maharishi Mahesh Yogi (1967, 1977).

1. Waking consciousness: In the waking state, the environment and the contents of the mind are experienced, but not their silent source, pure intelligence. Hence, the ability to know and to accomplish is limited.

2. Dreaming consciousness: In the dreaming state, there is illusory experience of oneself and the environment. Dreaming releases stress to some extent, and refreshes the mind and body by normalizing psychological and physiological functioning.

3. Deep Sleep: The state of deep sleep is characterized by lack of experience, total mental inertia. Deep sleep

provides rest to the mind and body, preparing them for activity in the waking state.

4. Transcendental consciousness: This state has already been discussed; it is the completely settled state of awareness in which the attention has traversed beyond the quietest, most subtle state of thought to the source of thought. Having transcended thought altogether, the subject is aware of his Self and nothing else; the individual mind is completely identified with pure intelligence, the cosmic psyche. This is transcendental consciousness, a state of unbounded awareness, the self-referral state of pure intelligence.

5. Cosmic Consciousness: In this state, which is said to unfold through regular practice of the TM and TM-Sidhi program, transcendental consciousness is permanently maintained along with the waking, dreaming, and deep sleep states. The awareness is established in the state of pure intelligence, even though the individual ego, intellect, mind, senses, and the body are all fully engaged in activity or sleep. Having access to his or her full mental potential, enjoying inner freedom and attunement with the laws of nature, the individual experiences unrestricted progress in daily life.

6. Refined Cosmic Consciousness, or God Consciousness: This state is said to develop through refinement of the faculties of feeling and perception, once cosmic

consciousness has been established. The functioning of all levels of the mind become more refined; sense objects are perceived in their most refined values, and the emotions are said to reach their full development. Transcendental consciousness is experienced along with the most refined value of the waking state. The full glory of creation is appreciated; waves of joy and devotion permeate every action and perception. Every thought and action enriches the whole environment.

7. Unity Consciousness: In unity consciousness, the physiology, the mind, and the emotions reach their most refined state of functioning, in which the object, as well as the subject, is experienced as pure intelligence, the cosmic psyche. In other words, the inner Self is appreciated as permeating every subjective experience and every object of experience. In this state the awareness of the individual is said to be a "field of all possibilities"; in other words, his or her awareness is permanently identified with the unified field of all the laws of nature, the infinite intelligence and organizing power of nature, and hence every intention of the individual is automatically fulfilled by nature; within the structure of human life, the individual has the ability to know and do anything at all times. Maharishi describes the state of unity in terms of pure intelligence as follows (Maharishi Mahesh Yogi, 1972a):

That state of consciousness, unity consciousness, which enlivens the transcendental, infinite

unboundedness of pure intelligence, is the most delicate aspect of life. The supreme value of realization is in owning that supremely delicate nature of infinity (Lecture 19,10)."

According to Maharishi's Vedic Psychology, the state of unity consciousness is the most natural, normal condition of human life. It is said to be possible for anyone to live in this state of consciousness. According to Maharishi's Vedic Psychology, the only reason why this state is not commonly experienced in society is that individuals are not currently being educated in the technology of transcending thought. As a result, the awareness of the individual is as if cut off from the unified state of pure intelligence, in which all the laws of nature are based. Consequently, individuals continually violate the laws of nature, creating stress in their physiology and further obstructing their ability to experience the settled state of their own awareness. The development of intelligence beyond this condition will be discussed more thoroughly in Chapter 5, "How and How Much Can Intelligence Be Developed?" The seven states of consciousness are depicted in Figure 2 at the center of the chart, where the individual is depicted as the embodiment of all levels of the mind.

According to Maharishi's Vedic Psychology, in one sense the process of knowledge acquisition remains essentially the same in higher states of consciousness as it was in the ordinary waking state, but the experience of gaining

knowledge and the quality of the knowledge gained are different. In another sense, the process of knowledge acquisition is different in different states of consciousness.

To elaborate, the process of gaining knowledge is the process of relating objects to the self or consciousness; in this sense, the process of knowledge acquisition is the same in different states of consciousness. However, with the unfoldment of higher states of consciousness, the individual's "self" expands from the narrow, surface boundaries of individuality in the ordinary waking, dreaming, and deep sleep states, to the unbounded, cosmic psyche, or cosmic Self, pure intelligence. In unity consciousness, for example, one is said to experience concretely that objects are the essentially the same as the unbounded Self, pure intelligence. In this sense, in higher states of consciousness, the process of gaining knowledge is qualitatively different. The world is experienced in a completely different light according to one's state of consciousness.

Maharishi explains this phenomenon as follows (1969),

When one sees through green spectacles, then everything looks green. When, through knowledge, the Self is realized as separate from activity and Self-consciousness becomes permanent in the state of cosmic consciousness, then everything is naturally experienced in the awareness of the Self; and when this permanent state of Self-consciousness, or cosmic consciousness, has been transformed through devotion into God-consciousness, then everything is naturally

experienced in the awareness of God, every experience is through God-consciousness, everything is experienced and understood in the light of God...(pp.306-307).

In terms of the mechanics of knowledge acquisition described earlier in this chapter, Maharishi explains the growth of clarity of experience in higher states of consciousness as follows:

The level at which a desire [or thought] is appreciated differs according to the level of the conscious mind of the individual. Men of purer mind appreciate thought or desire at a much subtler level during the process of thinking. It should be understood that a thought starts from the deepest level of consciousness and develops into a desire when it reaches the conscious level of the mind. A man for whom transcendental consciousness has become the level of the conscious mind appreciates the thought at its very start before it actually develops into a desire... a man for whom the level of transcendental consciousness has become the level of the conscious mind has gained cosmic consciousness, and in this state he experiences Being [pure intelligence] as separate from action (1969, pp.282-283).

According to Maharishi's Vedic Psychology, this element of increasing depth of conscious appreciation of thought is the most significant aspect of knowledge acquisition, for it is this development of consciousness which enables an individual to live the state of enlightenment, to enjoy use of his or her full mental potential, to experience unbounded awareness at all times in freedom from the binding influence of experience and action.

Prior to the full use of the conscious mind in higher

states of consciousness, every acquisition of knowledge creates a new impression on the pure consciousness of the experiencer, and thus overshadows the pure intelligence of the experiencer, perpetuating the state of ignorance, in which pure intelligence is as if cut off from conscious experience. By regularly allowing the awareness to transcend and know pure intelligence directly, the individual mind and nervous system become cultured so that transcendental consciousness is experienced at all times on the level of the conscious mind, thus breaking the cycle of bondage.

Maharishi comments (1969),

An impression on the mind is the seed of the desire which leads to action. Action in turn produces an impression on the mind, and thus the cycle of impression, desire and action continues, keeping a man bound to the cycle of cause and effect... this is commonly called the binding influence of action...(p.142).

When pure honey comes on the tongue, the taste of great sweetness surpasses in degree all the sweet tastes experienced up to then. If the tongue continues to cherish the taste of honey, then there will be no chance for a previous sweet taste to recur. This is what happens when the mind lives permanently in the experience of transcendental bliss [pure intelligence] in the state of cosmic consciousness; there then remains no chance for impressions of past experiences to capture it...if one has the taste of concentrated sweetness on the tongue and then tastes other sweets, these tastes do not leave any significant impression. When a man, established in the bliss of absolute Being [pure intelligence], acts...his experiences will not leave on the mind any deep impression which could give rise to future desires. In this way the cycle of action-impression-desire-action is broken. It is thus that, in an enlightened man, activity and experience in the world are debarred from sowing the seed of future action (pp.285-286).

It could be predicted that growth of the ability to appreciate an impulse of thought at deeper levels of the mind would result in improvements in perceptual-motor performance and cognitive abilities in general, for this reason: When a thought can be consciously appreciated closer to its source, before travelling all the way to the surface level of thinking, then there should be less opportunity for "noise" to interfere with the processing of that information by the mind. Hence, the efficiency of the information-processing system should improve. "Noise" in this context refers to distracting thoughts, feelings, conflicts, and mental excitation in general. This noise in the information processing system is held by Maharishi's Vedic Psychology to have a physiological counterpart in the form of stress in the nervous system, and crudeness due to lack of full development.

Every theory of knowledge acquisition must be judged not only for its ability to account for certain common experiences and perceptual abilities in the ordinary waking state of consciousness, but also for its ability to account for experiences of higher states of consciousness, and its potential for practical applications to improve the quality of life for individuals by enabling them to unfold higher states of consciousness. Perhaps more than anything else, it is the supremely effective applied value for everyone's life that distinguishes Maharishi's Vedic theory of intelligence

from other theories. By focusing on the role of pure intelligence or pure consciousness and the growth of consciousness in knowledge acquisition, rather than attempting to model the mechanical details of limited aspects of knowledge acquisition in the ordinary waking state of consciousness, Maharishi's Vedic theory represents a major advance in theory of knowledge acquisition and its applied value--a technology which can create ideal individuals and an ideal society.

Returning to the subject of qualitative differences between the process of knowledge acquisition in higher states of consciousness and the waking state of consciousness, there is one additional difference. According to Maharishi's Vedic Psychology, an individual who has complete conscious access to the deepest level of the mind has the ability to know anything directly, independently of boundaries of space and time. This is because pure intelligence transcends the limitations of space and time, and therefore, on the level of pure intelligence, there is really no difference between the observer and the observed; and hence the flow of information is completely unrestricted, instantaneous, and noise-free. This is the level of infinite correlation described in Chapter 1. Maharishi describes this most refined value of knowledge acquisition, called Ritam-bhara-Pragyan, as follows:

"Ritam-Bhara-Pragyan is that state of intelligence which knows everything, and which registers only

the truth (1988)."

In this state, individual intelligence is completely identified with cosmic intelligence, the vast intelligence of nature. The individual concretely experiences that he or she is the totality of nature's intelligence, and hence can know anything by simply having the desire for that knowledge. In this case, the process of knowledge acquisition is certainly different from knowledge acquisition through the physical sense organs. However, in one sense, the process is still the same as in the ordinary waking state, for it is still pure intelligence that is playing the role of knower, known, and process of knowing, just as it is in the ordinary waking state. The difference is that, for an individual who is in the ordinary waking state prior to higher states of consciousness, the process is not consciously experienced to be the self-interaction of pure intelligence.

Verification of the Process of Knowledge Acquisition
And Higher States of Consciousness
From Vedic Literature and Personal Experiences

The state of pure intelligence and its relationship to the process of knowledge acquisition in general is described in the Upanishads (Brihadaranyaka Upanishad, S. Nikhilananda, transl., 1962):

...as the various particular notes of a vina [stringed musical instrument], when it is played, cannot be grasped by themselves, but are grasped only when the general note of the vina or the general sound produced by different kinds of playing is grasped; similarly, no particular objects are perceived in the waking and dream states apart from Pure Intelligence (II,iv,9, p.202).

This relationship is also described in the Yoga Sutras of Patanjali (S.H. Aranya, transl., 1977):

"Yoga [transcendental consciousness] is the suppression of the modifications of the mind (Ch.1,v.2,p.7)"

"Then the seer abides in itself (v.3, p.12)."

"At other times the seer appears to assume the form of the modifications of the mind (V.4, p.13)."

Verses 2 and 3 describe the state of transcendental consciousness, or the experience of pure intelligence, as the least excited state of the mind, where pure intelligence knows itself. Verse 4 explains that at other times, pure intelligence appears to assume the roles of knower, known,

and process of knowing, causing experiences of the waking and dreaming states. The text proceeds to describe the waking, dreaming, and deep sleep states of consciousness, and experiences in the waking state, including memories.

Deep sleep is described as follows:

"Dreamless sleep is the mental modification produced by condition of inertia as the state of vacuity or negation (of waking and dreaming) (v.10. p.34)."

The process of memory is described as follows:

"Memory is mental modification caused by reproduction of the previous impression of an object without adding anything from other sources (v.11, p.36)."

Each of the higher states of consciousness is described in the Vedic literature. Several descriptions of transcendental consciousness from Vedic literature appear in Chapter 1, "What is intelligence?" Two additional passages are quoted here. One passage from the Bhagavad Gita describes the state of transcendental consciousness as beyond the quietest state of thinking,

"Let him gradually retire through the intellect possessed of patience; having established the mind in the Self, let him not think at all (VI,25, in Maharishi Mahesh Yogi, 1969, 432)."

In another passage, the self-referral nature of transcendental consciousness is described as,

"That (state) in which thought, settled through the practice of Yoga [transcendental meditation] retires, in which, seeing the Self by the Self alone, he finds contentment in the Self

(VI,25,423);"

Examples of personal experiences of transcendental consciousness are reported in Chapter 1, and an additional example is given below:

"During the practice of meditation my mind settles down, thoughts become more quiet, and there are moments where thoughts drop off completely and there is just awareness or knowing I'm awake without thinking (Cranson, 1988)."

As was mentioned above, in the fifth state of consciousness, cosmic consciousness, pure consciousness is experienced as an all-time reality as separate from waking, dreaming, and sleeping. The Bhagavad Gita describes cosmic consciousness as follows:

One who is in Union with the Divine (Self) and who knows the Truth will maintain 'I do not act at all.' In seeing, hearing, touching, smelling, eating, walking, sleeping, breathing, speaking, letting go, seizing and even in opening and closing the eyes, he holds simply that the senses act among the objects of sense (V,8,9, in Maharishi Mahesh Yogi, 1969, P.342).

He verily sees, who sees that all actions are done only by Prakriti [nature] alone and that the Atman [Self] is actionless (XIII,29, in S. Chidbhavananda, 1984, P.711).

The following are examples of this kind of experience, related by modern-day practitioners of the TM and TM-Sidhi program:

"Wholeness persisted in and out of meditation, as if there were no difference between meditation and activity... it was sometimes difficult to distinguish waking from sleep, as they were both

underlined by the continuum of the Self (in Maharishi Mahesh Yogi, 1977a, p.32)..."

"[During activity] my body moves and my mind operates, but I remain uninvolved, stationary and immovable, a silent witness to activity (in Alexander, 1987)."

"Often during dreaming I am awake inside, in a very peaceful, blissful state. Dreams come and go, thoughts about the dreams come and go, but I remain in a deeply peaceful state, completely separate from the dreams and the thoughts. My body is asleep and inert, breathing goes on regularly and mechanically, and inside I am just aware that I am (In Alexander, Cranson, Boyer, and Orme-Johnson, 1987, p.295)."

"[During deep sleep] my awareness is not cut off or disrupted. Even though my body is inert, inside I am awake, in a very peaceful, restful state (in Alexander, 1987)."

In the sixth state of consciousness, refined cosmic consciousness or God consciousness, transcendental consciousness is lived along with the most refined value of the waking state, which has been described in the Vedic literature as Divine, or the abode of God. In the Bhagavad Gita Lord Krishna, who is said to be the embodiment of the Divine level of nature, describes this state as follows:

"He who sees Me everywhere and sees everything in Me, I am not lost to him nor is he lost to Me (VI,30, Maharishi Mahesh Yogi, 1969, 443)."

Some examples of personal experiences characteristic of the growth of this state of consciousness are given below:

One experience... occurs very frequently. It is of being completely enveloped in an indescribable,

soft, divine gentleness. It embraces me outside and is lively within me. I feel I am that indescribable thing, so enormously wonderful, beyond intellectual description, so complete, so lively with pure love. I call it God-- because that is just what comes to mind when I experience it. I feel infinitely protected and cared for (Maharishi Mahesh Yogi, 1977a, 31).

Another practitioner of the TM and TM-Sidhi program reported the following:

At the same time as I felt my power and inner strength increase, I also noticed a totally new feeling of softness and sweetness develop. There were days when I felt my heart melting as if I could take everything in creation into myself and cherish it with the greatest love. Often I would have long periods of the day when everything I saw seemed to be glowing with divine radiance (1977a, p.81).

The seventh state of consciousness, unity consciousness, has been described as a state in which the Self, pure consciousness, dominates all experience to the point where every object is perceived as the Self. The Bhagavad Gita describes unity consciousness in the following way,

"He whose self is established in Yoga [transcendental consciousness], whose vision is everywhere even, sees the Self in all beings and all beings in the Self (VI,29, Maharishi Mahesh Yogi, 1969, 441)."

Yoga Vasistha describes unity consciousness similarly:

I salute the Self! Salutations to myself-- the undivided consciousness, the jewel of all the seen and the unseen worlds... you have been gained... Whatever there is in the universe is the one Self. In the past, present and in the future, here, there and everywhere, it is ever the same in all

apparent modifications...The Self is the eternal existence. I, the Self, alone am (in S. Venkatesananda, pp.193-194)...

In another passage from Yoga Vasistha the state of unity consciousness is described again:

At last I have attained that which is to be attained (known)... Even the mind and the senses are but the reflections of consciousness, though they are unreal independently of consciousness. this supreme consciousness alone exists... Once this truth is realized, it shines constantly without setting.

It is this consciousness that is known by various names-- Brahman, supreme Self, etc. In it there is no division into subject-object and their relationship (knowledge). Consciousness [intelligence] becomes conscious of its own consciousness; it cannot be realized otherwise. It is this consciousness alone that is manifest as the mind, intellect and the senses. This world-appearance, too, is but consciousness, apart from which nothing is... I am pure consciousness... all-pervading (335)...

The Upanishads describe this state of consciousness similarly:

"I am That [Brahman, or pure intelligence]. Thou art That. All this [universe] is nothing but That (Niralamba Upanishad of Sukla-Yajurveda, 41, in Aiyar, 1914, 23)."

"I am that Brahman [pure intelligence]. That...[which] is the support of all things, who lives in all creatures and who protects all is Myself. That... is Myself (Amritabindu Upanishad of Krishna-Yajurveda, in Aiyar, 36)."

"All this is Brahman [pure intelligence] alone. There is none other than Brahman and that is 'I' (Tejobindu Upanishad of Krishna-Yajurveda, III, in Aiyar, 86)."

"Brahman [pure intelligence] alone is everything

and there is nothing else. So 'That' is 'I', That is 'I', 'That' alone is 'I'. The eternal Brahman alone is 'I' (VI, in Aiyar, 100)."

The following are some experiences of the same type, related by individuals who practice the TM and TM-Sidhi program in modern times:

A very nice change which has taken place is an unbroken intimacy between my Self and the environment. It is a sort of liveliness of the Self, rather than flatness, which I experience in everything around me. The continuum of Self within myself and outside of me just seems to have a very enjoyable, lively, intimate quality-- as if my Self is smiling and radiating everywhere (in Maharishi Mahesh Yogi, 1977a, 31).

Pure consciousness, unboundedness, continued 24 hours a day. I perceived beauty and goodness in every situation... Everything was my Self, wholeness and oneness... It was my Self, infinite and eternal, containing everything and contained in everything in the universe. I was filled with such an intense love for everything and everyone, and as I put my attention on one person after another I discovered that the reason I loved them so much was because they were my Self (in Maharishi Mahesh Yogi, 1977a, 32).

As can be seen from these passages from the Vedic literature and from experiences of people in modern times, the process of knowledge acquisition retains similar elements in higher states of consciousness as in the ordinary waking state-- knower, known and process of knowing are still the basic elements-- and yet the process is qualitatively and experientially different. As discussed in this chapter, the difference is especially apparent in the

case of Ritam-Bhara-Pragyan. Some examples of this experience, reported by practitioners of the TM and TM-Sidhi program, appear here (Maharishi Mahesh Yogi, 1977a):

"...meditations quickly reach a level of absolute non-excitation. In that state of deep freshness, in the transcendent, attention acquires a more and more important potential of wakefulness. Many a time I thought in Ritam of a place which I dearly like, and immediately I felt my body react as if it were there--the smells, temperature, and impressions of colors (p.35)."

"Ritam is...no longer in response to clearly thought desires but rather faint feelings; the phenomenon of fulfillment of desire seems more and more given over to nature. Desires seem more and more satisfied within the Self (p.35)."

Verification of Points of the Subtheory of
Knowledge Acquisition and Growth of
Higher States of Consciousness from Scientific Research

In the subtheory of knowledge acquisition, it was predicted that the deepening of conscious appreciation of thought through the TM and TM-Sidhi program would result in improvements in perceptual-motor performance and other cognitive abilities. With regard to perceptual-motor performance, this prediction is confirmed by scientific research indicating improved efficiency and flexibility of visual perception (Dillbeck, 1982); Increased field independence (Dillbeck, Assimakis, Raimondi, Orme-Johnson, & Rowe, 1986; Pelletier, 1974); and Shorter reaction time

(Appelle and Oswald, 1974; Holt, Caruso, & Riley, 1978).

With regard to other cognitive measures, this prediction is confirmed by research indicating increased creativity (Shecter, 1978; Travis, 1979); Increased efficiency of concept learning (Dillbeck, Orme-Johnson, & Wallace, 1981); Improved memory, learning, and cognitive flexibility (Alexander, Langer, Newman, Chandler, & Davies, in press; Miskiman, 1976); greater task-specific EEG lateralization for both left and right hemispheres (Bennett & Trinder, 1977); Increased intelligence (Aron, Orme-Johnson, & Brubaker, 1981; Dillbeck et al., 1986; Eyerman, 1981; Shecter, 1978; Tjoa, 1975); Shorter latency of cortical evoked potentials, a correlate of intelligence (Kobal, Wandhofer, & Plattig, 1975; Wandhofer, Kobal, and Plattig, 1976); Increased achievement on basic academic skills (Nidich, Nidich, & Rainforth, 1986); and improved academic performance among graduate students (Kember, 1985). For additional research confirming improvements in perceptual-motor and cognitive performance, see Table 3.

Research findings that identify unique characteristics of transcendental consciousness during the TM technique are summarized in several books and reviews (Alexander, Cranson, Boyer, and Orme-Johnson, 1986; Dillbeck, 1988; Dillbeck & Orme-Johnson, 1987; MERU Press, 1974; Wallace, 1971, 1986), and in Table 3, under "Transcendental Consciousness." Some findings summarized by Dillbeck (1988) are: 1) Decreased

respiration rate and minute ventilation during Transcendental Meditation, and respiratory suspension during periods of transcendental consciousness (Badawi, Wallace, Orme-Johnson, & Rouzere, 1984; Dillbeck & Orme-Johnson, 1987; Farrow & Hebert, 1982; Wallace et al., 1971; Wolkove, Kreisman, Darragh, Cohen, & Frank, 1984);

2) Increased basal skin resistance during Transcendental Meditation and during periods of transcendental consciousness (Dillbeck & Orme-Johnson, 1987; Farrow & Hebert, 1982; Wallace et al., 1971; Wolkove et al., 1984;

3) Reduction in biochemical indices of stress during Transcendental Meditation (Dillbeck & Orme-Johnson, 1987; Jevning, Wilson, & Davidson, 1978; Jevning, Wilson, O'Halloran, & Walsh, 1983; Wallace et al., 1971;

4) Increased EEG alpha activity in frontal and central regions and increased EEG synchrony and coherence during Transcendental Meditation; increased EEG coherence during periods of transcendental consciousness (Banquet, 1973; Banquet & Sailhan, 1974; Dillbeck & Bronson, 1981; Farrow & Hebert, 1982; Orme-Johnson & Haynes, 1981; Wallace et al., 1971). For additional evidence of changes in these areas, see Table 3.

Research indicating the relationship between practice of the TM and TM-Sidhi program, and growth of higher states of consciousness beyond transcendental consciousness has

been conducted by Alexander (1978, 1979, 1982); Gackenbach, Cranson, and Alexander (1986); Jedrczak and Alexander (1986); and Jedrczak, Clements, and Alexander (1986). Other research on growth of higher states of consciousness and practice of the TM and TM-Sidhi program indicates correlations of EEG coherence, creativity, H-reflex recovery, and frequency of experiences of transcendental consciousness (Haynes, Hebert, Reber, & Orme-Johnson, 1977); correlations between experiences of higher states of consciousness, EEG coherence, creativity, and experiences of the sidhis (Orme-Johnson, Clements, Haynes, & Badawi, 1977); Orme-Johnson and Haynes (1981); and improved functional organization of the brain as indicated by changes in EEG coherence and cognitive correlates (Orme-Johnson, Wallace, Dillbeck, Alexander, and Ball, in press). For reviews of research on higher states of consciousness and the TM and TM-Sidhi program, see Alexander, Boyer, and Alexander (1987); Alexander, Cranson, Boyer, & Orme-Johnson (1986); Alexander, Langer, & Oetzel, (in press); Alexander, Davies, Dixon, Dillbeck, Oetzel, Drucker, Muehlman, & Orme-Johnson, (in press); and Wallace, (1986). For additional references on specific changes in each area of life indicating growth of higher states of consciousness, see Table 3. The relationship between the TM and TM-Sidhi program and growth of higher states of consciousness is discussed further in Chapter 5, "How and how much can intelligence be improved?"

and Chapter 7, "Measurement of intelligence in Maharishi's Vedic Psychology and twentieth century psychology."

The next chapter will further consider the integrated functioning of intelligence at many levels of nature.

Chapter 4

Integrated Functioning of Intelligence on Many Levels of Nature

This chapter addresses point 4 of Maharishi's Vedic theory of intelligence, listed in Table 2. The chapter describes the integrative nature of intelligence and how it maintains the orderly structure of intelligence at many levels of nature. In Chapter 1 we considered evidence that the fundamental nature of intelligence is integrative. Chapter 2 described and explained the simultaneously unified and multiple structure of intelligence. Two inherent tendencies of intelligence were described: a tendency to maintain its unified nature, and a tendency to discriminate within its nature, thus creating diversity. The balanced coexistence of these two tendencies is described as the integrative nature of creative intelligence, because it maintains the integrity of expressions of pure intelligence, including the levels of subjectivity. Maharishi describes the integrative quality of intelligence as follows (Maharishi Mahesh Yogi, 1972a, Lecture 5):

...one quality of creative intelligence is that it is integrative.

"Can we locate this integrative quality in nature around us? Let us take the example of a rose. Where is the seat of creative intelligence in a rose-- naturally, on the level of the sap. It is the intelligence of the sap, the quality of creative intelligence in the sap that displays itself in different ways, making the sap produce the stem, the leaves, the thorns, the beautiful rose. On the level of sap all these aspects of the

rose are sitting in an integrated manner. This is the integrative quality of creative intelligence. The sap has red in it; it has green in it; it has the ability of producing thorns or tender petals. All these different characteristics are sitting together, and this is the integrative aspect of creative intelligence.

When that integrative aspect starts to move, it moves in a very integrated manner. Think of the skill of the sap when it moves to create the stem: it must create a basis for all these manifestations, and the basis is a very solid, sturdy stem. Creative intelligence establishes as its first expression the basis of its action. And the basis of its action is, again, that integrative quality of creative intelligence which holds together at its basis. The basis of the manifestations that it produces is inclusive of all the multiple values that are going to express themselves in the variety of existence. So that creativity, that integrative value of creative intelligence, is profusely alive and vibrant at the basis of all creation.

According to the theories of quantum mechanics, which bring to light the fundamentals of creation from the field of physics, the "ground state" is a state in which all the qualities of the diverse universe are contained in a very integrated manner. This is the first expression of the unmanifest value of creative intelligence, holding onto its integrative value and, at the same time, to its progressive values...

In...meditation...the moment the mind transcends thought, it comes to a state where it is no longer active. This is the most compact, most integrated state of the mind, where mind is restfully alert (pp.4-5).

It is this integrative quality of intelligence that creates and maintains the structure of intelligence at all levels of the mind. With relation to Self, the mind, and the body, Maharishi explains (Maharishi Mahesh Yogi, 1985a):

Through sequential development consciousness unfolds itself into the value of matter; consciousness becomes matter. The Self becomes the

mind, and mind becomes matter...This transformation is sequential but always remains self-referral. It is like an airplane flying but always remaining self-referral to the ground station through the radio...This performance is self-referral because consciousness, intelligence, is developing itself into different expressions of its own nature and there is a continuity between matter and pure consciousness-- the Self, the mind, and the body (pp.68-69).

Having grasped this point, it is possible to understand the integrated functioning of intelligence on the different levels of mind and the body.

Figure 2 illustrates the integrated, holistic nature of intelligence (the holistic value of creative intelligence is its all-pervasive, transcendental, all-encompassing quality). It also shows how all the localized values of intelligence are naturally organized in terms of Rishi, Devata, and Chhandas, or knower, process of knowing, and known.

Figure 3 shows how all the localized values of intelligence described by Sternberg in table 1 are connected and sustained by the integrative nature of intelligence.

Figures 2 and 3 illustrate several principles: First, they show the connectedness of all the loci of intelligence, not only on the surface level of their functioning, but also at their common basis, pure intelligence, illustrated by Level 1 in both figures, and by the arrow of pure intelligence rising up the left side of Figure 2, connecting all levels with each other and with their common source.

Second, Figures 2 and 3 illustrate the holistic nature of intelligence. They show the relation of the partial values of intelligence to the wholeness of intelligence. The whole, pure intelligence, is more than the sum of the parts; it transcends them all. Unity is found within diversity. Just as the nourishing sap is found expressed as all the diverse parts of a tree, while simultaneously maintaining its unexpressed value, pervading all its expressions-- likewise, pure intelligence pervades and sustains all its diverse expressions: ego, intellect, feeling, mind, etc.

This holistic perspective based on the discovery of pure intelligence is much needed in modern intelligence theory and research. Researcher Lloyd Humphreys (in Sternberg & Detterman, 1986) expressed this need when he remarked,

It is tempting to compare psychologists who discuss intelligence to the blind men, stationed at different parts of the animal's anatomy, who described an elephant. Not only do individual psychologists describe intelligence differently, but some act like blind men, not in touch with any part of the anatomy...A beginning toward the description of the whole elephant is a scientific goal... (p.97).

With the discovery of the unified field of pure intelligence and research on its relationship with the localized aspects of intelligence, this goal is now being realized.

Returning to Figure 2 and the analogy of the tree, the third principle represented by these two is the lively quality of intelligence. Like intelligence in human life, a tree is a living thing, not just an inert mechanism; it has life, it grows, it adapts, and it does so from within. All the localized values grow together on the basis of the vitality and organizing power of the sap-- in the case of human life, pure intelligence. The vitality and growth of a tree depend upon its connection with the nourishment which is unmanifest, hidden at the base of the tree. In the same way, the growth and vitality of human intelligence depend upon the connection with pure intelligence which is unmanifest, the source of all expressed values of intelligence.

Fourth, Figure 2 and the tree analogy illustrate the principle that the intelligence of the individual and his environment are not separate things, just as the source of nourishment of a tree and all the surrounding plant life are not separate things. They are completely and constantly connected on the basis of their common source, pure intelligence.

Fifth, figure 2 and the tree analogy illustrate the principle that intelligence can be influenced by more than one intervention. Since all parts of the tree are interconnected through the unmanifest sap, theoretically any part of the tree can be influenced by influencing some other

part and so creating an impulse in the sap which affects the intended part. In horticulture, this type of influence is exemplified by use of foliar nutrients, grafting, and other procedures. In the case of intelligence, one example is influencing the functioning of intelligence in the mind and intellect by means of physiological interventions such as the Maharishi Ayur-Ved Panchakarma program (Chandler et al., 1987). There are also aspects of the Maharishi Technology of the Unified Field which influence the consciousness of the individual by creating a specific effect on the level of pure intelligence in his environment (Yagyas), and creating specific effects through the medium of the senses (Gandharva Ved), for example. In general, all the influences from an environment should influence the functioning of intelligence in either a positive or a negative way.

Description of the Integrative Nature of Pure Intelligence from Vedic Literature

Quotations from Vedic literature were cited in support of the principle that pure intelligence is simultaneously unified and diverse, in Chapter 3. Some of these quotations also illustrate the principle that pure intelligence integrates and supports the various levels of the mind. Two of these quotations are presented again here. The first, from Yoga Vasistha (S. Venkatesananda, transl., 1984),

states,

At last I have attained that which is to be attained (known)... Even the mind and the senses are but the reflections of consciousness, though they are unreal independently of consciousness. this supreme consciousness alone exists... Once this truth is realized, it shines constantly without setting.

It is this consciousness that is known by various names-- Brahman, supreme Self, etc. In it there is no division into subject-object and their relationship (knowledge). Consciousness [intelligence] becomes conscious of its own consciousness; it cannot be realized otherwise. It is this consciousness alone that is manifest as the mind, intellect and the senses. This world-appearance, too, is but consciousness, apart from which nothing is... I am pure consciousness... all-pervading (p.335)...

The Upanishads state,

Now the Self feeds on objects by the five rays [senses]. Who is the Self? He who has been defined as pure, clean, void, tranquil and of other marks. He is to be apprehended by his own marks... speech, hearing, sight, mind, breath; others say that it is understanding, steadfastness, memory, wisdom. Now, verily, these are the marks of him even as the sprouts here are the mark of a seed, as smoke, light and sparks are the marks of a fire. On this point they quote: As indeed the sparks from fire, and likewise as the rays from the sun, living creatures and the rest in proper order again and again proceed from him here on earth (Maitri Upanishad, VI,31, in Aiyar, K.N., 1914).

Support of the Integrative Nature of
Intelligence by Direct Experience Using
Subjective Means of Investigation

The theory that pure intelligence or pure consciousness integrates all levels of the mind is supported by experiences of practitioners of the TM and TM-Sidhi program during the practice and during activity. The following is an example reported by a research participant (Cranson, 1989):

I have experienced where some activity is taking place on the level of the body, some aspect of the mind and the senses is aware of or involved in that activity, while another, deeper level of the mind is involved in a purely mental activity. The intellect then chooses to be focused or involved with either of these two activities while I, the ego, am within myself witnessing all these different levels of activity and remaining silence. The whole thing creates a feeling of detachment in the midst of activity. The body has its intelligence and is doing its job; the mind has its intelligence and is doing its job; the intellect has its intelligence and is doing its job; the feelings have their own intelligence and are doing their job. I, -- on one side uninvolved, witnessing all this, and on the other side, very, very far, very, very faint but nevertheless present-- am not even witnessing all this, but have nothing to do with all this. What is meant by "I" here is my consciousness, the collection of all these aspects: body, senses, mind, intellect, feeling, ego, and absolute, infinite silence.

Another practitioner of the TM and TM-Sidhi program describes his experience of the connection between pure intelligence or pure consciousness (the Self), and the

activity of the mind (Maharishi Mahesh Yogi, 1977a):

Eventually the Self was perceived as totally separate and independent of thoughts...As the course progressed, this separateness took on another dimension...I began to notice thoughts being experienced as waves or ripples of consciousness; that is, the silence would begin to vibrate, and I would experience the vibration or wave as simply a fluctuation of pure consciousness. At times it seemed as if there were no coming or going, only pure consciousness vibrating within and for itself (p.35).

Another subject describes the experience of the integrated development of emotions, mind, and body as a result of the regular experience of the state of pure intelligence (MIU Press, 1981):

"I have gotten so much stronger since...[starting to practice the TM and TM-Sidhi program]-- physically, mentally, and emotionally--because the whole program is centered around inner development. And as we know, inner development always leads to outer development (p.64)."

Evidence for the Integrative Nature of Intelligence from Scientific Research

The concept of intelligence as an integrated wholeness supporting all aspects of the individual's personality is supported by scientific research. A famous study by Terman and his colleagues (Terman, 1925; Terman & Oden, 1959) intensively measured a thousand "gifted" children and followed them throughout their life-span. Individuals of

high IQ: 1) were slightly superior to others in health and physique; 2) scored much better in practically every personality and character trait than the normal school population; 3) scored higher in social-intelligence ratings, social interests, and play activities.

The hypothesis that pure intelligence integrates and sustains all the diverse levels of the mind is also supported by research indicating positive effects of the practice of the TM and TM-Sidhi program on several levels of the mind simultaneously. For example, Shacter (1978) found that subjects who practiced the TM program over a 14-week period improved their performance on measures of intellectual performance, creativity, and a number of personality variables (complexity, conformity, energy level, self-esteem, and tolerance). Dillbeck et al. (1986) found that subjects who practiced the TM and TM-Sidhi program for 4 years improved their performance on tests of IQ and field independence.

Several studies (Orme-Johnson & Haynes, 1981; Dillbeck, Orme-Johnson, & Wallace, 1981; Haynes, Hebert, Reber, & Orme-Johnson, 1977; Orme-Johnson, 1982) taken together indicate that frequency of the experience of pure intelligence in transcendental consciousness, is significantly correlated with a number of different affective, cognitive, and physiological variables, including: increased creativity, more principled moral

reasoning, higher IQ, increased efficiency in learning new concepts, decreased neuroticism, increased frontal EEG coherence, and faster recovery of the H-reflex, a measure of neurological efficiency. Other research indicating improvements in the functioning of all levels of the mind in connection with the practice of the TM and TM-Sidhi program is summarized in Table 3.

Clearly, if the TM and TM-Sidhi program, by enlivening the connection between pure intelligence and the mind, results in improved functioning of all levels of the mind simultaneously, this finding lends support to the hypothesis that pure intelligence integrates and supports all the levels of the mind. Additional support is provided for the hypothesis that pure intelligence is well-integrated with the body, in a study by Chandler, Glaser, Orme-Johnson, and Dillbeck (1987). The study indicated that procedures which increase balance and purity of the body (the Maharishi Ayur-Ved Panchakarma program) can result in improved functioning of the mind. Research showing the effect of the collective practice of the TM and TM-Sidhi program on trends of society demonstrates the connectedness of the unified field of pure intelligence with the whole society (Assimakis & Dillbeck, 1987; Dillbeck, 1987; Dillbeck, Cavanaugh, Glenn, & Orme-Johnson, 1987; Dillbeck, Banus, & Landrith, in press; Orme-Johnson, Gelderloos, & Dillbeck, in press; Orme-Johnson, Alexander, Davies, Chandler, & Larimore, 1989). For

additional research in this area, see Table 3, under "Social Intelligence," and "Ecological Intelligence." Finally, the results of the research study in Part III of this dissertation, by confirming the hypotheses, provide additional support for the hypothesis that pure intelligence integrates and supports all levels of the mind. The connection between the hypothesis and this point is discussed in the introduction to the study.

The next chapter will consider how intelligence can be developed by taking recourse to the holistic value of intelligence.

Chapter 5

How and how much can intelligence be developed?

In an extensive review of research and theory on how to improve intelligence, psychologist Douglas Detterman (1982) wrote:

"Knowing how and how much intelligence can be changed is important information and must be predicted by any finished theory of intelligence (pg.vii)."

To adequately deal with this question, a theory of intelligence should address, either explicitly or implicitly, the following issues: 1) "What is intelligence?" 2) "What is the nature of human potential?" 3) "What is the nature and range of human development?" and, 4) "Is there an overall purpose of human life, and if so, is the development of intelligence related to it?" Most theories of intelligence deal explicitly with only the first issue, "What is intelligence?" Answers to the other three issues are either implicit in the theories or become apparent in the way scientists approach empirical research. It is important for theory to address these issues, for how they are dealt with (or ignored) determines the depth, the focus and, in large part, the outcome of theory and research.

For example, in one view, the general perspective of twentieth century psychology, intelligence is viewed and measured as a limited set of abilities for dealing with certain types of information, e.g., speeded mathematical,

figural, and verbal performance. The implicit view of the nature of human potential is that intelligence is determined mostly by heredity and partially by early life experiences. Consequently, according to this view, intelligence is not particularly amenable to improvement. The development of general or "fluid" intelligence was understood to essentially end during late adolescence. According to the implicit view of most intelligence theorists, the purpose and goal of human life is to handle information efficiently in activity, to be successful in one's career, and to accumulate enough knowledge about the world to live a productive, useful life until the inevitable decline of cognitive function in old age. Understandably, this view of the nature of intelligence, its range, its development, and its purpose gave rise to interventions based on inforamatory training alone--classroom or tutorial-style teaching of mental exercises, learning techniques, and problem solving strategies based on conceptual, logical thinking in the ordinary waking state.

The Vedic view of the nature of intelligence, human potential, human development, and the purpose and goal of human life is different, hence it gave rise to a different approach to developing intelligence. Rather than training based on information alone, this approach emphasizes transcending thought altogether and allowing the individual mind to become completely identified with pure intelligence.

According to this approach, identification of the mind with pure intelligence allows the partial values of intelligence--ego, feeling, intellect, mind, senses, and physiology-- to unfold their full potential naturally under the progressive, evolutionary, integrating influence of pure intelligence, the intelligence of nature. We shall now consider how the Vedic theory of intelligence addresses each of the issues mentioned above.

The first issue has been discussed in Chapter 1, "What is Intelligence?"

Explicit View of the Nature of Human Potential

The Vedic view of human potential is, in short, that every human being has the innate ability to identify his or her awareness completely with pure intelligence, the vast intelligence of nature, and hence anyone can naturally unfold great genius in his or her lifetime. This view is summarized by Maharishi in several comments (1972a):

Because the basic value of all creation is intelligence, there is no reason for anyone to remain unintelligent. This is the practical significance of this analysis of the basic value of life. The basic value of life is intelligence; but if life is to be lived in fullness, this basic intelligence must become a permanent reality of our awareness. When the mind becomes established in this state of pure intelligence, which is the be-all of all creative intelligence, fullness of creative intelligence is lived. It becomes the breath of our thought and action (Lecture 8, p.4).

Commenting on intelligence and student life Maharishi

noted,

"Very great intelligence is hidden inside. Through the Transcendental Meditation program that becomes unfolded and everyone becomes brilliant, a great genius of his time. It is from inside, through the practice of transcendental meditation, that hidden genius comes out into the field of thought and action (1978a)."

Asked whether one can become a genius through developing his intelligence, Maharishi replied (Maharishi Mahesh Yogi, 1972a),

Yes. Man is born to be a genius. Even though born with full potential, the majority of the people use a very small portion of the mind, so someone who starts to use a little more of the mind is called a genius. Experience of the pure nature of creative intelligence naturally makes the mind more creative and unfolds the potential genius in man. There will be a society very soon now, arising as a result of the World Plan, in which everyone will use his full potential or very nearly full potential. Then all will be on the level of genius, and in that society, good and precise thinking, very effective action, the whole thing will be normal. This will eliminate the need to use the word genius. Genius is just a relative word used when most of the people are dull to indicate some intelligent man. Where everyone is intelligent no one is a genius-- they are all normal people. The practice of the Science of Creative Intelligence is going to eliminate the word genius from society. Everyone will be equally important and prosperous. Everyone will be a genius, which will be the word for normality, or it won't be used at all (Lecture 8, questions and answers).

Verification of the Nature of Human Potential

By Scientific Research

The point that anyone can develop his intelligence, is

supported by research on the TM and TM-Sidhi program and development of intelligence. This research is presented in two later sections of this chapter entitled, "Scientific evidence of the growth of higher states of consciousness," and "Improvements in intelligence test scores: a comparison of the TM and TM-Sidhi program with other interventions." Detailed descriptions of scientific research indicating improvements in all levels of the mind as a result of the TM and TM-Sidhi program appear in Part III of this dissertation, Chapter 2, entitled, "Rationale for choice of dependent variables." Research supporting this point is also extensively listed in Table 3, which documents improvements in all levels of the mind resulting from the practice of the TM and TM-Sidhi program. The improvements most commonly associated with intelligence by twentieth century psychology can be found under "intellect" and "mind".

The nature of human development

In the Vedic view of intelligence, human development does not end with the development of rational thinking in adolescence, but has the potential for unfoldment of higher states of consciousness, described in Chapter 3.

Alexander et al. (in press) have proposed a theory of human development that explains higher states of consciousness to be a natural extension of the ordinary

process of human development. The model relates the process of thinking described under "knowledge acquisition" in Chapter 3, and the concepts of levels of the mind and higher states of consciousness, to the process of cognitive development from childhood through adulthood:

According to [Maharishi's] Vedic Psychology, in the course of its microgenesis, every thought or perception-- from its origin in the least excited state of consciousness to its final expression as an object of conscious awareness--traverses many layers of cognitive structure and function. We will now consider our proposed model of how this microgenesis of thought in the adult knower may relate to the macrogenesis of cognitive development in the child and to the eventual establishment of higher states of consciousness...

For our purposes what is significant is that within the ontogenesis of ordinary waking state, there is a striking correspondence between these general periods of development [described by Piaget and other twentieth century psychologists] and the capacities associated with the levels of the mind, from gross to subtle, identified by [Maharishi's] Vedic Psychology (p.9).

In this model, the process of development--both in the ordinary process of development from infancy to adulthood, and in the process of development from ordinary waking consciousness through higher states of consciousness-- involves the growth of the individual's capacity to consciously utilize the deeper levels of the mind described by Maharishi's Vedic Psychology:

...we suggest that during the ordinary course of ontogenesis, the growing capacity to more fully activate and utilize successively subtler levels of mind corresponds with and underlies the unfoldment of the successive phases of cognitive development. The functioning of awareness through

each progressively finer level may provide the "deep structure" for each sequentially higher expression of cognitive growth. If so, the deepest level of mind through which awareness predominantly functions would determine one's current developmental period. How this underlying cognitive competence is displayed, and in what particular areas, is also influenced by learning and skill training. In this model, though environmental factors are necessarily involved in the full development of deeper levels of mind, the basic structure and function of each level is inherent (p.10).

Alexander explains that during the process of development,

...when awareness shifts to functioning primarily through a deeper mental level, this newly activated process of knowing is increasingly differentiated from the more expressed levels of thought and action and becomes the dominant locus of functional awareness. For example, when conscious awareness comes to function through the intellect in a reflective manner it provides the foundation for abstract reasoning such as formal operations. The reflective intellect, which involves the capacity to think about thinking, now represents the primary locus of conscious awareness (p.10).

Alexander et al. proceed to explain that when the awareness transcends the manifest levels of the mind and identifies itself with pure intelligence, the dominant level of awareness is temporarily stationed at that level. With practice, this situation becomes more established, until it becomes permanent. Thus, although pure intelligence permeates the thinking process, it is consciously appreciated only in higher states of consciousness:

In this view, the ultimate status of the knower is always pure consciousness. However, in the process

of experience, awareness becomes localized as the individual ego and identified with (i.e., unable to distance or distinguish itself clearly from) the processes of the current dominant level of the mind...Ultimately, in the higher levels of development described by [Maharishi's] Vedic Psychology,... consciousness becomes fully integrated and self-referral, allowing direct self knowledge (p.11).

Evidence in support of the theory is summarized in Table 3 under the level, "Self", and in Alexander (1978, 1979, 1982); Alexander & Boedeker (1982); Alexander, Boyer, & Alexander (1987); Alexander, Cranson, Boyer, & Orme-Johnson (1986); Alexander, Davies, Dixon, Dillbeck, Drucker, Oetzel, Muehlman, & Orme-Johnson (in press); Alexander, Langer, & Oetzel (Eds.), (in press).

View of Intelligence in Relation to The Purpose of Human Life

Every theory of intelligence has a view, whether explicit or implicit, of the purpose and goal of human life. In most theories this view is implicit, being a part of the overall world-view of twentieth century psychology and, more generally, western culture. In this conception, the goal and purpose of human life is generally seen in terms of a successful career and accumulation of wealth, some degree of happiness, a harmonious family life, and avoidance of

serious personal problems, such as poor health, poverty, alcohol or drug addiction, etc. Born of this world-view, the conception of intelligence focuses on the limited mental abilities mentioned earlier, developed in the normal process of education, which tend to further this goal, such as abstract reasoning ability, verbal ability, mathematical ability, etc.

While supportive of the above goals, the Vedic view of life is a broader and deeper perspective. In the Vedic view of human life, the purpose of life is the expansion of happiness, and the development of full enlightenment in the highest state of consciousness, unity consciousness. According to Maharishi Mahesh Yogi, founder of Vedic Psychology,

"Expansion of happiness is the purpose of life, and evolution is the process through which it is fulfilled... Expansion of happiness carries with it the expansion of intelligence, power, creativity, and everything that may be said to be of significance in life (1969, p.63-64)."

"If one is not happy, one has lost the very purpose of life. If one is not constantly developing his intelligence, power, creativity, peace, and happiness, then he has lost the very purpose of life (1969, p.64)."

According to Maharishi's Vedic psychology, anyone can become happier as well as more intelligent by opening his awareness to the full range of creative intelligence because, according to this view, the ultimate nature of

creative intelligence is intensely concentrated happiness, or bliss (Maharishi Mahesh Yogi, 1969):

The practice of ...[Transcendental Meditation] is a direct way to evolution. Through it, the individual mind gains the state of cosmic intelligence-- that unbounded state of universal Being which is the summit of evolution...

On the way to ... [that state] 'no effort is lost'...the process, having started, cannot stop until it has reached its goal. This is so in the first place because the flow of the mind towards this state is natural, for it is a state of absolute bliss, and the mind is always craving for greater happiness. Therefore as water flows down a slope in a natural way, so the mind flows naturally in the direction of bliss (p.118).

Maharishi explains how the regular experience of this state of bliss develops steadiness of intellect:

Transcendental Meditation technique is a]... path to bliss. When the mind moves towards bliss, it experiences increasing charm at every step; as when one proceeds towards the light, the intensity increases continuously. When the mind experiences increasing happiness, then it does not wander; it remains focused in one direction, unwavering and resolute. Such is the state of the mind moving in the direction of bliss, and when it arrives at the direct experience of bliss, it loses all contact with the outside and is contented in the state of transcendental consciousness. When the mind comes out of this state into the field of action again, it remains contented and therefore maintains its resolute state to a greater or lesser degree. Through practice this state becomes established. This is what the Lord [Krishna in the Bhagavad Gita] means when he says that 'in this Yoga the resolute intellect is one-pointed'.

The minds of those who do not practice this... [Transcendental Meditation] are constantly in the field of sensory experience. This fails to provide the mind with that great joy which alone can satisfy its thirst for happiness. That is why the minds of such people continue to search and wander endlessly (1969, p.120)."

... This natural equanimity of the mind, even while it is actively engaged, is the state of steady intellect (1969, 154)."

Hence, according to the Vedic theory of intelligence, intelligence develops together with happiness as the individual naturally grows to fulfill the purpose and goal of life, which is the expansion of happiness. Both these aspects of life, intelligence and happiness, develop together because, according to Maharishi's Vedic Psychology, they both belong to the ultimate nature of pure intelligence. This integrated nature of pure intelligence is captured in the Vedic terms, "Sat chit ananda," "absolute bliss consciousness."

Evidence from Scientific Research, Of the Relationship Between Happiness and Intelligence

There is considerable scientific evidence that contact of the mind with pure intelligence, achieved through the TM and TM-Sidhi program, brings about an increase in happiness. This research is summarized in Table 3, under the level of "feeling" (See also Alexander et al., 1987; Gelderloos, 1987).

There is also considerable scientific evidence that the capacity to be happy is a correlate of intelligence. In Terman's landmark study of a thousand gifted individuals, he

found that individuals of high IQ were happier and better adjusted than individuals of average IQ (Terman, 1925). Terman's associates, who continued the study after his death, found that this correlation between happiness and IQ held up throughout the life span of the original subjects (Terman & Oden, 1959).

More recent studies by Isen (1984, 1985, 1987) indicate that happiness facilitates creative problem solving and other cognitive abilities. In four experiments (1987) she found that positive affect, induced by means of seeing a few minutes of a comedy film or receiving a small bag of candy, improved performance on two tasks that require creative ingenuity: Duncker's (1945) candle task and M.T. Mednick, S.A. Mednick, and E.V. Mednick's (1964) Remote Associates Test. Another experimental condition in which negative affect was induced and a control condition in which subjects engaged in physical exercise failed to produce comparable improvements in creative performance. Isen found similar improvements in categorization ability (1984), and unusualness of word associations (1985) when positive affect was experimentally induced. As discussed above, the unfoldment of intelligence brought about by repeated contact of the mind with pure intelligence develops a permanent state of bliss consciousness. If a temporarily induced state of happiness can bring about temporary improvements in cognitive performance, it would be expected that a permanent

state of happiness would be accompanied by permanent improvements in cognitive performance. This hypothesis appears to be borne out by research on the effects of the TM and TM-Sidhi program, as shown in Table 3, under "mind" and "intellect" (See also Nidich and Nidich, 1986, 1987).

Description of the Relationship Between Happiness and Intelligence in Vedic Literature

The relationship between happiness and intelligence is affirmed by various branches of Vedic literature. For example, Taittiriya Upanishad (Radhakrishnan, transl., 1953) states:

"He performed... [meditation]; having performed meditation (III,4,1, p.555),

He knew that intelligence is Brahman (the Self). For truly, beings here are born from intelligence, when born, they live by intelligence and into intelligence, when departing, they enter... He performed...[meditation]; having performed meditation (III,5,1, p.556),

He knew that Brahman is bliss. For truly, beings here are born from bliss, when born, they live by bliss... (III,6,1, p.557).

The Bhagavad Gita asserts that without having the individual mind established in its basis, pure intelligence, there can be no real peace nor happiness:

He who is not established [in the Self, or pure intelligence] has no intellect, nor has he any steady thought. The man without steady thought has no peace; for one without peace how can there be happiness? (II,66, in Maharishi Mahesh Yogi, 1969,

p.166)"

The Bhagavad Gita states that experience of the self is by nature completely satisfying, and that contact with it brings stability to the intellect (Maharishi Mahesh Yogi, transl., 1969):

"Being satisfied in the Self through the Self alone, then is he said to be of steady intellect (II,55, p.150)."

"Knowing that which is infinite joy and which, lying beyond the senses, is gained by the intellect, and wherein established, truly he does not waver; (VI,21, p.425)"

Now evidence from the subjective means of gaining knowledge will be presented in support of the hypothesis that the nature of the Self, or pure intelligence, is bliss. Personal experiences of practitioners of the TM and TM-Sidhi program will be examined.

Support from Personal Experiences

Using Subjective Means of Gaining Knowledge

The following are reports of an experiences of total happiness, or bliss, during the practice of Transcendental Meditation:

The most charming and overwhelming experience in nearly all my meditations is bliss. All other experiences can't surpass this feeling of bliss. It absorbs me completely. My whole attention is directed to it, and in its most intensified states there is nothing of interest except this. My psychology, my heart, my head, my body are filled with it (Maharishi Mahesh Yogi, 1977a, p.32).

The experience of bliss is accompanied by expansion of awareness, and greater alertness as well. With practice, both these values are stabilized so that they can be lived in the midst of daily activity. A typical experience of this is reported by another individual:

"The experience of unbounded bliss consciousness and witnessing of activity seemed to have become strengthened and more stabilized...Sometimes I had a very universal feeling, a universal awareness, accompanied by the feeling the 'I know everything' (p.33)."

With continued practice, the state of bliss begins to be experienced not only as inside oneself, but in the environment as well:

"I cannot ever remember feeling so uncompromisingly complete and confident about myself and the direction my life is taking. My favorite companion is the bliss and silence of my Self which is growing in leaps and bounds and spilling into the relative [environment] (p.31)."

"Perception continued to become refined, while at the same time my awareness was unified...I felt like bliss in motion, saturated, concentrated, absolute happiness. All creation waved in different degrees of my bliss (p.32)."

To summarize: it has been considered how all theories of intelligence contain notions of the purpose and goal of human life, in most cases implicitly. It has been shown that in the Vedic view of intelligence, the ultimate, universal purpose and goal of life is the expansion of happiness. The relationship between intelligence and happiness is explained by theory, demonstrated by scientific research, supported by Vedic literature, and by personal experience using the

subjective means of gaining knowledge. We now consider how intelligence can be developed.

How Can Intelligence Be Developed?

According to Maharishi's Vedic theory of intelligence, intelligence can be naturally developed by regularly transcending thought and allowing the awareness to identify itself completely with pure intelligence, the unified field of all the laws of nature; also, by refining and restoring balance to the physiology through other procedures of Maharishi Ayur-Ved. Maharishi Ayur-Ved and the TM and TM-Sidhi program are aspects of Maharishi's Vedic Science and Technology. Ayur-Ved is an ancient Vedic system of health care, revived in its completeness by Maharishi. Hence, this system of knowledge is known as Maharishi Ayur-Ved. In this system, the TM and TM-Sidhi techniques are included as two of twenty procedures, all of them designed to restore and improve balance in mind, body, and behavior.

The TM and TM-Sidhi techniques differ from other interventions that attempt to improve intelligence as they are not techniques to improve learning or problem-solving per se. Rather, they are techniques to expand the conscious capacity of the mind, improve general psychological and physiological functioning and thereby unfold intellectual ability, as well as other abilities (Maharishi Mahesh Yogi,

1963, 1969, 1972; MERU Press, 1984).

As was mentioned in Chapter 1, the TM technique allows the individual to consciously transcend thought and experience the state of transcendental consciousness. When the attention comes to this level, the individual mind is said to be completely identified with the field of pure intelligence, the cosmic psyche, or the Self. The TM-Sidhi techniques allow the mind to function while the awareness is established in transcendental consciousness, thereby accelerating the integration of pure intelligence with the mind.

Maharishi explains how this integration of pure intelligence with individual intelligence is accomplished by taking recourse to the holistic nature of intelligence rather than by attempting to develop partial values of intelligence, as in approaches of twentieth century psychology (Maharishi Mahesh Yogi, 1972a, Lecture 5):

Because all these qualities [self-referral, self-sufficiency, infinite dynamism, integration, infinite creativity, infinite organizing power, perfect orderliness, etc.] are found to be the nature of intelligence, we say that creative intelligence has a holistic existence. It contains the wholeness of life.

When the sap travels, every grain of sap contains the whole value of the tree. It is so intelligent that it leaves a little portion here to become green, a little portion here to become a little harder, and so on. All these expressions in varying degrees and in a progressive scale show us that every little bit of creation is structured in the wholeness of life. All the intelligence that is there is everywhere. This demonstrates the holistic quality of creative intelligence.

What we experience [as the holistic quality of creative intelligence] when we start to meditate is the ability to comprehend a greater horizon. Silence is growing in us, and silence means harmony-- that harmony that is underlying everything. That level of life which is non-active is the unmanifest value of creative intelligence. And that unmanifest value of creative intelligence is everywhere. All the manifestations of creation are on the basis of that unmanifest value, which is omnipresent. That layer of life, finer than the finest [the unified field], is everywhere, and because everything else is the expression of it we say that it is holistic in its nature. This shows, on the basis of our own experience, and also on the basis of the observation of the environment around us, that creative intelligence is holistic.

It is from this experience and knowledge that we say: 'Water the root to enjoy the fruit.' By taking care of the root we can enrich all aspects of the tree. By taking care of this holistic field of life, in the pure nature of intelligence, we can enrich all aspects of life. Our life has so many aspects. The whole creation has so many aspects. All the diverse aspects cannot possibly be attended to for their enrichment; fullness of life cannot be gained on the basis of that approach. Wholeness of life cannot be gained by amending the parts. What we can do is take care of the fundamental, holistic value of creation, which lies in the unmanifest value of pure intelligence, by opening our awareness to it through Transcendental Meditation. Then we will be enriching all aspects of life, all expressions of creative intelligence, all manifestations of the unmanifest creative intelligence.

If you want to capture all the different parts of a territory--gold mine, silver mine and everything else--the formula is to capture the fort which controls the whole territory. The fort of creation is this holistic nature of creative intelligence, which is progressive, integrative, self-sufficient. It is unbounded, unrestricted. We experience it in our own meditation the moment our awareness arrives at the goal of meditation. All relative boundaries fall off, and the awareness remains unbounded, pure. This unboundedness is the home of all qualities (pp.7-8)...

Thus, according to this view, by opening awareness to the holistic nature of creative intelligence, or pure intelligence, all levels of the mind are simultaneously improved, as they are parts of the whole that is sustained by pure intelligence. In this regard, Maharishi comments (Maharishi Mahesh Yogi, 1972a),

In one word, mind, we can include the entire range of expression of creative intelligence from that universal, unbounded eternal to the individual ego, to feelings, to the thinking ability, and to the senses. The value of creative intelligence is appreciated on all these different levels. And when that universal value of life which we experience at the source of thought during meditation is appreciated on the basis of one's own personal experience, we find that the ego, the emotions, the intellect, the mind, the senses, all begin to breathe a richer life. We experience greater comprehension and richer, sharper perception. Activity is strengthened, resulting in greater achievement and a higher level of fulfillment. We think more precisely, more exactly, and more effectively. Our senses begin to perceive more fruitful values in the environment. The eyes seem to open a little bit more, and the ears begin to hear a deeper reality; words not only fly on the surface level of sound, but something deeper is grasped. The mind begins to enjoy more and to comprehend more. This means the mind is less restricted than before, more expanded, more open. It is capable of greater comprehension. The small lens has become a wide-angle lens.

This upsurge of life comes spontaneously through Transcendental Meditation. When the mind begins to lose its restrictions, life as a whole is improved. These experiences prove to us that the mind is an infinitely flexible organ of creative intelligence. It can confine itself within boundaries so rigid and narrow that it may be difficult for it to come out. Or it can expand to comprehend the great variety and infinite value of creation (Lecture 19, pp.4-5).

Commenting on a passage from the Bhagavad Gita, Maharishi describes the improvement of all levels of the mind from another point of view (Maharishi Mahesh Yogi, 1969):

Self has two connotations: lower self and higher Self. The lower self is that aspect of the personality which deals only with the relative aspect of existence. It comprises the mind that thinks, the intellect that decides, the ego that experiences. This lower self functions only in the relative states of existence-- waking, dreaming and deep sleep... the higher Self is that aspect of the personality which never changes, absolute Being [pure intelligence], which is the very basis of the entire field of relativity, including the lower self.

A man who wants to master himself has to master the lower self first and then the higher Self. Mastering the lower self means taking the mind from the gross fields of existence to the subtler fields, until the subtlest field of relative existence is transcended (p.339).

How the TM and TM-Sidhi Program Unfolds Intelligence,
in Terms of the Qualities of Pure Intelligence,
and Its Relationship With the Mind and Intellect

We shall now consider in more detail, how the TM and TM-Sidhi program unfold intelligence, specifically, from the point of view of pure intelligence, the mind, and the intellect.

Maharishi describes the unified field of pure intelligence, the cosmic psyche, as a field of all possibilities (Maharishi Mahesh Yogi, 1976b):

"It is a field of all possibilities, where all creative potentialities exist together, infinitely correlated but as yet unexpressed. It is a state of perfect order, the matrix from which all the laws of nature emerge, the source of creative intelligence (p.123)."

As briefly mentioned in Chapter 1 of Part II, Maharishi and Dr. John Hagelin, a leading physicist, referring to these "creative potentialities," have described 26 qualities of the unified field, pure creative intelligence, which exist in its unmanifest nature (International Assn. for the Advancement of the Science of Creative Intelligence, 1984). Many of these qualities have already been mentioned in this dissertation. They include: all possibilities, self-referral (ability to know itself), self-sufficiency, infinite dynamism, infinite silence, infinite correlation, infinite creativity, infinite organizing power, perfect orderliness, simplicity, perfect balance, immortality, integrating, unmanifest, freedom, unboundedness, evolutionary, immortality, total potential of natural law, pure knowledge, the quality of being fully awake within itself, the quality of nourishing, the quality of harmonizing, the quality of purifying, invincibility, and bliss.

Chapter 1 defined intelligence in terms of qualities generally agreed upon by twentieth century psychologists:

orderliness, adaptability, efficiency, integration, and progressiveness. Perfect orderliness and integration are already included in the above 26 qualities, and the other qualities noted by psychologists can be derived from the 26 qualities of the unified field.

Specifically, adaptability is an expression of being "wide awake within itself", self-referral, perfect orderliness, all possibilities, perfect balance and infinite creativity, since, as discussed in Chapter 1, adaptability requires being aware of orderliness in oneself and the environment, open to new possibilities, and adjusting one's situation by creating order, while maintaining balance in the mind and body. Efficiency is embodied in the qualities of infinite organizing power and infinite silence, which indicate the ability to accomplish actions with minimum expenditure of energy. Finally, "progressive" is a synonym for "evolutionary". As discussed in Chapter 1, "Evolutionary" here is not used in the sense of the Darwinian theory of evolution of species, but rather in the sense of progress and development of life within the individual as well as across generations.

According to the Vedic view of intelligence, these qualities of intelligence belong to every individual since the settled state of his or her awareness is identical with pure intelligence, the field of all possibilities. In other words, we are pure intelligence; all its qualities are

embodied in each of us. From this point of view, all these qualities should be fully displayed in our personality at every level of the mind, in our every thought and action. The question, then, is not whether or how these qualities can be developed in us, but rather why they are not being fully lived by every individual in daily life.

The answer, according to Maharishi's Vedic Psychology, is that due to loss of the knowledge of Vedic Science over many generations, mankind has simply forgotten how to establish and maintain the conscious connection between his individual intelligence and the holistic value of intelligence, pure intelligence. Consequently, people's attention is totally absorbed in perceptions, thoughts, feelings, and desires during the waking and dream states, or in the inertia of deep sleep, while the source of intelligence is out of conscious awareness. In other words, instead of consciousness remaining self-referral in the state of transcendental consciousness, consciousness is object-referral--identified completely with objects of thought and perception.

Maharishi Ayur-Ved refers to this forgetting the Self as "Pragya-aparadha," the "mistake of the intellect," (Caraka Samhita, Sarirasthanam, I, 98-102, 109, P.V. Sharma, transl., 1981) and cites it as the cause of limitation of mental abilities, physical and mental problems, and suffering of all kinds. The intellect, not being conscious

of its connection with pure intelligence, mistakes itself for the processes in which it is engaged, and the contents of those processes. According to Maharishi's Vedic Psychology, this situation simply represents an incomplete experience of reality; restoration of complete experience is simply a matter of bringing individual awareness to its basis in pure intelligence, so that pure intelligence and its expressions both are consciously maintained in awareness.

The twenty procedures of Maharishi Ayur-Ved, including the TM and TM-Sidhi program, are described as means to correct the mistake of the intellect, so that the individual never loses awareness of his identity with pure intelligence, and naturally embodies the wholeness of pure intelligence and all its qualities. This state is referred to in the Bhagavad Gita as the state of "established intellect," or "steady intellect," in which the intellect is permanently established in its connection with pure intelligence. Individual intelligence then becomes the spontaneous expression of all-powerful intelligence of nature. As a result, the individual enjoys enlightenment, use of full mental potential, perfect health, and creates an orderly, harmonious, evolutionary influence in the whole environment.

Evidence of the Relationship Between the
Qualities of Creative Intelligence,
The TM and TM-Sidhi Program,
and the Development of Intelligence,
from Scientific Research

When all the qualities of creative intelligence are fully embodied in the individual, intelligence is improved at every level of life: psychological, physiological, sociological, and ecological. Figure 3 presents all the scientific research documenting this growth of intelligence, organized according to these four areas of life and, within the field of psychology, according to levels of the mind.

Description of Prajna Aparadha and
the Established Intellect in Vedic Literature

The "mistake of the intellect" is translated from Sanskrit as follows:

PRAJNA APARADHA-- the intellect which is not put back (to transcendence)

Prajna Aparadha is described in Charaka Samhita, one of the three principal texts of Ayur-Ved, as follows (P.V. Sharma, transl., 1981):

"Derangement of intellect, restraint, and memory; advent of time and action and contact with unsuitable sense objects should be known as the



cause of misery (v.98).

"Adherence to wrong discrimination between eternal and non-eternal as well as wholesome and unwholesome is known as derangement of intellect because by nature the intellect sees rightly (v.99).

"The unwholesome action performed by one whose intellect, restraint and memory are deranged is known as intellectual error (prajnaparadha). It vitiates all the dosas [i.e., creates imbalances and disorders in the mind and body] (v.102).

"Wrong understanding by the intellect and wrong actions (accordingly) should be known as intellectual error (prajnaparadha)...(v.109, Caraka Samhita, Sarirasthanam, I, pp.406-407).

The state of established intellect is described in the Bhagavad Gita. The attainment of this transcendent state beyond the senses through Transcendental Meditation is described as follows (Maharishi Mahesh Yogi, transl., 1969):

"Therefore he whose senses are all withdrawn from their objects, O mighty-armed, his intellect is established (II,v.68,p.168).

The following verses describe the nature and benefits of the permanent state of established intellect:

"Their intellect rooted in That, their being established in That, intent on That, wholly devoted to That, cleansed of all impurities by wisdom, they attain to a state from which there is no return (IV,v.17,p.356).

"He who neither greatly rejoices on obtaining what is dear to him, nor grieves much on obtaining what is unpleasant, whose intellect is steady, who is free from delusion, he is said to be a knower of Brahman [totality of pure intelligence], established in Brahman (IV,v.20,p.361).

The realization of one's true identity as pure intelligence, the totality of nature's intelligence, is recorded in the Upanishads in the expression, "Ahambrahmasmi", "I am Brahman, the totality" (Painkala Upanishad, Ch.III,v.49, K. N. Aiyar, transl. 1914).

How the TM and TM-Sidhi Program Unfolds Intelligence From the Point of View of the Mind and Body

Having considered how the TM and TM-Sidhi program unfolds intelligence from the perspective of pure intelligence itself, we shall now consider how it unfolds intelligence from another perspective.

Maharishi has predicted and explained the effects of the TM and TM-Sidhi techniques on cognitive functioning in terms of the intimate relationship between mind and body (Maharishi Mahesh Yogi, 1963, 1969, 1972a). By allowing the mind to experience quieter levels of thought, the TM technique is said to engage the mind in increasingly refined, or abstract activity. Since the mind and body are interrelated, the refinement of mental activity is accompanied by refinement of physiological functioning. Distinct changes in physiological functioning have been found to accompany the experience of transcendental consciousness, for example, respiratory suspension and increased EEG coherence (Alexander, Cranson, Boyer, & Orme-

Johnson, 1987, [review]; Badawi, Wallace, Orme-Johnson, & Rouzere, 1984; Farrow & Hebert, 1982; Gallois, 1984; Orme-Johnson & Haynes, 1981; Travis, 1988; Wallace, 1971, 1986 [review]).

As was mentioned in Discussed in Chapter 1, there many distinct physiological indicators of the state of transcendental consciousness. These physiological changes are listed at length in Table 3 under "Transcendental Consciousness," and documented in detail in several reviews (Alexander, Cranson, Boyer, & Orme-Johnson, 1987; Dillbeck & Orme-Johnson, 1987; MERU Press, 1984; Wallace, 1971, 1986).

This process of transcending thought has been referred to in Vedic literature as a process which leads to "self-purification"--purification of the mind and body. In terms of cognitive psychology, this is purification of, or reduction of "noise" in the information processing system. According to information theory, which is used in cognitive psychology, reduction of noise in the system should result in more efficient and accurate processing of information, or improved cognitive performance.

Perhaps the most direct reference to the process of purification is in the text on Yoga, which is a part of the Upangas, one of the most central and compact branches of the Vedic literature. According to the Yoga Sutras (Aranya, transl., 1963),

"On gaining proficiency in Nirvichara
[transcending thought through the TM program]

purity in the inner instruments of cognition is developed (Book 1, verse 47, p.114)."

"Purification of the mind, agreeableness of feeling, concentration and ability for self-realization are also acquired (Book II, v.41, p.251)."

The Bhagavad Gita also refers to this process of purification through meditation:

"Seated there on the seat, having made the mind one-pointed, with the activity of the senses and thought subdued, let him practice Yoga for self-purification (VI,12, Maharishi Mahesh Yogi, 1969, p.406)".

Maharishi explains the process of purification described in the above verse,

In the state of absolute [transcendental] consciousness, the mind is free from all modes of the relative order and thus gains its most purified state. This is the state of Yoga... 'practice yoga for self-purification'... means that the practice of gaining this state is a means of gaining purification of body, mind, and spirit [consciousness].

When the mind experiences subtle states of the object of meditation, it becomes very sharp and refined. At the same time the breath becomes correspondingly refined, and this soft fine breathing tends to return the nervous system to its normal functioning order; any abnormal functioning is restored to normality. When the mind gains transcendental consciousness, it reaches its most purified state. At the same time the whole nervous system gains a state of restful alertness... This is the most purified state of the body (Maharishi Mahesh Yogi, 1969, p.407)."

Regularly exposing the physiology to a more refined style of functioning through the TM and TM-Sidhi program is

said to culture its ability to function in this way. A well established principle in developmental neurobiology is that experience can affect neural development (Bennet, Diamond, Krech, & Rosenzweig, 1964; Blakemore & Cooper, 1970; Diamond, Ingham, Johnson, Bennet, & Rosenzweig, 1976; Hubel & Wiesel, 1979; Milgram, MacLeod, & Petit, 1987; Wallace, 1986). It appears that the refinement of mental activity brought about by the TM and TM-Sidhi techniques stimulates corresponding development of the nervous system (Wallace, 1986).

According to Maharishi's Vedic Psychology, refinement of the nervous system in turn increases the ability of the senses to perceive, and the mind to experience more abstract, comprehensive levels of thought and feeling (Maharishi Mahesh Yogi, 1963, 1969, 1972a, 1972b). Hence, this process of mutual development of mind and physiology has been predicted to improve the functioning of all levels of the mind: ego, feeling, intellect, mind, senses, and physiology. (Maharishi Mahesh Yogi, 1963, 1969, 1972a, 1972b). A large body of scientific evidence supports of this prediction; as mentioned earlier, it shows improvements at all levels of the mind and body as a result of practice of the TM and TM-Sidhi program. This research is summarized in Table 3. Another dimension of the unfoldment of intelligence is the development of higher states of consciousness. We shall now consider how practice of the TM and TM-Sidhi

program unfolds higher states of consciousness.

How the TM and TM-Sidhi Program Develops Higher States of Consciousness

Chapter 3 explained that the natural unfoldment of intelligence brought about through the TM and TM-Sidhi program is experienced in stages, called higher states of consciousness. We shall now consider how the unfoldment of higher states of consciousness takes place on the basis of development of the nervous system through the TM and TM-Sidhi program. The role of experience and the nervous system in the unfoldment of cosmic consciousness is explained in The Vedic Psychology of Maharishi Mahesh Yogi: Fulfillment of Modern Psychology (Orme-Johnson, Dillbeck, & Alexander, Eds., in press):

Each major state of consciousness has a corresponding style of neurophysiological functioning. For transcendental consciousness to be permanently maintained along with the states of waking, dreaming, and sleeping, the style of functioning of the nervous system corresponding to transcendental consciousness must coexist with the style of physiological functioning of each of the other three states. This integrated style of functioning is brought about by the mind alternately experiencing transcendental consciousness and the waking state of consciousness....

By virtue of the enormous flexibility of the human nervous system, which gives it the capability to integrate diverse modes of functioning, transcendental consciousness naturally comes to coexist with the waking state of consciousness as well as with the dreaming and

sleeping states of consciousness.

Even in the waking state, the human nervous system is capable of maintaining diverse levels of mental activity simultaneously. For example, during the process of perception, thought may accompany perception, decision making may underlie the direct thought, and delicate feelings may guide decision making. The integration of transcendental consciousness and waking consciousness in cosmic consciousness simply represents the further extension of the nervous system's ability to simultaneously maintain different levels of mental activity. In cosmic consciousness, the silent state of transcendental consciousness at the source of thought comes to be maintained along with the more manifest levels of feeling, thought, perception, and action...

Repeated experience of the unique state of deep physiological rest during the practice of the Transcendental Meditation technique spontaneously dissolves fatigue and deeply rooted stress, thus normalizing physiological functioning... In the state of cosmic consciousness, a normally functioning, stress-free nervous system spontaneously maintains the absolute bliss of transcendental consciousness at all times (pp.80-81).

The mechanics of transition from cosmic consciousness to God consciousness will now be considered in terms of refinement of the nervous system through the TM and TM-Sidhi program. In cosmic consciousness, as Maharishi explains in his commentary on the Bhagavad Gita, the two levels of physiological functioning which support transcendental consciousness and the waking state of consciousness operate independently but simultaneously, so that the inner Self is experienced along with activity but separate from it (Maharishi Mahesh Yogi, 1969, p.324). As Orme-Johnson et al. explain,

In order for the individual to develop from cosmic consciousness to God consciousness, the nervous system needs to be further cultured so that these two levels come to function in an increasingly integrated manner. This integration gives rise to a state of consciousness in which the sense of separation between the Self and activity is all but dissolved (p.85).

The integration of these two styles of physiological functioning is brought about by the Transcendental Meditation and TM-Sidhi program, as well as by highly refined mental activity outside of the period of Transcendental Meditation (p.85).

Maharishi (1969) explains what this type of refined activity is:

In order to define activity of this quality, we must analyze the whole range of activity. The activity of the organs of action is the most gross, the activity of the senses of perception is more refined, the mental activity of thought is finer still, and the activity of feeling and emotion is the finest of all. One could further classify different levels of quality in emotional activity, such as anger, fear, despair, happiness, reverence, service and love.

The activity of devotion comprises the feelings of service, reverence and love, which are the most refined qualities of feeling. It is through the activity of devotion that cosmic consciousness develops into God-consciousness (p.315).

Orme-Johnson et al. (in press) continue to describe the development of cosmic consciousness into God-consciousness:

A necessary condition for developing the most refined mental activity, the feelings of devotion, is cosmic consciousness, the state in which the individual is established in the universal bliss inherent in the cosmic psyche. Only when the infinite reservoir of universal bliss is established in human awareness can this bliss come to be expressed in overflowing waves of service, reverence and love... Such refinement of feeling gradually cultures the physiological basis of

perception until one appreciates in any object of experience the subtlest manifest level of natural law.

In a discussion of the TM-Sidhi techniques designed to enhance the senses, Maharishi (1980) explains how the TM-Sidhi techniques help culture God consciousness by enlivening the finest levels of perception and feeling:

In each one of these procedures, perception is refined so that perception is possible in a state of awareness that is as near as possible to unbounded awareness. As a result of these procedures, two values of awareness emerge. The mind becomes exercised in the ability to maintain unbounded awareness during a specific experience and also, since the senses always entertain the most refined aspect of any experience--at the junction point between unbounded awareness and specific thoughts--the element of bliss is never lost in any experience (p.35).

In God consciousness, the ability to perceive the junction point between the unmanifest field of pure consciousness or pure intelligence and its expressions, is permanently established. This junction point is the levels where the TM-Sidhi phenomena are experienced (Maharishi Mahesh Yogi, 1980).

The final step of development of intelligence is the transition from God consciousness to unity consciousness, the highest state human development. The mechanics of this transition are explained as follows (Orme-Johnson et al., in press):

In God consciousness, the object of perception is appreciated in its finest manifest value but still as unconnected with the unmanifest value of the

Self. In the transition from God consciousness to unity consciousness, the finest manifest level of the object is increasingly appreciated in terms of the underlying unmanifest unity of the cosmic psyche [pure intelligence], the unified field of natural law. The gap between the Self and objective existence is bridged as every object is experienced in terms of the Self.

The development of unity consciousness is based on the complete refinement of physiological functioning. For awareness to sustain this supreme state of development, the nervous system must attain a level of perfect physiological integration (p.89).

Gelderloos and van den Berg (1989) explain how the TM-Sidhi program hastens the development of unity consciousness:

...unity consciousness, in which all aspects of creation are experienced as expressions of the Self--pure consciousness [or pure intelligence], is directly cultivated by the practice of the TM-Sidhi program. The TM-Sidhi techniques develop the ability to be active within the field of silent, transcendental consciousness and thus cultivate the appreciation of the ultimate value of all active states of awareness as pure consciousness. When one consciously creates qualities of awareness from the unqualified state of pure consciousness, all partial values of awareness become directly connected with their underlying wholeness. With continued practice all qualities of awareness and even the whole manifest universe become experienced as reflections of the self-referral state of the cosmic psyche (p.382).

Scientific Evidence of the Growth of Higher States of Consciousness

The growth of higher states of consciousness and the development of intellectual abilities resulting from the TM

and TM-Sidhi program is documented by scientific research. Research studies verifying the psychological and physiological changes that take place in the state of transcendental consciousness are listed in Table 3 under the level, "Transcendental Consciousness". As has been mentioned, they include changes in oxygen consumption, natural suspensions of breath, EEG coherence, decreased heart rate, decreased basal skin resistance, reduction in biochemical indices of stress, and others (see Table 3).

The growth of cosmic consciousness is documented by research which measured the frequency of experiences of "witnessing" the waking, dreaming, and sleeping states of consciousness (Alexander, 1979, 1982; Alexander, Cranson, Boyer, & Orme-Johnson, 1986; Gackenbach, Cranson, & Alexander, 1986; Jedrczak & Alexander, 1986; Jedrczak, Clements, & Alexander, 1986; Orme-Johnson, Clements, Haynes, & Badawi, 1977), and in studies on field independence, which indicate that practice of the TM and TM-Sidhi program fosters the development of a stable internal frame of reference that is independent of the environment (Pelletier, 1974; Dillbeck et al., 1986).

Growth of higher states of consciousness and improved cognitive performance are correlated. The ability to maintain a broad, holistic style of awareness while simultaneously focusing on the parts of a problem may account for observed improvements in performance on I.Q.

tests of figural reasoning (Aron, Orme-Johnson, & Brubaker, 1981; Dillbeck et al., 1986; Tjoa, 1972, 1977; Shecter, 1978) and choice reaction time (Holt, Caruso, & Riley, 1978), since both tests emphasize the ability to perceive and analyze relations of parts with one another and with a larger whole, and to respond accordingly.

As further evidence of the relationship between maintenance of unbounded awareness and superior cognitive performance, long-term practitioners of the TM and TM-Sidhi program exhibited significant positive correlations between frequency of clear experiences of transcendental consciousness, IQ scores (Jedrcozak, Clements, & Alexander, 1986); creativity (Haynes, Hebert, Reber, & Orme-Johnson, 1977; Orme-Johnson & Haynes, 1981; Orme-Johnson, Wallace, Dillbeck, Alexander, & Ball, 1977; Vogelmann, 1978); and EEG coherence (Haynes et al., 1977; Orme-Johnson & Haynes, 1981)

In addition, the TM-Sidhi program longitudinally increases neurophysiological efficiency, as shown by more rapid recovery of the paired Hoffman reflex (Wallace, Mills, & Orme-Johnson, 1983; Wallace, Mills, Orme-Johnson, Dillbeck, & Jacobe, 1982) increased stability of hormonal rhythms (Walton, Lerom, & Salerno (1981), decreased blood pressure (Wallace, Silver, Mills, & Dillbeck, 1983), and behavioral flexibility (Wallace, Dillbeck, Jacobe, & Harrington, 1982). All these changes, taken together, indicate the development of a more flexible, optimal style

of psychological and physiological functioning that characterizes higher states of consciousness. As yet, research is lacking on the physiological correlates of the sixth state of consciousness, God consciousness, and the highest state of human consciousness, unity consciousness.

The hypothesis of the present research study is that the TM and TM-Sidhi program improve the functioning of intelligence at several levels of the mind (see part III of this dissertation). The hypothesis and its relationship to the issue discussed in this chapter are presented in the introduction to the research study. Interventions which have attempted to directly improve performance on intelligence tests shall now be considered.

Improvements in Intelligence Test Scores:

A Comparison of the TM and TM-Sidhi Program With Other Interventions

Theorists and researchers in the field of intelligence often disagree on appropriateness of various measures of intelligence, but they do agree on the importance of this question: "To what extent can intelligence be increased, if at all, and how?" Robert Sternberg (in Kezerian, 1986) recently remarked,

"Psychologists can certainly continue to test intelligence, but they would provide more of a service to people by developing their intelligence than merely by measuring it (p.28)."

Despite numerous projects and vast expenditures by government and private organizations, results of attempts to improve intelligence have been on the whole disappointing or inconclusive. In a comprehensive review of research in this area, Douglas Detterman (1982) observed,

"Prior to 1965, there was a substantial body of research on compensatory education and its effects on intellectual development. We have located 30 studies...Of those... 40 to 60% of the studies showed no effect... those studies that do show effects, generally show small effects...(p.46)."

"We have located 54 studies conducted after 1965 concerned with the relationship between early intervention and intellectual development. Of those studies, 49% show no or little gain in intellectual development... evidently, little has changed... the data of many [of the] other studies, show that any IQ gains are largely lost... on whether preschool programs affect intellectual behaviors... It is clear that they have no direct effect (pp.54-55)."

Similarly, Arthur Jensen (1981) noted,

"Despite more than a half century of repeated efforts by psychologists to improve the intelligence of children, particularly those in the lower one quarter of the IQ distribution relative to those in the upper one half, strong evidence is still lacking as to whether or to what extent it can be done."

Lastly, in a comprehensive review of all the major efforts to raise the IQ's of retarded children, Spitz (1986) concluded that they have uniformly failed (pp.216-219).

According to the Vedic theory of intelligence, these past approaches to improving intelligence failed primarily

because they attempted to improve intelligence by giving instruction in the form of additional information, without increasing the underlying capacity of the subjects to use information. In other words, these interventions dealt with the partial values of intelligence, the expressions of intelligence (intellect, mind, and information) rather than the wholeness of intelligence, the source and cause of its expressions in the form of partial values.

In this view, any intervention that attempts to improve intelligence by using the currently limited capacity of the student to think will enjoy only limited and temporary success at best, because the general mental capacity of the student will not have been increased. By contrast, the TM and TM-Sidhi program is shown to be a method of directly increasing the students' mental capacity--putting him in contact with the wholeness of intelligence, and increasing his ability to acquire and use information intelligently (Aron, Orme-Johnson & Brubaker, 1981; Dillbeck, Assimakis, Raimondi, Orme-Johnson, & Rowe, 1986; Kotchabhakdi, N.J. Pipatveravat, Kotchabhakdi, N., Tapanya, & Pornpathkul, 1982; Nidich, S., Nidich, R., & Travis, 1987; Tjoa, 1975; Travis, 1979).

In six independent studies, subjects who practiced the Transcendental Meditation (TM) and TM-Sidhi program showed significant gains (.4-.88 standard deviations in I.Q. scores) over 3 months to five years of practice.

At the grammar school level, Nidich, Nidich, & Travis (1987) found that students aged 4 to 12 who practiced the TM program showed a 5-point increase in IQ scores (0.4 standard deviations, $p < .05$) as measured by Cattell's Culture Fair Intelligence Test, over a one-year period.

At the high school age level, studies of longer than three months' duration consistently show significant increases in growth rate of fluid intelligence among students who learned the TM technique compared to controls (Shecter, 1978; Tjoa, 1977). There are some shortcomings in the design of Tjoa's study. The sample size was small-- $N=7$ for meditators and $N=6$ for nonmeditating controls. Second, the technique of data analysis used did not control for differences between the two groups on pretest scores.

Testing high school student subjects as Tjoa did, Shecter (1978) overcame some methodological problems of the Tjoa study. Shecter's 14-week longitudinal study employed a much larger number of subjects, 20 in each of four groups. One group learned the TM technique and the Science of Creative Intelligence (SCI) course (a course on the theoretical principles of TM and the Science of Creative Intelligence). A second group learned the practice of TM only without any theory; a third group received only the theory of the SCI course but not the practice of TM; and a fourth group received no instruction of any kind. Sixty subjects were randomly assigned to one of the first three

conditions, and a group of volunteers, matched to the other three groups by grade and sex. In the group who learned both TM the SCI course, mean scores on the Raven's Advanced Progressive Matrices increased by .625 SD over the 14-week experimental period. Scores of the TM-only group increased by .5 SD, while scores in the SCI-only group and the non-treatment group did not increase significantly.

At the college level, two studies at Maharishi International University (MIU), where the entire student body practices the TM and TM-Sidhi program, found significant increases in scores on Cattell's Culture Fair Intelligence Test (CFIT). In a study by Aron, Orme-Johnson, & Brubaker (1981), incoming freshmen at MIU were tested upon entrance and again two years later. No significant change in scores was observed. However, in a follow-up testing session at graduation two years later, a significant increase of 8.3 points in mean IQ, (.52 standard deviations) was observed compared to pretest scores from the freshman year ($p < .005$). In a second study by Dillbeck, Assimakis, Raimondi, Orme-Johnson, and Rowe (1986), students were tested upon entrance and posttested three to five years later. A significant increase of nine IQ points (.88 standard deviations, $p < .001$) was found on the CFIT.

Cross-sectional research indicates that in the general population, maximum scores on the CFIT are reached at about age 17, with a subsequent decrease and a gradual flattening

out after age 40 (Barton, 1973; Horn & Cattell, 1966; Singh & Hundal, 1971). Hence, the gains at the university level described above are in the opposite direction to the national trend, which shows a decline for the age group studied.

Because of the apparent trend in the general population, the most appropriate intervention studies with which to compare results from the TM-related studies are those which draw on populations of similar age-- high school- and college-age subjects. Feuerstein (1979) has conducted several studies in Israel on the effects of learning interventions on cognitive measures. In most of Feuerstein's research, the effects of his interventions on standard measures of general intelligence are not reported. One exception is what he calls the Hodayot study-- a study involving 9th and 10th grade students attending a vocational school.

In the Hodayot study, Feuerstein attempted to improve the scores of low-scoring pupils whom he described as culturally deprived, functionally illiterate, and of borderline mental ability, by demonstrating and modeling correct solutions to problems similar to the items of Thurstone's Primary Mental Abilities Test (PMA). Prior to the intervention, the ninth-grade students in the superior group scored .68 standard deviations higher on the PMA than the low-scoring group. After one year they exceeded the low-

scoring group by .71 standard deviation units. Thus the intervention had no effect on the magnitude of the difference in intelligence scores for the ninth-grade students. Prior to the intervention, the tenth-grade students in the low-scoring group scored 1.07 standard deviations below the high-scoring group on the PMA and, after one year, this difference was reduced to .26 standard deviations. Thus, the intervention did decrease the difference in test scores for the tenth-grade students.

In a review of the Feuerstein study, Brody (1985) argued that the results should be averaged for ninth and tenth grades, since the samples were small for the tenth-grade group -- 32 for the high-scoring group and 16 for the low-scoring group. Brody comments,

This leaves us with an initial difference of .88 standard deviation units that is reduced to a difference of .48 standard deviation units. The .40 reduction is not large in magnitude. When looked at in this fashion the study does not provide dramatic evidence for increments in intelligence scores as a result of the educational interventions. Feuerstein's research demonstrates that changes in test performance can occur for specific tests that are the focal point of the intervention but does not indicate that these changes generalize to scores on omnibus measures of intelligence. Thus little convincing data supports the claim that scores on intelligence tests are modifiable as the result of his training procedures (p. 371).

Tjoa (1975) investigated the effect of practicing the TM program on fluid intelligence test scores among adults in Holland. A significant longitudinal increase was found (.66

standard deviations, $p < .025$) over a 16-month period among regular participants in contrast to those meditating irregularly². Several studies conducted with other samples attempted to increase intelligence test scores among adults in the 60-80 age range, and these results may appropriately be compared with the above finding³. In a review of literature on intervention studies for increasing intellectual performance among adults, Willis (1987b) reports four studies which achieved effect magnitudes on the order of .50 to 1.00 standard deviations (Baltes, Dittmann-Kohli, & Kliegel, 1986; Hornblum & Overton, 1976; Willis, Blieszner, & Baltes, 1981; Willis & Schaie, 1986). In contrast with the approach of the TM and TM-Sidhi program, which are designed to accelerate the overall physiological, psychological, and social development of the individual in a holistic manner, these interventions involved training in strategies related to a particular test, as did Feuerstein's study. The training effect was expected to generalize from

² In Tjoa's second study (1977), the data gathering techniques were not ideal. For posttest, the test was untimed, whereas it was timed at pretest, and it was given individually at posttest instead of in a group. In some cases, the test was sent to subjects in the mail for posttest. Finally, as in the previous study, the statistical analysis did not control for differences between the two groups on pretest scores. However, these weaknesses do not explain the group differences in results for regular and irregular meditators.

³ Even though the mean age of Tjoa's group was 31 years and was skewed to appear older due to a few outliers, the mean age of this group is the highest of all the TM groups studied.

the particular test used to other measures which presumably represent the same "ability factor" or "primary mental ability" (Thurstone, 1938), viz. verbal meaning, inductive reasoning, spatial orientation, number, or perceptual speed. In the above four studies, the interventions succeeded in improving performance in the targeted ability, while having no influence on other abilities. With regard to lack of generalizability to other dimensions of intelligence, Willis (1987a) comments,

Some have argued that training effects should extend to abilities that are empirically distinct from the ability/cognitive process that was the target of training... Why this should be so is unclear to us. First, training procedures have typically focused on those cognitive strategies and behaviors that are directly related to performance on the target ability, and thus it would be expected that training effects would be limited to the target ability. Second, the current state of the field of cognitive psychology is not such that it is possible to specify cognitive strategies that are common (i.e., generalizable) across empirically distinct abilities.

Temporarily accepting Thurstone's classification scheme for the sake of comparison, it is noteworthy that, while training in the TM and TM-Sidhi program is not aimed at improving performance on any specific mental ability, there is evidence that practice of these techniques results in improvements in more than one of the primary mental abilities described by Thurstone and Willis. For example, researchers investigating the effects of the TM and TM-Sidhi program have found improvements in three of the five mental

abilities described by Thurstone inductive reasoning (Aron, Orme-Johnson, & Brubaker, 1982; Dillbeck et al, 1986; Shecter, 1978; Tjoa, 1977; Nidich, Ryncarz, Abrams, Orme-Johnson, & Wallace, 1983;), number (Miskiman, 1973), and perceptual speed (Appelle & Oswald, 1974; Holt, Caruso, & Riley, 1978). This outcome is predicted by Maharishi's Vedic Psychology, which states that pure intelligence is the common source of all mental abilities; hence, when the mind becomes completely identified with pure intelligence in the TM technique, and begins to consciously function from that level during the TM-Sidhi program, all the related mental abilities are more fully unfolded. The details of this process have been discussed earlier in this chapter.

In summary, the effect of the TM and TM-Sidhi program on fluid intelligence test scores has been investigated in six longitudinal studies varying in duration from fourteen months to five years. In every case, significant improvements in intelligence test scores were observed. Three of the studies included control groups and, in two of the other three studies, the improvement in scores was clearly contrary to the declining trend of the general population for the same age group.

The effect of the TM and TM-Sidhi program has been compared with the effects of other interventions aimed at improving intelligence in subjects of high school age or older. In one of the non-TM interventions (Feuerstein, 1979)

the effect of the intervention was not statistically significant. In the remaining four non-TM studies (Baltes, Dittmann-Kohli, & Kliegel, 1986; Hornblum & Overton, 1976; Willis, Blieszner, & Baltes, 1981; Willis & Schaie, 1986), the result was significant, however, in each study the result was observed for only one of the specific primary mental abilities on which the subjects were trained.

There are several differences between the TM and TM-Sidhi program and the other interventions:

1. Whereas participants in the TM and TM-Sidhi program are trained to transcend the thinking process altogether and consequently enjoy benefits which develop naturally with no further effort, subjects in the other studies were trained in specific problem-solving strategies directly related to the test they were to take.

2. While the benefits of the TM and TM-Sidhi program generalize to many mental and physical abilities, including Thurstone's five primary mental abilities-- verbal meaning, spatial orientation, inductive reasoning, number, and perceptual speed-- the effect of the training procedures in the other studies was limited to one of the primary mental abilities, the one for which the subject was trained. The holistic nature of the improvements in mental functioning as a result of the TM and TM-Sidhi program is explained by Vedic Psychology.

3. While the effects in the other studies were achieved

in a short time (in some cases, after five one-hour sessions), the effect of the TM and TM-Sidhi program on test scores was not observed until at least a fourteen months, and, in two of the studies, three to five years after instruction. Vedic Psychology predicts this gradual change; it states that the TM and TM-Sidhi program foster the natural unfoldment of the full mental and physiological potential of the individual. Such natural human developmental processes, involving fundamental physiological and psychological changes, are characteristically gradual.

Although the long-term longitudinal studies on the TM and TM-Sidhi program showing improvements in IQ can be explained by theory and past research, they raise at least two questions. First, since the studies used cross-sectional, rather than longitudinal normative data for comparisons rather than control groups, it may be argued that observed increases in I.Q. scores simply reflect a rise in scores among the general college population or test-retest learning effects, rather than a change unique to practitioners of the TM and TM-Sidhi program.

Second, since previous research indicates a relationship between choice reaction time and "g", considered by some to be a measure of general intelligence (Barrett, Eysenck, & Lucking, 1986; Eysenck 1986, 1988; Frearson & Eysenck, 1986; Jensen, 1979, 1982a, 1982b, 1985a, 1985b, 1987; Smith and Stanley, 1988; Vernon, 1983, 1987),

it may be hypothesized that if the practice of the TM and TM-Sidhi program increases IQ, it should also improve other aspects of intelligence.

Part III of this dissertation, the research section, attempts to answer these questions by including other measures along with psychometric I.Q. tests and employing a comparison group in a 2-year longitudinal design.

The Role of Maharishi Ayur-Ved In the Unfoldment of Intelligence

So far this chapter has considered only one procedure of Maharishi's Vedic Science and Technology. To date, the effect of one other aspect of Maharishi's Vedic Science and Technology on cognitive measures has been investigated-- the Maharishi Ayur-Ved Panchakarma program.

As discussed earlier in this chapter, Maharishi Ayur-Ved, a part of the Vedic tradition of knowledge, is an ancient science dealing with attainment and maintenance of perfect balance of the mind and body, and the resulting development of consciousness. The purpose of Maharishi Ayur-Ved and its relationship with intelligence is described by Maharishi in the following excerpts from Maharishi's World Plan for Perfect Health (1985b), and the book, Life Supported by Natural Law (1986a):

Ayur-Ved is an aspect of the Ved, an aspect of that science which is holistic in nature and which

alone in the world is competent to deal with the holistic value of life. Ayur-Ved, being an aspect of the total science of life, is the scientific means for prevention of disease, cure of sickness, and promotion of longevity (Maharishi Mahesh Yogi, 1986a, p.46."

Ayur-Ved...takes into account the totality of life, ranging from its unmanifest source in the total potential of natural law to all its manifest expressions (Maharishi Mahesh Yogi, 1985b, p.1)."

Through sequential development consciousness unfolds itself into the value of matter; consciousness becomes matter. The Self becomes mind, and mind becomes matter. We see this in modern physiology, when the DNA and RNA give rise to all the proteins, which in turn structure the body systems. This transformation of the field of pure knowledge [pure intelligence] rising from DNA as the impulse of information in RNA, to RNA becoming protein and protein becoming the whole material system is the description of consciousness becoming matter.

This transformation is sequential but always remains self-referral. It is like the airplane flying but always remaining self-referral to the ground station through the radio. All the activities of DNA, RNA, protein, and the whole system are always self-referral... because consciousness, intelligence, is developing itself into different expressions of its own nature and there is a continuity between matter and pure consciousness-- the Self, the mind, and the body.

The purpose of Ayur-Ved is to enliven the link between the unexpressed and the expressed values of life, between consciousness and matter. This natural transformation of the intelligence of natural law into the physical properties of matter reveals Ayur-Ved's profound theme of creating perfect health by maintaining the lively coordination between the creative intelligence of natural law and its transformed value of physiology. This theme is clearly expressed in the transformation of the intelligence of DNA into the impulses of RNA that produce proteins.

In this relationship between intelligence and its transformed values in matter, the supreme fundamental of perfect health and longevity is

located. This fundamental further offers the basis of the prevention programs of Ayur-Ved, which aim at stopping the rise of any imbalance between consciousness and physiology, and maintaining life in perfect balance.

In this state all aspects of life-- mind, body, behavior, and the environment-- enjoy a lively relationship with their common source, the field of pure knowledge [pure intelligence], in which the quality of balance is available in its perfection in the infinitely dynamic, self-referral structure of the Ved, the unified field of all the laws of nature (1985a, p.15).

Ayur-Ved achieves these purposes [of restoring the connection between the intelligence of nature, the mind, and the body; prevention of disease; and promotion of longevity] through knowledge of the impulses of intelligence or consciousness which have taken some material form. Through knowledge of the infinitely balancing impulses of intelligence available in some herb or root or fruit, Ayur-Ved provides a cure for any imbalance that has developed in the body. In Ayur-Ved, these impulses of intelligence are incorporated to heal the ailment, and, by being incorporated in the conscious mind, bring about the repair of any damage which has dismantled mind-body coordination in any part of the body (1985b, pp.46-47).

With reference to Figure 2, Maharishi Ayur-Ved is said to enliven the connection between level 1, Self, or pure intelligence; level 2, mind; and level 3, Body. By utilizing the balancing properties of the intelligence of nature in plants, Ayur-Ved enlivens the connection between levels 1, 2, and 3 with level 5, Universe; i.e., Maharishi Ayur-Ved makes use of the intelligence of nature, present throughout creation.

As mentioned earlier, there are twenty aspects of Maharishi Ayur-Ved, including the TM and TM-Sidhi program. Another aspect of Maharishi Ayur-Ved, the Maharishi Ayur-Ved Panchakarma program, is a system of purificatory procedures which are applied to the physiology for the purpose of increasing balance and purity in the body and mind, so that their connection with the intelligence of nature is enlivened. The procedures of the Maharishi Ayur-Ved Panchakarma program include oleation, medicated oil massage, various types of fomentation, and eliminatory procedures.

The benefits of the Panchakarma Program for health are documented in some 300 published research studies. Many of the studies were conducted in India, where Ayur-Ved originated, and some were conducted in western countries. Recent studies on the Maharishi Ayur-Ved Panchakarma program in the U.S.A. found improvements in both physical and mental health (Schneider, Cavanaugh, Rothenberg, Averbach, & Wallace, 1985; Schneider, Kasture, Rothenberg, Averbach, Cavanaugh, Robinson, & Wallace, in press).

Chandler, Glaser, Orme-Johnson, and Dillbeck (1987) investigated the effect of the panchakarma program on general intelligence, or "g", and found statistically significant increases after only two weeks of treatment ($t=1.69$, $p<.05$, $N=43$), apparently the result of a general increase in alertness. It will be interesting to see the results of future research regarding the effects of other

aspects of the Maharishi's Vedic Science and Technology on intelligence.

How and how much can intelligence be developed:

Description from Vedic literature

According to Vedic literature, the oldest and most complete knowledge about intelligence, intelligence can be developed to its full fruition in higher states of consciousness, or enlightenment, through the set of procedures that are now known as the TM and TM-Sidhi program. Perhaps the most direct reference to this is in the text on Yoga, the Yoga Sutras:

"With devoted, respectful and regular practice [of meditation] for a long time, enlightenment comes (I,14, in Maharishi Mahesh Yogi, 1986b)."

The Yoga Sutras further state that this process of purification of consciousness brings about improvements in all levels of the mind, including self, feelings, mind, senses, and the body. A quotation cited earlier is repeated here:

"On gaining proficiency in Nirvichara [transcending thought through the TM program] purity in the inner instruments of cognition is developed (Book 1, verse 47, S.H. Aranya, 1963, p.114)."

"Purification of the mind, agreeableness of feeling, concentration and ability for self-realization are also acquired (Book II,41, in S.H. Aranya, 1963, p.251)."

"Through destruction of impurities, practice of [meditation] brings about perfection of the body and senses (43, p. 253)."

As quoted earlier, the Taittiriya Upanishad asserts that meditation is the means to know the nature of intelligence through direct experience,

"He performed meditation; having performed meditation...He knew that intelligence is Brahman [the cosmic psyche, the unified field] (III,4-5, in S. Radhakrishnan, 1953, p.555-556)."

As mentioned earlier in this chapter, the Bhagavad Gita describes transcendental consciousness as a state of "established intellect", "balanced intellect" or "equanimity", in which the individual intelligence is established in pure intelligence, in the state of transcendental consciousness. The Gita proclaims that gaining and maintaining this state is the key to superior performance of any action:

"And when such a man withdraws his senses from their objects... his intellect is established (II,58, Maharishi Mahesh Yogi, 1969, p.159)."

"Far away, indeed, from the balanced intellect is the action devoid of greatness, O winner of wealth... (II,49, p.159)"

"Even here, in this life, the universe is conquered by those whose mind is established in equanimity. Flawless, indeed, and equally present everywhere is Brahman [pure intelligence]. Therefore they are established in Brahman (V,19, p.360)."

The Yoga Sutras further state that purification of consciousness leads to knowledge of the transcendent, and "Ritam-Bhara-Pragyan", which was discussed in Chapter 3 in the context of knowledge acquisition. To review, Ritam-Bhara-Pragyan is described as the ability to gain knowledge directly, without having to do so through the physical sense organs, or through logical deduction or inference. It takes place when the individual is able to maintain his awareness at the point where pure intelligence begins to express itself as impulses of intelligence, which are said to be the basis of all processes and forms in creation. To repeat part of an earlier quotation,

"On gaining proficiency in Nirvichara [transcending thought through the TM program] purity in the inner instruments of cognition is developed (Book 1, verse 47, S.H. Aranya, 1963, p.114)."

"The knowledge that is gained in that state is called Ritam-Bhara-Pragyan (filled with truth) (p.48)."

Hence, according to the Vedic literature, the development of intelligence is not limited to the ordinary range of skills employed in the waking state. With the unfoldment of Ritam-Bhara-Pragyan along with the waking state, the ability to know virtually anything develops, as do higher states of consciousness. Maharishi describes this development as follows:

Ritam is a word from Rig Ved which means truth. Pragyan means intelligence. Ritam-Bhara-Pragyan means that state of intelligence which expresses

only the truth. On this level a thought spontaneously produces its corresponding form and any desire is spontaneously fulfilled. It is the development of this value of Ritam that gives rise to higher states of consciousness (Maharishi Mahesh Yogi, 1977a, p.30).

The Upanishads confirm that by knowing the Self, pure intelligence, anything can be known:

"...it is the Self that should be seen, heard of, reflected on and meditated upon. Verily by [knowing] the Self, all this is known (Brihad-Aranyaka Upanishad, II,4,5, Radhakrishnan, p.197)."

The Yoga Sutras likewise state that discernment between pure intelligence (Purusha) and the individual intellect (buddhi) develops the ability to know and do virtually anything:

"To one established in discernment between buddhi [individual intellect] and Purusha [pure intelligence] come supremacy...and omniscience (Book III, v.49, S.H. Aranya, p.368)."

Additional passages from Vedic literature illustrating the existence of higher states of consciousness, and personal experiences of higher states of consciousness reported by practitioners of the TM and TM-Sidhi program are cited in Chapter 3, in the section on higher states of consciousness, and in Chapter 7.

Chapter 6

Primacy of Heredity or Environment

In the Determination of Intelligence

The issue of heritability of intelligence has been a topic of intense debate since the turn of the century (see Figure 1 in Chapter 1). There is evidence that heredity is a major factor in the determination of individual differences in intellectual abilities as well as personality traits. Research in this area indicates that genetic factors account for approximately 50 - 70 percent of the variance in IQ (Bouchard & McGue, 1981; Jensen, 1980, 1981, 1985b; Plomin, 1986, 1988; Scarr & Weinberg, 1978; Teasdale & Owen, 1984; Vandenberg & Vogler, 1985; Wilson, 1983). Furthermore, in a study which measured cognitive performance of adult monozygotic twins reared apart (McGue & Bouchard, in press), genetic differences between individuals accounted for roughly 50% of the variance in verbal reasoning, spatial ability, and perceptual speed and accuracy measures. Results of a similar study by McGue, Bouchard, Lykken, & Feuer (1984) support the existence of a general speed component underlying performance on most experimental cognitive tasks [including reaction time] that is strongly related to psychometric measures of "g", and for which "there are substantial genetic effects." Vernon (1987) reported similar results using measures of RT and speed of information processing.

Some intelligence theorists have concluded from this information that intelligence, as they understand it, cannot be improved, while others have brought forth evidence of environmental influences to challenge this assertion. In this debate, it is important to understand two points from the outset: first, the debate has been over a conception of intelligence that, according to Maharishi's Vedic psychology, is a very limited in scope. Second, the hypothesis of immutability of intelligence has prevailed due to lack of awareness of successful efforts to improve intelligence. These two points are related. A relatively superficial view of intelligence as a limited set of conceptual, mathematical, and verbal cognitive skills has inspired interventions which attempted to develop this set of cognitive skills by providing information alone--in the form of classroom instruction in learning strategies and intellectual approaches to problem solving--rather than taking a holistic approach and establishing contact of the mind with the unified source of all mental abilities, pure intelligence, thereby strengthening all abilities simultaneously. As Chapter 5 argues, informational interventions have failed because they are based on this superficial, piecemeal approach.

Another misconception that has clouded the debate is the presumed relationship between heritability and immutability of intellectual abilities. As psychologist

William Angoff has argued, the concepts of heritability and immutability "do not go hand in hand" (1988, p.713). Angoff points out that "many inherited characteristics are changeable" (p.713). As an example, Angoff cites an increase of four inches in mean height of adults in Japan over a 36-year period, and a similar though smaller change in height in the U.S. population. He adds that "...inherited characteristics, even those with heritability coefficients approaching unity, have changed, sometimes dramatically, from one generation to the next and certainly over the course of several generations" (p.714).

Referring to height again, Angoff notes, "...if a trait with this degree of heritability is so changeable, then certainly other traits, like intelligence, which are acknowledged to have lower heritability coefficients, may also be changeable (p.714)."

As an example of change in an inherited characteristic within a life-span, Angoff and others (Breiter, 1970, p. 289; Crombach, 1969; Erlenmeyer-Kimling & Jarvik, 1963; Jensen, 1969; and Rose, 1976, p.124) have pointed out that the effects of phenylketonuria, an inherited metabolic defect, are now controllable through diet. This is also true, Angoff observes, for inherited diseases including hemophilia, diabetes, and galactosemia, as well as heart disease and the tendency to develop dental caries.

The above view on the error of equating heredity with

immutability is shared by two of the most prominent developmental behavioral geneticists, Sandra Scarr and Robert Plomin. Scarr (1981) has written,

"A... faulty... conclusion is that, if genetic differences contribute more than environmental differences due to the variance of IQ scores, then IQ is considered to be not very malleable. The myth of heritability limiting malleability seems to die hard (p.53)."

In another place (1981) she wrote,

"Even if the heritability for IQ in a population were 1.0, meaning that present environmental differences contributed nothing to individual phenotypic differences, a change in environment could dramatically shift the mean of the entire phenotypic distribution (p.53)."

Robert Plomin (1983) similarly observed that there is some difficulty in "shaking the mistaken notion that genetic differences begin prior to birth and remain immutable ever after" (p.253). He wrote,

"We need to pry apart the close association that the adjectives 'genetic' and 'stable' have come to share: Longitudinally stable characters are not necessarily hereditary, nor are genetically influenced characters necessarily stable over time... genetic does not mean immutable (p.254)."

Other prominent researchers in the field of intelligence who have made the same point include Anastasi (1982, p.350) and Crawford (1979). Even behavioral scientists representing opposing sides of the heredity-environment debate have expressed their agreement on this point, including Stephen Jay Gould (1981, p.156) on the environmental side, and Arthur Jensen (1969, p.45) and

Richard Herrnstein (1973, p.58) on the hereditary side.

While hereditary characteristics do appear amenable to change, Angoff and others point out that

...conversely it is well known that some environmentally acquired habits and attitudes are extremely resistant to change. These include not only the physically addictive habits like smoking, drinking, and drug addiction, but also racial, national, and religious prejudices; attitudes toward crime, money, and marriage; attitudes of authoritarianism, and even voting behavior (p.715).

Can it be concluded that intelligence, as defined by most psychologists, behavioral geneticists and educators, can be changed or not? Angoff is not able to provide any clear evidence that it can. Nevertheless he expresses his belief, based largely on cross-sectional evidence, that IQ can be improved through cognitive training, but only if the training is begun at a very young age, continued into adolescence, and administered in a very "supportive and motivating" environment.

As was shown in the preceding chapter, the results of past interventions aimed at improving IQ are on the whole disappointing or inconclusive, except for six studies involving the TM and TM-Sidhi program, which consistently yielded positive results among high school students, university students, and adults.

How can the difference in outcome be accounted for? As was discussed in Chapter 5, it appears that the TM and TM-Sidhi program refine the functioning of the mind and the

physiology, allowing the mind to become consciously identified with the source of human intelligence, in so that all mental abilities develop simultaneously.

Even though the initial physiological structure is largely determined by heredity, the TM and TM-Sidhi program appears to facilitate the full development of neural structures and hence the expression of the full genetic potential, which may be much greater than anyone has imagined, including psychologists, genetic behaviorists, and educators. As was mentioned in Chapter 5, the principle of modifiability of neural structures through experience and changes in the environment is supported by a substantial body of research. Reviewing recent research by many neurobiologists, N.W. Milgram, McLeod and Petit (1987) concluded,

"We know that both the structure and the physiology of neurons can be modified by providing specific experiences... we also know a good deal about the mechanisms (p.1)."

Heretofore behavioral scientists have estimated the modifiability of human intelligence on the basis of success or failure of interventions which they applied. In doing so, the danger is that the consistent failures are attributed to the nature of human intelligence rather than the inadequacy of the interventions used so far. If, on the other hand, an intervention has repeatedly been applied to different samples and the results are consistently positive, as is the

case with the TM and TM-Sidhi program, it can be concluded that human intelligence is in fact amenable to development, and hence that everyone has the potential to be intelligent. Maharishi, quoted on this point in Chapter 5, affirms that "man is born to be a genius."

Thus, while it is difficult to determine precisely the relative contributions of heredity and the environment in the development of intelligence, it seems certain that the limits that were presumed to be imposed on human intelligence by heredity are not so narrow nor rigid as was once supposed. It also appears that the TM and TM-Sidhi program is capable of unfolding intelligence beyond the level inherited by each individual. The crucial factor in the development of intelligence appears to be refinement of the mind and physiology, accomplished through transcending and other procedures of Maharishi's Vedic Science and Technology.

The hypothesis that anyone can develop his intelligence, is supported by research on the TM and TM-Sidhi program and development of intelligence, summarized in Table 3.

If the hypothesis of the study proposed in Part II is supported, it will constitute further evidence that practice of the TM and TM-Sidhi program can have a strongly positive influence on the development of intelligence. In order for the growth of intelligence to be verified it must be

measured. Therefore, the question of how to measure intelligence is considered in the following chapter.

Chapter 7

Measurement of Intelligence in Maharishi's Vedic Psychology And Twentieth Century Psychology

A corollary to the question, "What is intelligence?", and equally controversial in twentieth century psychology, is the question of how intelligence can be measured. Since its birth at the turn of the century, western psychology has attempted to use a strictly objective approach to the study of intelligence. Through measuring behavioral, cognitive, physiological, and psychophysiological phenomena, researchers have attempted to understand the nature of intelligence, to build and test theories about it. Through analysis, researchers attempted to divide intelligence into components and study these components and the relationships between them.

From the point of view of Maharishi's Vedic Psychology, the objective approach to the study of intelligence alone can never be completely successful in comprehending the totality of intelligence, because it ignores several important facts: First, the tripartite nature of knowledge-- knower, known, and process of knowing--requires an approach to research which fully comprehends and utilizes all three aspects of knowledge, not just the known, or objective aspect. In addition to the objective aspect of knowledge, the subjective aspect of knowledge and its relationship with the objective can not only be studied, but can be used as a

means of gaining knowledge to support and supplement the objective means of gaining knowledge. The use of the subjective means of gaining knowledge to support and complement the objective means of gaining knowledge is illustrated Chapters 1-5, where evidence from both means of gaining knowledge is presented in support of the Vedic theory of intelligence.

Since the turn of the century, western psychology--indeed, all of western science--has taken the position that a valid and reliable subjective means of gaining knowledge is not possible to achieve. It is understandable why this notion arose--the subjective means of gaining knowledge in use at the time, such as "introspection", were unreliable. However, Maharishi's Vedic Science and Technology overcomes the problems associated with previous subjective approaches to gaining knowledge. Appendix A explains how this has been achieved. The conclusion is that this long-held notion, which has become ingrained in the thinking of twentieth century psychologists, is no longer necessary.

The second reason why the subjective means of investigation is important for comprehending the totality of intelligence, is that the holistic, unmanifest nature of intelligence must be fathomed by direct experience and intellectual understanding both, for a complete comprehension of the partial values of intelligence. This point has been explained in Chapters 3, 4, and 5, where the

relationship of the holistic value of intelligence and the partial values of intelligence was explained.

Third, higher states of consciousness must be experienced and understood for the following reasons: a) in order to comprehend the full range of human development and hence the full range of expression of intelligence. As an illustration of this point, the reader is referred to the discussion of higher states of consciousness in Chapter 3 in light of the experiences and quotations from the Vedic literature, which are presented as data gathered using the subjective means of gaining knowledge;

b) in order to comprehend the expanded framework from which to see the holistic nature of intelligence and the relationship of man's intelligence with nature's intelligence. As an illustration of this point, the reader is referred to Chapter 3, specifically to the section where the state of unity consciousness is discussed as a frame of reference from which to experience the holistic nature of intelligence and its relationships.

c) in order to comprehend the discrete levels of functioning of intelligence in man's life. As an illustration of this point, the reader is referred to the section in Chapter 4 where a sample of a subjective experience of the functioning of various levels of the mind is presented.

Fourth, an objective measure of growth of intelligence

should be holistic itself or be part of a system of measures which include subjective measures, so as to reflect the holistic nature of intelligence rather than only some partial value of the expression of intelligence, as objective measures currently do. For example, many IQ tests are confined to reasoning abilities in spatial, analogic, mathematical and verbal domains. Other measures are simply tests of figural reasoning ability. If the nature of intelligence is truly unlimited, and if man has greater potential to express it than scientists have realized, then it could be expected that current cognitive measures of intelligence, based on a limited notion of intelligence, would be incapable of capturing its full expression.

It is entirely possible that everyone has a ceiling of performance on traditional and currently popular tests that purport to measure intelligence, because these tests fail to measure the holistic value of intelligence. Maharishi's Vedic theory of intelligence proposes that there is a holistic value of intelligence, and that the degree of its expression in the individual can be measured.

As has been discussed in Chapters 2, 3, and 4, according to Maharishi's Vedic Psychology, intelligence permeates every aspect of life--physiological, psychological, sociological, ecological. As Table 3 in Chapter 1, entitled, "The Fundamentals of Intelligence" shows, a wide variety of currently available measures, taken

together, indicate that the qualities of intelligence--orderliness, efficiency, adaptability, integration and progress--all improve simultaneously when intelligence is unfolded through the TM and TM-Sidhi program. This is a strong foundation of a system of measures, which together can measure the growth of intelligence.

General Criteria for an Adequate Measure of Intelligence

Some general criteria for an adequate measure of intelligence will now be considered. Given the definition of intelligence from Maharishi's Vedic psychology, it may be reasoned that a truly adequate measure of intelligence should be able to detect the degree to which pure intelligence is being consciously lived in the life of an individual, i.e., the degree of attunement of the individual's mind with the unified field of natural law. Such a measure would have at least three dimensions: 1) how frequently the individual has the direct experience of the field of pure intelligence, i.e., verification of his experience of higher states of consciousness, as judged by his ability to answer, with no preparation, in-depth questions about nature of the field of pure intelligence and its relationship with himself and the universe (his responses would have to be scored by several individuals

using a previously agreed-upon set of criteria, and inter-rater reliability would have to be checked, or, alternatively, he could be questioned by a group who are themselves established in higher states of consciousness!) (Examples of this procedure from the traditional Vedic literature will be discussed below); 2) the degree to which the individual can display mastery of the laws of nature (performance of the siddhis, to be discussed below); 3) how developed--i.e., how refined, effective and healthy--the individual is in all the various levels of the mind: Self, ego, feeling, intellect, mind, desire, senses, physiology, and how well all these levels are integrated with each other in the individual's life (both objective and subjective measures could be used here).

From the perspective of Maharishi's Vedic Psychology, the growth of intelligence is the growth of higher states of consciousness, and therefore if a measure or system of measures could be found which could detect higher states of consciousness, we would have a measure of intelligence. From the point of view of the evaluator, it would be most convenient if there could be a single measure that could capture the essence of intelligence or higher states of consciousness. Since, according to Vedic psychology, intelligence is holistic and ultimately unified at the deepest level of its structure, perhaps this is possible. At the same time, since, according to the Vedic theory, pure

intelligence is present at every point in nature, it could be possible to see its reflection in a single measure, just as a total experience can be captured to some degree in a photograph. Taking an example from the health sciences: Even though the state of an individual's health is a holistic phenomenon, since the blood is present everywhere in the body, the general state of health can be known to some extent by analyzing even a single drop of blood. In theory, then, there could be some unitary measures of intelligence.

Traditional Unitary Measures

In ancient India, during an era in which it is said that the knowledge of Vedic Science was more widespread in society than today, there were traditional ways of verifying the highest level of unfoldment of intelligence, or the highest level of consciousness, unity consciousness. One measure was partially subjective and partially objective; another completely objective. The first method was what is known today in the social sciences as "peer review". In peer review, an evaluation of an individual's performance is made by a group of peers who are considered experts in the individual's field of expertise. In ancient India, peer review in Vedic science often took the form of a debate in which an individual who was renowned for his or her state of enlightenment (personal knowledge of "Brahman" or the

unified field of pure intelligence) was questioned repeatedly in great depth by other individuals who were equally renowned as great seers, or enlightened sages living the highest state of human consciousness, unity consciousness.

The Vedic literature contains many accounts of such debates, one of the most famous of which appears in the Brihad-Aranyaka Upanishad. In this account, Janaka, king of Videha, gathered all the Brahmanas (enlightened scholars) who were learned in Vedic Science together to test which of them was the wisest. The king offered a reward of a thousand cows adorned with gold to whichever Brahmana could prove he was the wisest among them. According to the account, a sage named Yajnavalkya stepped forward and asked one of his disciples to drive away the cows.

The other scholars, aroused by Yajnavalkya's boldness, began to question him on the nature of Vedic Science-- the ultimate nature of the Self, and all aspects of knowledge of the Self. All the sages took turns questioning Yajnavalkya, who answered every question in such a profound, complete and satisfactory way that each of the questioners fell silent, one by one. One of the many questions and Yajnavalkya's answer are given here as an example:

Usasta Cakrayana said: 'This has been explained by you as one might say "this is a cow," "this is a horse." Explain to me the Brahman that is immediately present and directly perceived, that is the self in all things.'

"Yajnavalkya: 'This is your self that is within all things.'

"Usasta Cakrayana: 'Which is within all things, Yajnavalkya?'

"Yajnavalkya: 'You cannot see the seer of seeing, you cannot hear the hearer of hearing, you cannot think the thinker of thinking, you cannot understand the understander of understanding. He is your self which in all things...' Thereupon Usasta Cakrayana kept silent (III,5,I,2, Radhakrishnan, p.220)."

After hours of deep questions and even more profound answers from Yajnavalkya, a lady seer named Gargi Vacanavi declared,

" 'Venerable Brahmanas, you may think it a great thing if you get off from him through bowing to him. Not one of you will defeat him in arguments about Brahman.' Thereupon (Gargi) Vacanavi kept silent (III,8,12, Radhakrishnan, 1953, p.234)."

Still, other sages continued to question Yajnavalkya and he continued to expound on the nature of the Self. Finally, the other Brahmanas had no further questions to ask. According to the account, having silenced all of his questioners, Yajnavalkya began to put questions to them which they could not answer, and then instructed them further:

"Then he (Yajnavalkya) said: 'Venerable Brahmanas, whosoever among you wishes to do so, may question me or you all may question me or I will question him of you who wishes (to be questioned) or I will question all of you.' Those Brahmanas, however, did not dare (to say anything) (III,9,27, Radhakrishnan, 1953, p.243)."

Hence, the renowned Yajnavalkya became even more widely renowned as an enlightened and highly intelligent man.

A second and completely objective method of verification of the full development of intelligence-- also a traditional "test" of development-- is the demonstration of mastery of the laws of nature in the perfect performance of the "Sidhis", or extraordinary abilities such as levitation, extraordinary powers of hearing, sight, etc. According to Maharishi, these powers are normal for an individual whose intelligence is fully developed, in whom pure intelligence is fully enlivened--i.e., an individual who is living the state of unity consciousness. The TM-Sidhi program is designed to unfold the Sidhis. Maharishi describes it as follows:

"The TM-Sidhi program is that program which takes our conscious mind and makes it conversant with that level of intelligence from where all the laws of nature function (1984b)."

The following explanation of the TM-Sidhi program is provided by Gelderloos & van den Berg, (1989):

The meaning of Sidhi is 'perfection'; Maharishi (1978b) explains that each TM-Sidhi technique is a method for developing optimal functioning or perfection in specific functions of the mind or channels of mind-body coordination. The TM-Sidhi procedures utilize deeper levels of natural law to, for example, enhance the senses, develop human virtues, and develop abilities such as being able to move through the air by mere intention.

[As discussed in Chapter 5] The TM-Sidhi program was brought to light by Maharishi from the ancient Yoga Sutras of Patanjali. The Yoga Sutras comprise one of the six systems of gaining knowledge, also known as the Upa-Angas, found in Maharishi's Vedic Science. 'Yoga sutra' literally means 'thread of unity'. Maharishi explains that the Yoga sutras are a means to develop unity consciousness, the supreme state of enlightenment.

Each TM-Sidhi technique enlivens a specific aspect or 'thread' of functioning of the mind or mind-body coordination by connecting these aspects to the underlying wholeness of the cosmic psyche [pure intelligence]. The TM-Sidhi program as a whole enlivens the many threads of mind-body coordination to weave the holistic fabric of unity consciousness.

Maharishi points out that regular practice of the different TM-Sidhi techniques develops increasingly optimal states of functioning in all areas of intellect, emotions, thinking, perception, and behavior [i.e., in all levels of the mind], by bringing each channel in attunement with the cosmic psyche [pure intelligence]--the state of pure subjectivity, the total potential of natural law. As the various TM-Sidhi techniques foster the connection between mind-body channels and the field of pure consciousness, the unity underlying all diversity begins to be directly experienced in the midst of thought and action. In time, the TM-Sidhi procedures stabilize the wholeness of pure consciousness in every aspect of feeling, thought, speech, and behavior, fully integrating the unbounded silence of the cosmic psyche with more active levels of functioning. The ability to think and act from the full potential of natural law becomes a spontaneous and natural feature of daily life (pp.376-377).

There are many different Sidhis. There are Sidhis that develop extraordinary sensory abilities, for example, and there is a sidhi for levitation, the TM-Sidhi Yogic Flying technique. Even though the demonstration of Sidhis is extraordinary in itself, the achievement of these special creative capabilities are only the outer expression of inner development; they are the consequence of the development of consciousness rather than goals in themselves. Maharishi has emphasized that the primary goal of the TM-Sidhi program is to develop the highest state of enlightenment, unity

consciousness, which it accomplishes through enlivening all the channels of mind and body in the total potential of natural law.

While practice of the TM-Sidhi techniques cultures the growth of higher states of consciousness, Maharishi (1977b) explains that the ability to successfully perform the Sidhis also verifies the degree to which enlightenment is established.

[The practice of the TM-Sidhi program] simultaneously produces beneficial effects on the inner level of consciousness and the outer observable levels of physiology and the environment. Profound development of mind-body coordination is the automatic and immediate result. Thus, successful performance of the Sidhis is in effect a test of the degree of growth of enlightenment, for it demonstrates both profound growth of consciousness and intimate, highly developed mind-body coordination. With the growth of enlightenment the ability to perform Sidhis, known throughout the ages as "supernormal powers," automatically grows. It is not possible to separate Sidhis from the development of enlightenment; enlightenment cannot be complete without full mastery over the Sidhis (p.2).

Gelderloos and van den Berg continue,

Maharishi points out the specific psychophysiological channels enlivened by the TM-Sidhi procedures are expressions of the specific laws of nature emerging from the total potential of natural law, the cosmic psyche. The practice of each TM-Sidhi technique tests how well the specific laws of nature governing the functioning of a particular psychophysiological channel are coordinated with the holistic nature of the total potential of natural law in pure consciousness. If a particular mind-body relation is not functioning perfectly, then the corresponding TM-Sidhi ability will not be fully expressed. Successful performance of all the Sidhis indicates that an individual has passed all the 'tests': that

perfection has been achieved in each psychophysiological channel, and that the supreme state of perfection in life--unity consciousness--has been gained (p.382).

Hence, the perfect performance of the TM-Sidhi techniques, many of which can be objectively verified, constitutes a method of verifying the full development of intelligence in the state of unity consciousness.

Performance of the Sidhis in Modern Times

The TM-Sidhi techniques became available on a large scale only twelve years ago; hence not many individuals have been found who are able to demonstrate perfect performance of all the TM-Sidhi techniques. However, tens of thousands of practitioners of the TM-Sidhi program regularly perform all the sidhi techniques with some verifiable results, especially the technique of yogic flying.

Maharishi Mahesh Yogi describes the technique as follows (in MERU Press & Age of Enlightenment Press, 1987):

Yoga means union, the union of the individual awareness with the unified field of all the laws of nature in the state of transcendental consciousness. 'Yogic flying' demonstrates the ability of the individual to act from the unified field and enliven the total potential of natural law in all its expressions-- mind, body, behavior, and environment. 'Yogic flying' presents in miniature the flight of galaxies in space, all unified in perfect order by natural law.

The mind-body coordination displayed by 'yogic flying' shows that consciousness and its expression-- the physiology-- are in perfect

balance (vii)

Yogic flying was traditionally performed in the lotus posture, and is today as well. Proficiency in yogic flying develops in stages. According to the Vedic literature, in the first stage there is "hopping", in which the body lifts into the air momentarily and then quickly comes down again. In the second stage of yogic flying, the body is said to remain suspended in the air for some time. In the third and final stage, the practitioner can fly through the air in any direction at will.

In 1986, public demonstrations of the first stage of yogic flying, the "hopping" stage, were held in 108 countries, with thousands of practitioners of the TM-Sidhi program participating. The performance of yogic flying was recorded by scientists and the world press, and the reports are documented in a book entitled, Maharishi's Programme to Create World Peace: Global Inauguration: Demonstrating the Mechanics to Create Coherence in World Consciousness, the Basis of World Peace (1987). Since the first public demonstration, local, national, and international yogic flying competitions, open to the public, have been held annually.

Objective Verification of Partial Performance of the Sidhis

In yogic flying and other TM-Sidhi techniques, it is possible to measure changes in the individual that indicate acceleration of neurophysiological development. For example, during yogic flying, at the moment of lift-off interhemispheric EEG coherence has been found to increase dramatically (Orme-Johnson, Clements, Haynes, & Badawi, 1977; Travis, 1988b). Furthermore, during yogic flying, EEG alpha rhythm, an indication of restful alertness, is maintained (Orme-Johnson & Gelderloos, 1988). Another study found a distinctive EEG feature of 9.5 Hz peaks in global power (all leads) and higher frontal-central coherence (theta and beta) during yogic flying (Travis, 1988b).

The TM-Sidhi technique to develop refined hearing has been found to reduce the auditory threshold of advanced participants below a baseline already eleven decibels more sensitive than the population mean (Clements & Milstein, 1977). These and other changes are discussed in detail in Chapter 5, "How and how much can intelligence be developed?"

Corroboration of Sidhis from Vedic Literature

The Vedic literature describes Sidhis, or supernormal powers, in many places. For example, in the Yoga Sutras,

"On practicing ...[sidhi techniques] passage through the sky can be secured (III, 42, in Aranya, 1977, p.354)."

The Upanishads mention Sidhis in many passages, one of which describes the stages of yogic flying (Mahashabde [W. Sands, transl.], 1977):

"...from more practice, Darduri is born of him. Just as the frog (Dardura) moves, continually hopping, so does the Yogi, sitting in lotus, move along the ground.

"Then, from more practice, he leaves the earth...

"[That Yogi], sitting in lotus position, leaving the ground, departs (Yogatattvopanishad, 53-55).

Another passage from the Yogatattvopanishad describes several Sidhis:

"That yogin who is constantly practicing yoga attains the power to levitate... Then various wonderful powers are attained by the yogin, such as clairvoyance, clairaudience, ability to transport himself to great distances within a moment, great power of speech, ability to take any form, ability to become invisible...(Yogatattva Upanishad of Krishna Yajurveda, in K. N. Aiyar, 1980, pp.196-197)."

Another reference to Sidhis occurs in the Siva Samhita:

Then the Yogi, though remaining in Padmasana [sitting position] can rise in the air and leave the ground, then know that he has gained Vayu-siddhi (success over air), which destroys the darkness of the world... It destroys decay and death (in trans. Raj Bahadur Srisa Chandra Vasu, 1984)."

This last reference to the power of yogic flying to destroy the "darkness of the world" is verified by

scientific research on the effects of group practice of the TM-Sidhi program, summarized in Table 3 of Chapter 1 under "Ecological Intelligence." The research shows decreases in international conflict and crime as a result of group practice of the TM and TM-Sidhi program.

Verification of the Effects of Sidhis
from Personal Experiences

Using the Subjective Means of Gaining Knowledge

The following are experiences of yogic flying reported by modern-day practitioners of the TM and TM-Sidhi program who regularly exhibit the first stage of yogic flying. It is notable that the experience of flying is accompanied by the experience of self-referral with the environment, waves of bliss, and a feeling of increased integration of the levels of the mind, all of which are indicators of the growth of unity consciousness. This is predicted by the Vedic theory of intelligence, which connects the ability to levitate with the growth of unity:

"When my body lifts up in the air, I feel an enormous inner peace and integration of the heart, mind, body, and surroundings. There is a feeling of togetherness with everyone and everything (in MERU Press, 1987, p.571)."

"During the demonstration, there was a feeling of great expansiveness, as though the consciousness had filled the hall. The whole time it seemed as though I were moving about very freely and effortlessly in that feeling. This expansiveness completely dominated the experience. I was not so

much aware of the body except to know that it was very light and moving about in a very blissful, energetic, and silent manner (pp.570-571)."

"The experience of 'yogic flying' is one of complete silence and peace followed by very powerful thrills of bliss that literally propel the body into the air (p.570)."

"When the body lifts up into the air, I feel a great strengthening of the physiology, and my mind is filled with a feeling of joy, vitality, and brilliance (p.570)."

Specific Criteria for a Modern Measure of Intelligence

As has been discussed above, ancient unitary measures of intelligence--the first stage of yogic flying and other Sidhis--and their relationship to growth of unity consciousness, can be verified to some degree today from objective measurements, and supported by accounts in the Vedic literature and personal experiences. However, in the absence of large numbers of individuals who currently meet the high standards of full development of consciousness embodied in the traditional tests of peer review and perfect performance of all the TM-Sidhi techniques, it is proposed that the most viable approach to measuring growth of the holistic value of intelligence is a convergent approach. This approach would include objective and subjective measures related to each level of the mind, so that the development of intelligence could be verified on each level.

In addition to measures from twentieth century

psychology, which attempt to measure partial values of intelligence such as mathematical ability, verbal ability, figural reasoning, etc., the approach should include objective measures of psychological and physiological changes associated with higher states of consciousness, and more holistic measures of intelligence, such as self-report questionnaires intended to subjectively verify growth of higher states of consciousness.

A self-report method of verification of higher states of consciousness is the subject's report of a qualitative change in his or her experiences that is characteristic of the onset of such a state. For example, as discussed in Chapter 3, cosmic consciousness, the fifth state of consciousness is described as a state in which transcendental consciousness is lived along with the other three states of consciousness, waking, dreaming, and deep sleep. One unmistakable symptom of the growth of this state is the experience of inner awareness during deep sleep. Maharishi has called this phenomenon "witnessing" the state of deep sleep--the term by which it is also known in the Vedic literature--and cites it as a clear indication of the growth of cosmic consciousness.

Although "witnessing" deep sleep is a subjective experience, some questionnaires have been developed that attempt to minimize the influence of demand characteristics and subject expectations. One such self-report questionnaire

includes misleading items (Alexander, 1978, 1982; Alexander, Boyer, & Alexander, 1987). Another elicits concrete examples of the experience from the subject (Gackenbach, Cranson, & Alexander, 1987; Cranson, in press), which are then scored independently by several investigators.

Such a convergent approach could accomplish several goals: 1) measuring the development of the partial values of intelligence, i.e., each level of the mind; 2) measuring the development of the holistic value of intelligence, i.e., higher states of consciousness; 3) determining which measures, or combinations of partial measures, are most directly related to one another and to the holistic value of intelligence-- hence contributing to a better understanding of the structure of intelligence.

At a minimum, the convergent approach would utilize: a) a technology for direct investigation of pure intelligence, its self-interacting dynamics, sequential expressions, and higher states of consciousness, i.e. the various procedures of Maharishi's Vedic Science and Technology; b) experiential reports of experiences of growth of higher states of consciousness; c) traditional texts of Vedic Science that record and describe systematic investigation, through direct experience, of the structure and functioning of intelligence as well as higher states of consciousness; d) objective measurement of behavioral correlates of intelligence, e.g., improvements in scores on cognitive tests; e) objective

measurement of psychophysiological correlates of intelligence, e.g., improvements in choice reaction time; f) objective measurement of physiological correlates of intelligence, e.g., changes in EEG characteristic of higher states of consciousness, changes in blood chemistry, etc.; g) objective measurement of psychological, physiological and psychophysiological measures associated with performance (or partial performance) of the Sidhis; h) subjective report associated with experience of performance of the Sidhis.

By using a variety of means of gaining knowledge--both subjective and objective--in a convergent approach, Maharishi's Vedic Psychology aims to comprehend the holistic nature as well as the particulate nature of intelligence, thereby providing truly comprehensive knowledge. Part III of this dissertation represents a first step in this direction. Since time and resources did not permit inclusion of all the above measures in this study, an attempt was made to provide objective measures corresponding to each level of the mind, a self-report measure of growth of higher states of consciousness, and reference to Vedic literature, which has already been made in Part II.

In addition to testing hypotheses about the growth of intelligence derived from Maharishi's Vedic theory of intelligence, the study attempts to determine which objective and subjective measures can contribute to such a holistic measure of intelligence.

Regarding the question of whether Maharishi's Vedic theory of intelligence can be operationally defined--the large body of published scientific research on the TM and TM-Sidhi program attests that it can. Included in this research are studies on the growth of abstract reasoning ability, learning ability, creativity, memory, and other mental abilities (see Table 3). The study presented in Part III of this dissertation also verifies that Maharishi's Vedic theory can be operationally defined.

The next chapter compares Maharishi's Vedic theory of intelligence with other theories of intelligence.

Chapter 8

Comparing Maharishi's Vedic Theory of Intelligence With Other Theories of Intelligence

This chapter will begin by considering some points of comparison between Maharishi's Vedic theory of intelligence and twentieth century theories of intelligence in general.

The second part of this chapter presents a very brief comparison of Maharishi's Vedic theory of intelligence with each of the 25 contemporary intelligence theories summarized by psychologist Robert Sternberg in his book, What is Intelligence. Sternberg's summary of the 25 contemporary theories appeared as Table 1 in Chapter 1.

In the third part of this chapter, two prominent contemporary theories of intelligence will be used to represent two general perspectives in intelligence theory. They are: 1) the theory of "g", as represented by Arthur Jensen's work in particular (Jensen, 1979, 1980, 1985); and 2) Howard Gardner's theory of multiple intelligences (Gardner, 1983).

Each theory will be compared with the Vedic view regarding how it addresses each of the major issues in intelligence theory, listed in Table 2. These issues include: 1) What is Intelligence? 2) Are there multiple intelligences or one intelligence? 3) How does the theory explain knowledge acquisition? 4) How does the theory explain the integrated functioning of intelligence at many

levels of nature? 5) How and how much can intelligence be developed? 6) Which is more important in determining the level of intelligence in the individual, heredity or the environment? 7) How can intelligence be measured?

General Comparison of Maharishi's Vedic Theory Of Intelligence with Twentieth Century Theories

As can be understood from the discussion so far, there are fundamental differences, as well as similarities, between Maharishi's Vedic theory of intelligence and other theories of intelligence. Most of the similarities arise from the fact that both approaches study intelligence on the level of mental and behavioral events, although, as has been shown, this level is only part of the range of intelligence comprehended and studied by Maharishi's Vedic theory.

The differences in approach stem from the fact that Maharishi's Vedic theory of intelligence is based on a body of knowledge, Maharishi's Vedic Science and Technology, that includes means to directly experience pure intelligence and systematically observe its self-interacting dynamics. The availability of this technology has resulted in three important benefits: First, it has opened a new dimension of empirical research into the nature of intelligence, and provided an answer to the theoretical question, "What is Intelligence?"

Second, the availability of this technology has greatly improved psychologists' ability to empirically investigate and theoretically describe how intelligence functions in human life, as well as in the rest of nature. Third, the technology, especially the TM and TM-Sidhi program, can be practically applied to develop intelligence, by creating conditions that allow intelligence to naturally unfold beyond the level commonly achieved in society.

As a result of direct investigation of pure intelligence and the psychophysiological development that results from the process, Maharishi's Vedic theory is based on the principles, "Knowledge is structured in consciousness," and "Knowledge is different in different states of consciousness (Maharishi Mahesh Yogi, 1972a, Lesson 9). Hence, the Vedic theory of intelligence begins by investigating the nature of intelligence at the deepest level of its structure and proceeds logically and empirically from there to more expressed structures, rather than focusing on behaviors related to intelligence, as other theories do, and attempting to deduce supporting structures from them without any direct knowledge of the deeper levels of the structure of intelligence. In proceeding this way, the Vedic theory of intelligence opens up a comprehensive view of intelligence.

As has been discussed, because Maharishi's Vedic theory comprehends a broad and deep range of intelligence, it has

been termed a vertical as well as a horizontal view of intelligence, in comparison to twentieth century theories, which are essentially horizontal in their scope (Sternberg & Detterman, 1986). That is to say, these theories view intelligence as generally restricted to the level of conceptual thinking, and behavioral performance.

Furthermore, based on the direct experience of pure intelligence in the simplest form of human awareness, it is possible to describe the relationship of human intelligence with the vast intelligence of nature. This total view of intelligence was presented in chart form in Chapter 1. Figure 2 depicted the range of intelligence described by Maharishi's Vedic theory of intelligence, and Figure 3 described the relationship between Maharishi's Vedic theory and other contemporary theories in general.

We now consider in detail some fundamental similarities and differences between Maharishi's Vedic theory and twentieth century theories.

Qualities of Intelligence

There are some qualities of intelligence that are generally agreed upon by Maharishi's Vedic theory of intelligence and twentieth century theories of intelligence. These qualities were discussed in Chapter 1. It was shown how the qualities that are generally included in twentieth century definitions of intelligence--orderliness,

efficiency, adaptability, integration, and progress or evolution--can be derived from the 26 qualities attributed to pure intelligence by Maharishi's Vedic Psychology. Some of these qualities are referred to in Chapters 1, 3, and 4, and they are listed in their entirety in Chapter 5. For the sake of comparison, a brief and admittedly partial definition of intelligence was proposed--the ability to detect and create order in the environment and in oneself, resulting in progress, or evolution, towards more optimum functioning of the individual and/or the environment. This definition incorporates qualities of intelligence that are held in common by Maharishi's Vedic theory of intelligence and twentieth century theories of intelligence. It also incorporates the main principles of twentieth century theories of intelligence and completes them in several ways.

First, in twentieth century theories of intelligence, the ability to detect and create order usually refers to the ability of the individual's mind and intellect to apprehend order in the field of behavior and conceptual thought. In Maharishi's Vedic theory, in addition to the sense just mentioned, this term refers to the ability of pure intelligence or pure consciousness--the cosmic psyche--to detect order within itself through its own self-referral awareness, and to create order in the form of impulses of creative intelligence, or laws of nature, purely through its

own self-interacting dynamics. As a result of this infinitely creative, dynamic process of self-referral, pure intelligence is said to create all the diversity of order in all aspects of individual life (levels of mind--ego, feelings, intellect, mind, desire, senses, senses, and social behavior) and the whole universe.

The ability to detect and create order also applies to the conscious participation of the individual in this process of self-interacting dynamics of intelligence, as in the practice of the TM-Sidhi program, for example. Maharishi comments,

We experience in the TM-Sidhi program that our self-referral awareness immediately becomes awake in the different characteristics of the unified field. We see that the unified field is capable of spontaneously producing through its self-referral activity different characteristics or different shades of its own nature, like pure, crystal water becoming pink and then yellow and then green. These different qualities of the self-referral state of consciousness can be produced at will. Through this practice, a very clear habit develops of producing the quality we want in our awareness. This habit gives us greater and greater alliance with the total potential of natural law, which is the unified field (1986, p.86).

Those who practice the TM-Sidhi program experience that self-interacting quality as one value transforms into another value...Completely identified in transcendental consciousness with the full potential of natural law, the human mind is a field of all possibilities (1986, pp.30-31).

Hence, in the Maharishi's Vedic theory, the ability to detect and create order is not limited to the level of individual perception, thought, and behavior in the ordinary

waking state of consciousness, but includes the self-sufficient, self-interacting dynamics of nature's vast intelligence--cosmic intelligence or the cosmic psyche--and the individual's ability to detect and create order by participating in this self-interacting dynamics of intelligence in the state of transcendental consciousness, a situation that becomes permanent in higher states of consciousness.

Second, in addition to the qualities attributed to intelligence by twentieth century theories of intelligence, Maharishi's Vedic theory of intelligence identifies many additional qualities of it, on the basis of direct experience of pure intelligence through Maharishi's Vedic Science and Technology in modern times, and also on the basis of examination of the texts of Vedic literature, which record direct experiences of pure intelligence and its functioning by Vedic scientists throughout the ages. Some of these qualities are: self-sufficiency, infinite dynamism, self-referral, bliss, infinite organizing power, infinite silence, unboundedness, freedom, purifying, total potential of natural law, harmonizing, perfect balance, etc.

It can be shown that when pure intelligence is experienced regularly by the individual through practice of the TM and TM-Sidhi program, its qualities are increasingly expressed at all levels of individual and collective life, physiological, psychological, sociological, and ecological,

as indicated by scientific research in these four areas of life. Table 3 in Chapter 1 showed this in the case of the qualities included in the partial definition of intelligence provided above. Increasing expression of the other qualities of pure intelligence is also documented by scientific research. This has been shown for the qualities of self-sufficiency, self-referral, and infinite dynamism, in an article by David Orme-Johnson (1988).

The Basic Unit of Analysis

Theorists have always found it necessary to model a mechanism of some sort in order to account for the properties and functioning of intelligence. Sternberg notes this in proposing his "triarchic" theory of intelligence (Sternberg, 1985):

Theories of human intelligence have traditionally relied upon some basic unit of analysis for explaining sources of individual differences in intelligent behavior. Theories have differed in terms of (a) what is proposed as the basic unit; (b) the particular instantiations of this unit that are proposed somehow to be locked inside our heads; and (c) the way in which these instantiations are organized with respect to each other. Differences in basic units have defined "paradigms" of theory and research on intelligence; differences in instantiations and organizations of these units have defined particular theories within these paradigms (p.97).

Sternberg proceeds to give examples of units which have defined different paradigms:

Some of the units that have been considered have been the factor, the S-R bond, and the TOTE (Test-Operate-Test-Exit). The present subtheory

designates the information-processing component as the basic unit of analysis (pg.97)."

Each of the elementary units mentioned by Sternberg can be shown to be an instantiation, or modified version, of the basic unit from Maharishi's Vedic theory of intelligence as described in Chapters 2 and 3. This unit includes Rishi, Devata, and Chhandas, or knower, process of knowing, and known, their interactions within the wholeness of the Samhita, or pure intelligence, and resulting transformations.

We shall begin the comparison by examining the primal process of self-interaction of pure intelligence as an example of the basic unit of analysis. At the level of nature's intelligence, this unit of intelligence is the self-sufficient, self-interacting dynamics of pure intelligence within itself. As was discussed in Chapters 1, 2, and 3, by virtue of its own ability to be aware of itself, pure intelligence, the Samhita, creates within itself the divisions of Rishi (knower), Devata (process of knowing), and Chhandas (known). As a result of these interactions, the original impulses of pure intelligence are transformed into new values, or laws of nature, while the original values remain as well, in the wholeness of the Samhita.

In his discussion of the Ved Lila, or self-interacting dynamics of pure intelligence in the form of the Ved,

Maharishi says that the interaction between Rishi and the wholeness of the Samhita creates a transformation within the field of pure intelligence, so that new patterns of intelligence arise; those impulses of intelligence can be known in the simplest state of human awareness as the impulses of natural law contained in the Ved and the Vedic literature. According to Vedic Science, there are many types of transformations, and taken together, they give rise to a whole field of knowledge, which can be experienced by human intelligence as the whole Vedic literature.

The unit of self interaction of intelligence applies on the level of individual thinking and perception in the waking state, as well as on the level self-interaction of cosmic intelligence, experienced in the state of transcendental consciousness. This was discussed in Chapter 3, on knowledge acquisition and the process of perception.

In referring to the process of perception, it should be kept in mind that from the perspective of a Vedic scientist, all the forms and events in the universe are really fluctuations of the unified field of pure intelligence-- i.e., impulses of intelligence--just as, from the perspective of a modern theoretical physicist, all the forms and events in the universe are really fluctuations of an underlying superfield. The discussion in Chapter 3 referred to an object of experience (ultimately, an impulse of intelligence itself) creating an impression on consciousness

or intelligence, and that impression "colliding" with a like impression at the deepest level of the mind, in that mode of intelligence called the storehouse of impressions. The collision gives rise to an impulse of intelligence that progresses to a more superficial level of the mind where it is consciously experienced as a thought or desire, and then is perhaps translated into action.

In this case the object of knowledge, or known, can be any object which makes an impression on the mind. That mode of intelligence or consciousness called mind is the knower; the process of impressions colliding and subsequent transformation of the initial impression into an impulse of thought is the process of knowing; that mode of intelligence called mind is the wholeness, or system in which the interaction takes place, and the output is desire or action.

In both the examples just cited, there is an object of knowledge which is known or operated upon, a knower, or operator, a process of knowing or information process, a wholeness, or system in which the interaction takes place, and a transformation of the input into some sort of output.

In the S-R approach, the stimulus is the known, the organism is the knower, and conditioning is the process of knowing. The Samhita is the wholeness of the organism and its surrounding environment, and the stimulus is transformed into a behavioral response, which is the output. We

shall now consider the basic unit of analysis in the information-processing paradigm. Sternberg defines the information-processing component as follows:

A component is an elementary information process that operates upon internal representations of objects or symbols. The component may translate a sensory input into a conceptual representation, transform one conceptual representation into another, or translate a conceptual representation into a motor output. What is considered elementary enough to be a component depends upon the desired level of theorizing. Just as factors can be split into successively finer subfactors, so can components be split into successively finer subcomponents (98)."

In the information-processing approach in general, the input in the form of an internal representation is the known, the "scheme", or "condition", or "image" is the knower, and the comparison of the representation with the "scheme", or "condition", or "image" is the process of knowing. The samhita is the component; the internal representation is transformed into some other representation, or into a motor response.

Sternberg's information-processing component is a description of representational thought (Alexander et al., in press), i.e., thinking which is object-referral. In representational thought, the object of consciousness is always a representation of something, whether it be an object, a symbol, or even our Self. At this level, what is perceived as the self or the knower is a representation, or concept of the self, rather than the ultimate level of the

Self--pure consciousness or pure intelligence. Consciousness is aware of its representations or thoughts, to the exclusion of its own nature as pure intelligence.

In "post-representational," or self-referral information processing, intelligence can operate on itself without any symbol or concept, as in transcendental consciousness, or can operate on itself in the form of a symbols or concepts, as in representational thought. The difference between this type of information processing and ordinary representational thought is that in post-representational thought, consciousness does not lose awareness of its ultimate nature as pure intelligence while it is attending to the representations. A "component" in this case is an elementary information process that operates upon itself (alone or in the form of internal representations of objects or symbols).

The component may translate one form of self-referral into another mode of self-referral, or into a specific output (e.g., thoughts or motor output in the spontaneous process of thinking and behavior; creation of specific impulses of intelligence and their transformations into effects during practice of the TM-Sidhi program; or, on the level of cosmic intelligence, transformation of one aspect of Vedic literature, into another). Self-referral "components," or processes, can be split into successively finer subcomponents. In this case, all the "different"

components ("sensory," "motor," "conceptual," etc.) are seen as different modes of self-referral intelligence. When the ultimate level of self-referral (pure intelligence) is completely enlivened, all the different components are optimally integrated with each other to carry out evolutionary, progressive purposes.

To summarize: In each instance provided above, what is proposed as the elementary unit of intelligence can be shown to be an example of the basic unit of Rishi, Devata, Chhandas, and Samhita, described in Maharishi's Vedic theory of intelligence.

What distinguishes Maharishi's Vedic-Psychological model from other models is this point: The twentieth-century models fail to identify pure intelligence or consciousness as the knower--the self-knowing basis of the system--or, in the language of information-processing theorists, the ultimate metacomponent, the knower who monitors and operates the other metacomponents and components by spontaneously integrating them with the total potential of natural law.

As a consequence, the concept of "homunculus" has come into use in cognitive psychology and in contemporary intelligence theory (Sternberg, 1985, p.99; Gardner, 1983, p.279). A "homunculus" is a "little person" in the system that has the qualities of self-awareness and accompanying abilities that are usually attributed to intelligence, but which cannot be explained by the theory in question--such as

the ability to interpret stimuli and to change those interpretations according to different contexts, to have ideas and goals, to make plans, and adjust plans in order to meet those goals, etc.

The appearance of a homunculus in a theory indicates that the theory has reached a limit to its explanatory power. Psychologists realize that there is a knower with the qualities listed above, yet theories that are built on analogies to inert components cannot explain these qualities. They cannot identify who processes and interprets information. On this point, D.C. Dennett (1978) remarked,

For the British Empiricists, the internal representations were called ideas, sensations, impressions; more recently, psychologists have talked of hypotheses, maps, schemes, images, propositions, engrams, neural signals, even holograms and whole innate theories...[however] nothing is intrinsically a representation of anything; something is a representation only for or to someone; any representation or system of representations thus requires at least one user or interpreter of the representation who is external to it. Any such interpreter must have a variety of psychological or intentional traits; it must be capable of a variety of comprehensions and must have beliefs and goals (so it can use the representation to inform itself and thus assist itself in achieving its goals.) Such an interpreter is then a sort of homunculus. Therefore psychology without homunculi is impossible but psychology with homunculi is doomed to circularity of infinite regress, so psychology is impossible (p.122).

That is, psychology finds itself having to posit a homunculus, or "little person" inside the information processing system that can interpret stimuli or monitor the

components, and then another homunculus within the first that can monitor the first homunculus, and so on, ad infinitum. Without a knower or consciousness that can be aware of itself (whether directly in the state of self-referral awareness or indirectly as ideas or representations in the state of object-referral awareness), psychology in general and intelligence theories in particular will always be fundamentally incomplete.

Maharishi's Vedic Psychology and Maharishi's Vedic theory of intelligence overcome this problem by identifying pure consciousness, or pure intelligence as the knower within, that can know itself in the self-referral state and know thoughts and perceptions as well. As has been discussed, pure intelligence has qualities of self-sufficiency, self-referral, etc.

As was discussed in Chapter 3, in Maharishi's Vedic-Psychological model, consciousness or intelligence is seen as self-referral by nature, and therefore self-sufficient in the information-processing system--not requiring an external source of intelligence for its successful operation. It is intelligence or consciousness creates the impression of the object, resonates with a like impression in its own structure, transforms itself into an impulse of intelligence that is experienced as a thought or a desire, and eventually from a desire into an action.

To be sure, a human physiology is necessary for pure

intelligence or pure consciousness to be experienced as consciousness and its objects by an individual, but pure intelligence is said to be self-sufficient and independent of the human nervous system, just as the field of electromagnetism is independent of a machine that runs on electricity, or, to use a comparison from Chapter 3, just as sunlight exists independently of a vessel of water that reflects it. This point of self-sufficiency of pure intelligence has been discussed in Chapter 1, and scientific evidence provided in support of it.

The existence of intelligence or consciousness as the self-sufficient, self-referral basis of the functioning of intelligence in the mind, or information processing system, is not a matter of philosophical speculation or theory alone. According to Maharishi's Vedic Psychology, it is a simple matter for any psychologist to verify its nature as self-referral in the simplest form of his or her own awareness, using the Transcendental Meditation program.

Furthermore, as has been discussed in Chapters 3, 5, and 7, the state of transcendental consciousness, in which this experience takes place, can be verified as a fourth major state of consciousness, using objective physiological and psychophysiological measures.

Perhaps Sternberg comes closer than others have so far to an intuitive grasp of the self-referral, self-sufficient nature of pure intelligence, in his notion of self-

monitoring by metacomponents:

Self-monitoring should eventually result in improved allocations of metacomponential resources, in particular to the self-monitoring of the metacomponents. Thus, self-monitoring by the metacomponents results in improved allocation of metacomponential resources to the self-monitoring of the metacomponents, which in turn leads to improved self-monitoring, and so on. Here...there exists the possibility of an unending feedback loop, one that is internal to the metacomponents themselves (Sternberg, 1985, pg.124)."

Even though this passage gives a sense of self-referral, the concept of metacomponent as defined by Sternberg does not include a level of cognitive competence higher than a collection of electronic circuits. Reading this passage, one intuitively looks for a higher-order metacomponent that has consciousness--a level of intelligence that can "monitor" the metacomponents, interpret the information, create programs for the components at a human level of competence--and realizes that this type of "metacomponent" has always taken the form of a human programmer.

In addition to this problem, Sternberg's componential subtheory of intelligence has other problems as well: a) the concept has never been verified using the subjective means of gaining knowledge; b) the theory is not capable of being either confirmed or disconfirmed using objective means of investigation; c) it is a "horizontal" theory of intelligence that attempts to explain knowledge acquisition

on the level of senses, mind, and intellect without accounting for the ability of intelligence to know itself directly in the simplest state of human awareness.

Despite its shortcomings, Sternberg's componential theory of intelligence illustrates the functioning of the basic structure of knower, known, process of knowing, and wholeness of the three at many levels of cognitive functioning. An example of this is his classification of components into three levels of generality: "General" components, "Class" components, and "specific" components (Sternberg, 1985, pg.108).

Twenty-five Contemporary Theories of Intelligence In Relation to Maharishi's Vedic Theory of Intelligence

The following section will briefly describe how twenty-five theories of intelligence are comprehended within the range of intelligence described by Maharishi's Vedic theory of intelligence. Chapter 1 included a table by Sternberg, Table 1, that summarized the loci of intelligence posited by the twenty-five theories. Figure 2 illustrated the range of intelligence comprehended by Maharishi's Vedic theory of intelligence, and Figure 3 depicted the areas of intelligence described by Sternberg's table in relation to the range covered by Maharishi's Vedic theory.

Figures 2 and 3 are reproduced here to facilitate

comparisons in the discussion that follows.

;

Figure 2

The Range of Intelligence in Maharishi's Vedic Psychology

THE RANGE OF INTELLIGENCE IN MAHARISHI'S VEDIC PSYCHOLOGY

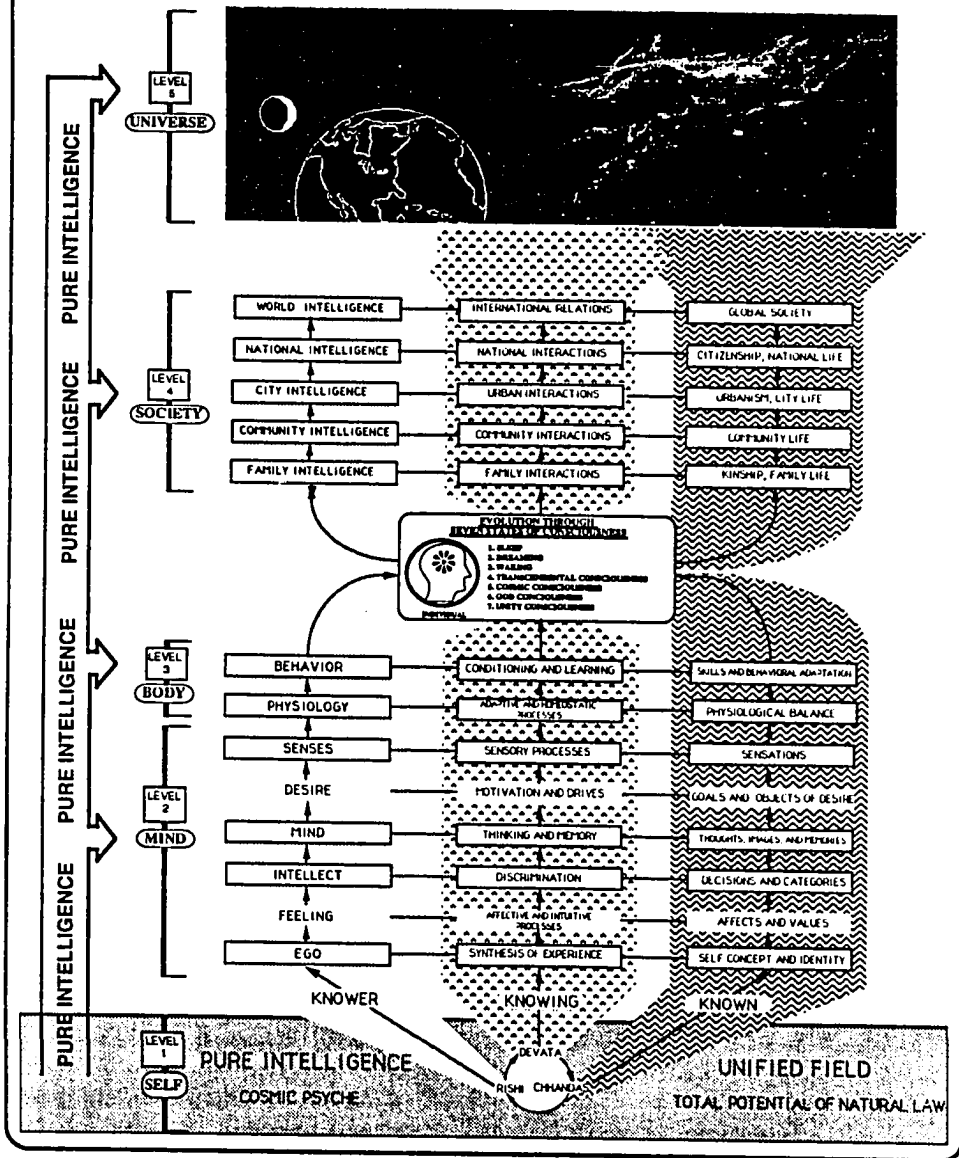
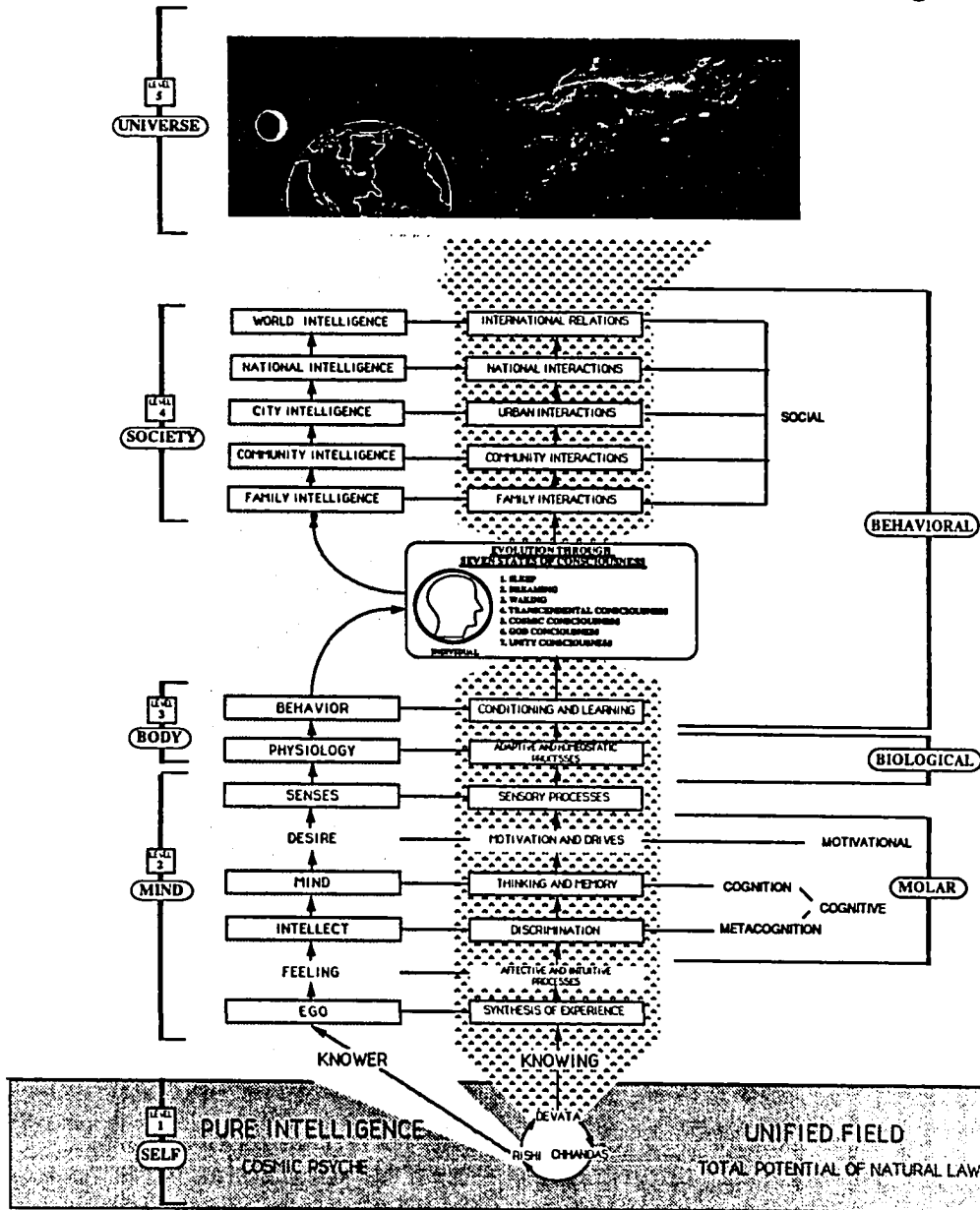


Figure 3
Sternberg's Loci of Intelligence in Relation to
Maharishi's Vedic Theory of Intelligence

Sternberg's Loci of Intelligence in Relation To Maharishi's Vedic Theory of Intelligence

Vedic Theory

Sternberg



From the Figures 2 and 3 it can be seen that Maharishi's Vedic theory of intelligence represents a very large range of intelligence in nature, while other theories from twentieth century psychology cover various parts of this total range.

One difference between the Vedic theory and other theories is apparent from Figure 3 in Chapter 1 and Figure 4 in this section; the other theories are "horizontal" views of intelligence--i.e., they view intelligence as a cognitive ability that belongs to one or two or more levels of the mind, but they do not conceive intelligence as having a basis at the source of the mind, in a transcendental field of pure intelligence.

The Vedic view, on the other hand, is a vertical as well as a horizontal view of intelligence. As explained in Chapters 1-4, it depicts the deepest level of intelligence as pure intelligence, which pervades all its expressions in the form of levels of the mind, from the ego, feeling, intellect, mind, desire, senses, physiology and behavior on the level of the individual to the collective intelligence of society, ultimately extending throughout the whole universe as the intelligence of nature.

Figure 4 illustrates how the various twentieth century theories are related to each level of the mind depicted previously in Figures 2 and 3.

Figure 4
Twentieth Century Theories of Intelligence
In Relation to Levels of the Mind

FIGURE 4
TWENTIETH CENTURY THEORIES OF INTELLIGENCE
IN RELATION TO LEVELS OF THE MIND

Society

• A. Anastasi: Intelligence as ability to adapt to environmental demands • A. Brown and J. Campione: Learning in the everyday environment • J. Carroll: Intelligence as a concept in the mind of society at large • H. Gardner: Theory of multiple intelligences, including interpersonal intelligence • R. Glaser: Intelligence acquired through interactions in the everyday world • J. Goodnow: Intelligence in social interactions • J. Horn: Broad abilities including knowledge of the culture • J. Pellegrino: Intelligence determined by interaction of individual's cognitive machinery with the environment • E. Zigler: Developmental interaction between the individual and his environment

Behavior

• A. Anastasi: Intelligence as a quality of behavior • R. Glaser: Intelligence acquired through interactions in the everyday world • J. Goodnow: Intelligence in social interactions • J. Pellegrino: Intelligence determined by interaction of individual's cognitive machinery with the environment • S. Scarr: Intelligence as adaptation to everyday life • E. Zigler: Developmental interaction between the individual and his environment

Physiology

• H. Gardner: Theory of multiple intelligences based on neurological components • H.J. Eysenck: Biological basis of intelligence— error-free cortical transmission • A. Jensen: Biological substrate of "g"

Senses

• J. Berry: Cognitive-psychological domain, including sensory and perceptual functioning • D. Detterman: Complex system of cognitive processes • H. Gardner: Theory of multiple intelligences— incl. musical, spatial, bodily-kinesthetic • J. Horn: Broad abilities, incl. visual thinking, auditory thinking, short-term acquisition-retrieval, attentive speediness • Hunt: Level of elementary information-processing processes • R. Snow: Apprehension of experience

Desire

• J. Baron: Intelligence as ability to achieve rationally chosen goals • J. P. Das: Generation of plans and strategies • R. Snow: Adaptive purposeful striving • E. Zigler: Motivational component of intelligence

FIGURE 4 (CONTINUED)
TWENTIETH CENTURY THEORIES OF INTELLIGENCE
IN RELATION TO LEVELS OF THE MIND

Mind

• P. Baltes: Innate intellectual capacity— Learning capacity • J. Baron: Capacities— Mental speed • A. Brown and J. Campione: Processes and products of learning • E. Butterfield: Centrality of learning in intelligence • J. Carroll: Cognitive capacities • J.P. Das: Planning, coding of information • D. Detterman: Complex system of cognitive processes • W. Estes, Centrality of cognitive processes such as learning, deciding, selective attention • H. Gardner: Theory of multiple intelligences • R. Glaser: Acquired cognitive proficiency • J. Horn: Broad abilities which include visual, auditory thinking, short-term acquisition-retrieval, long-term retrieval-storage, attentive speediness • E. Hunt: Elementary information-processing operations that combine into strategies • R. Schank: making sense • R. Snow: Purposeful thinking, apprehension of experience • R. Sternberg: Functions of mental self-government

Intellect

• P. Baltes: Innate intellectual capacity, problem-solving ability • J. Berry: Cross-Cultural view of intelligence in cognitive-psychological domain • J. Baron: Capacities, dispositions and rational thinking • E. Butterfield: Information-processing strategies • J. Carroll: Cognitive capacities • J. P. Das: Planning, coding, attention arousal • D. Detterman: Complex system of cognitive processes • W. Estes: Centrality of cognitive processes such as learning, deciding, selective attention • H. Gardner: Theory of multiple intelligences • R. Glaser: Acquired cognitive proficiency • J. Goodnow: Intelligence as judgment or attribution • J. Horn: Centrality of cognitive capacities, correct decisions • L. Humphreys: System of knowledge and skills • E. Hunt: Capacity to manipulate symbol systems • A. Jensen: Theory of "g"— complex mental transformations of symbols • J. Pellegrino: Interaction of culture and cognitive processes, meta-cognitive aspects of mental functioning • R. Schank: Levels of understanding— modeling thought processes • R. Snow: fluid- analytical reasoning • R. Sternberg: mental self-government

Feeling

• H. Gardner: Theory of multiple intelligences, including intra- and interpersonal intelligence • R. Schank: Levels of understanding—Complete empathy • R. Snow: Cognitive aptitudes, including mental playfulness • R. Sternberg: Triarchic theory of intelligence • E. Zigler: Motivation, cognitive processes, interaction of the individual with the environment

Ego

• J. Baron: Disposition to be self-critical • A. Brown and J. Campione: Metacognitive bases of learning • Detterman: Complex system of cognitive processes • J. Pellegrino: Importance of metacognitive aspects of mental functioning • R. Schank: Levels of understanding • Snow: Organizing knowledge

The theories depicted in Figure 4 are related to the various levels of individual mind (level 2), physiology and behavior (level 3), and society (level 4). Some theories, such as Gardner's theory of multiple intelligences, for example, address aspects of more than one level of the mind, while others are primarily directed to only one aspect.

Since Sternberg has written a comprehensive and concise summary of each theoretical viewpoint (1986), which accompanies his table, his summary will be quoted extensively in this description. References to parts of Sternberg's table (Table 1 in Chapter 1), will be replaced by references to corresponding levels of the mind depicted in Figures 2 and 3, and reproduced in Figure 4. The following passage is quoted directly from Sternberg (1986) with material added by the author in brackets:

Anastasi conceives intelligence as a quality of behavior...["behavior" level in Figure 5]. However, she emphasizes that intelligent behavior is behavior that is adaptive, representing effective ways of meeting the demands of environment as they change... [level 4, society]. What constitutes adaptive behavior varies... with the context in which the organism lives...[level 4, society], so that intelligence is a pluralistic concept.

Baltes expresses a preference for speaking not in terms of intelligence per se, but rather in terms of the specific constructs that constitute what we ordinarily think of as intelligence-- constructs such as innate intellectual capacity...[genetics-- level of physiology, level of intellect] intellectual reserve capacity...[intellect, mind], learning capacity...[intellect, mind, behavior], problem-solving ability...[intellect, mind], and knowledge

systems...[intellect, mind]...

Baron defines intelligence as the set of abilities involved in the achievement of rationally chosen goals...[intellect, mind, desire] whatever these goals might happen to be. He distinguishes between two types of abilities: capacities, which are things like mental speed ...[mind, intellect] and mental energy ...[feeling, desire]; and dispositions, which include, for example, the disposition to be self-critical...[ego, intellect]...

Brown and Campione, in their definition of intelligence, emphasize especially the processes and products of learning ...[behavior, mind, intellect] as well as the interaction between these processes and products.

Butterfield emphasizes four bases of individual differences in intelligence that emerge from the literature of cognitive psychology. Like Brown and Campione, he emphasizes the centrality of learning in intelligence...[behavior, mind, intellect]. The four aspects of Butterfield's definition are that less intelligent people have smaller and less elaborately organized knowledge bases ...[ego, intellect, mind]; that they use fewer, simpler, and more passive information-processing strategies ...[feeling, intellect, mind, desire]; that they have less metacognitive understanding of their own cognitive systems and how the functioning of these systems depends upon the environment ...[ego, intellect, level 4-- society]; and that they use less complete and flexible executive processes for controlling their thinking...[ego, intellect].

Carroll argues that the domains to which intelligence is applied are basically threefold: academic and technical...[intellect, mind], social...[level 4-- society], and practical...[intellect, mind, level 4-- society]. He argues that first and foremost, intelligence must be understood as a concept in the mind of a society at large...[community intelligence, city intelligence, national intelligence in level 4, society], and that the exact nature of this concept may depend upon the society...[community intelligence, city intelligence, national intelligence].

Das views intelligence as the sum total of all cognitive processes...[level 2-- mind], including planning...[intellect, mind], coding of information...[intellect, mind], and arousal of attention...[ego, feeling, desire].

Detterman views intelligence as a complex system composed of numerous independent cognitive processes...[intellect, mind]. These processes contribute to the appearance of a general factor.

Estes ...suggests that three central capacities that have been isolated in artificial intelligence research are critical for human intelligence as well: the capacity to manipulate symbols...[intellect, mind]; the capacity to evaluate the consequences of alternative choices...[intellect]; and the capacity to search through sequences of symbols...[intellect, mind].

Eysenck clearly concentrates on the biological...[physiology] rather than the molar...[intellect, mind] bases of intelligence... He views intelligence as deriving from the error-free transmission of information through the cortex. He suggests that the use of evoked potentials measured from the cortex provides a particularly apt way of assessing accuracy of transmission.

Gardner suggests the need to understand intelligence in terms of variations in types of naturally occurring cognition in the everyday environment ...[level 4-- society], and especially to concentrate upon the cognitive contents of intelligence...[intellect, known; mind, known]. He believes that there is no one intelligence, but rather multiple, independent intelligences [intellect, mind]. He further believes that our understanding of these intelligences will increase only if we move away from laboratory studies toward an understanding of the interaction of the individual with the everyday environment... [behavior, process of knowing; level 4-- society, process of knowing]...

Glaser defines intelligence as proficiency (or competence) and intellectual cognitive performance...[intellect, mind], using the term intellectual to separate out from intelligence emotional cognition...[feeling]. Glaser distinguishes between knowledge in artifactual

domains, such as most of the academic ones...[mind, intellect; level 4, community intelligence, city intelligence, national intelligence], and intelligence in natural domains...[family intelligence, community intelligence, city intelligence, national intelligence, world intelligence]. Whereas intelligence in artifactual domains is usually acquired primarily through formal schooling...[intellect, mind], intelligence in natural domains is usually acquired more informally through interactions in the everyday world...[level 2-- mind; level 3, body; level 4, society].

Goodnow views intelligence as a judgment or attribution, comparable to the judgments we make about people being physically attractive or friendly, rather than as a quality residing in the individual...[level 2-- mind-- ego, feeling, intellect, mind, senses; level 4-- society, family consciousness, community consciousness, city consciousness]. In order to understand intelligence, therefore, we should not look to intelligence tests, cognitive tasks, or physiologically based measures, but rather to the attributions people make about themselves and each other with respect to intelligence. Goodnow is explicit in emphasizing that intelligence should be viewed as encompassing situations in which people interact with one another or solve problems together...[level 4, society, family consciousness, community consciousness], not merely situations in which people work on their own or interact with objects or abstract concepts...[intellect, mind, senses].

Horn is critical of our use of the concept of intelligence, because he believes it represents the reification of a functional unity that does not in fact exist... Horn does believe, however, that there are certain broad abilities that need to be understood in order to comprehend various kinds of intellectual performances, namely, visual thinking...[mind, senses], auditory thinking...[mind, senses], short-term acquisition-retrieval...[mind, senses, behavior], long-term retrieval-storage...[mind, intellect], speediness in reading...[intellect, mind, desire, senses], correct decisions...[intellect], attentive speediness...[intellect, mind, desire], structured knowledge of the culture...[intellect, mind; level

4-- society], and flexibility of reasoning under novel conditions...[ego, feeling, intellect, mind, physiology, behavior].

Humphreys defines intelligence as the repertoire of intellectual knowledge and skills available to a person at a particular point in time...[intellect, mind]... He suggests that it is necessary to understand both the content and the processes of intelligence [process of knowing and known at all levels of the mind]...

Hunt views intelligence as a shorthand term for the variation in cognitive tasks that is statistically associated with personal variables, either as main effects or as interaction terms...[feeling, intellect, mind, senses, physiology, behavior]. Hunt notes that a full understanding of intelligence would require a theory of three levels of performance and their interactions: the level of biology...[physiology], the level of elementary information processes...[senses, mind], and the level of both general and specific information-processing strategies...[intellect, feeling].

Jensen defines intelligence in terms of the general factor obtained from factoring an intercorrelation matrix of a large number of diverse mental tests. He notes that the tests that load most highly on the general factor usually involve some forms of relation induction or relatively complex mental transformations or manipulations of stimulus input in order to achieve the correct response...[intellect]... Jensen believes that intelligence has a biological substrate...[physiology], but that it is usually studied both in the context of laboratory cognitive tasks...[intellect, mind] and in the context of the everyday environment...[ego, feeling, intellect, mind, desire, senses, physiology, behavior; level 4-- society: family consciousness, community consciousness, city consciousness, national consciousness, world consciousness].

Pellegrino argues that in order to understand intelligence, we need to understand the nature of human cognition...[ego, feeling, intellect, mind, desire, senses, behavior] as well as the nature of the value system within which that cognition functions...[level 4-- society]. He argues that

intelligence is implicitly determined by the interaction of the individual's cognitive machinery with that individual's social-cultural environment...[all levels of the mind, including society]. In terms of cognition, Pellegrino emphasizes the special importance of metacognitive aspects of mental functioning...[intellect, ego], but these metacognitive processes and contents...[process of knowing, known] cannot be understood outside of the context of the cognitive processes and content...[process of knowing, known] upon which they act...[mind, desire, senses, physiology, behavior].

Scarr notes that the question "What is intelligence?" is actually several questions. A first question pertains to the structure of intelligence ...[all levels of the mind, including level 1, self; level 2, mind; level 3, body; level 4, society; and level 5 universe], a second to the cognitive processes of intelligence...[intellect, mind, desire, senses], a third to the neurological processes of intelligence...[physiology], a fourth to the evolution of intelligence...[all levels of the mind], and a fifth to the sources of individual variability of intelligence...[all levels of the mind]. Scarr clearly takes a broad rather than a narrow view of intelligence, arguing that it is time to conceive of it in terms of people's adaptation in their everyday lives...[level 2, mind; level 3, body; level 4, society]. Intelligence requires broad forms of personal adaptation in formulating strategies for solving both the small and the large problems that confront us in our everyday lives...[level 2, mind; level 3, body; level 4, society].

Schank views intelligence largely in terms of understanding...[intellect, mind]. He suggests that there are three levels of understanding. The lowest level, making sense ...[mind, intellect] involves finding out events that have taken place and relating them to a perception of the world. For example, reading a newspaper article generally involves what Schank refers to as making sense. Cognitive understanding, the next level, involves building an accurate model of the thought processes of a given person...[intellect, mind]. Complete empathy, the highest level, involves emotional as well as cognitive understanding...[feeling, intellect]. One comprehends not only the thoughts of another, but

the person's feelings.

Snow presents a definition of intelligence with six aspects: the incorporation of concisely organized knowledge into purposive thinking...[feeling, intellect, mind] apprehension of experience...[senses, mind]; adaptive purposeful striving...[intellect, mind, desire]; fluid-analytical reasoning...[intellect]; mental playfulness...[feeling, intellect]; and idiosyncratic learning...[behavior, mind, intellect]. Snow notes that these six aspects of intelligence are interactive, working together to produce observable behavior...[feeling, intellect, mind, desire, senses, behavior]. He does not believe that these six aspects of intelligence constitute necessary or sufficient conditions for intelligence. Rather, he views intelligence as a family resemblance concept, or prototype, which is organized around aspects such as the ones described here...[this suggests that Snow is searching for a truly holistic view of intelligence. That view is realized by the Vedic view, which includes levels 1, Self; and 5, universe-- i.e., the holistic value of intelligence which is the source, essence and support of all levels of the mind].

Sternberg suggests that intelligence should be viewed as mental self-government. He supports his idea by elaborating an analogy between intelligence, on the one hand, and government, on the other. He views intelligence as providing a means to govern ourselves so that our thoughts and actions are organized, coherent, and responsive both to our internally driven needs...[ego, feeling, desire, physiology] and to the needs of the environment...[level 4, society].

Zigler emphasizes the arbitrary nature of definitions, and the fact that definitions cannot be right or wrong, but only useful or not useful. He views intelligence as a hypothetical construct that has its ultimate reference in the cognitive processes of the individual...[ego, feeling, intellect, mind, desire, senses, physiology, behavior], but he supports this definition in terms of its usefulness, not in terms of any arbitrary standard of correctness. Zigler also believes that intelligence has a motivational component...[desire]. As a developmental psychologist, Zigler is particularly interested in

the developmental interaction between the individual and the environment...[behavior, level 4, society], and presents a model of the form this interaction takes over time (1986, 9-15).

As can be seen from the above examples, all the major contemporary theories of intelligence are comprehended in the range of intelligence described by Maharishi's Vedic theory of intelligence.

Comparison of Maharishi's Vedic Theory of Intelligence With Two Major Theoretical Viewpoints

I. The Theory of "g"

The theoretical viewpoint represented by Arthur Jensen, H.J. Eysenck and others, may be called the theory of "g", or general intelligence. It will now be considered how this theoretical viewpoint addresses each of the issues in Table 2.

1. What is intelligence?

Jensen defines intelligence as " 'g' , or the first principal component [or general factor, obtained from either principal components analysis or factor analysis, respectively] of an indefinitely large and varied battery of mental tests" (Jensen, 1987, pg.17). By "mental tests", Jensen means that "little or none of the variance in test scores in the general population is attributable to individual differences in sensory or motor capacities per se

(17)."

Even though Jensen admits that this definition of intelligence is a "working definition" based on mental testing, he claims that g really is a measure of the ability for complex thinking:

The g factor is manifested in tests to the degree that they involve mental manipulation of the input elements... choice, decision, invention in contrast to reproduction, reproduction in contrast to selection, meaningful memory in contrast to rote memory, long-term memory in contrast to short-term memory, and distinguishing relevant information from irrelevant information in solving complex problems (1979, p.18).

Furthermore, Jensen claims that g is a phenomenon whose predictive power extends beyond the environment of mental tests into the "real world"; as evidence, he points out that g is a far better predictor of academic performance and occupational success than any other factor or combination of factors:

Psychometric g is by far more highly correlated with all tests conventionally called "IQ," "cognitive abilities," and the like, than any other single factor or combination of other factors independent of g . Also, g is by far the largest part of the validity of multitest batteries used for selection and prediction of success in school and college, in the armed forces, and in business and industry. This fact indicates that many "real life" kinds of performance, and not just psychometric tests, are substantially g -loaded (1987, p.196).

The ability of IQ test scores to predict academic success virtually undisputed, since this has been repeatedly

confirmed by empirical evidence; however, the ability to predict occupational success has been brought into question by two studies (Olneck & Crouse, 1979; McClelland, 1973). On the basis of longitudinal research that followed subjects from childhood through their careers, these authors have argued, along with Fallows (1989), that IQ tests measure a capacity for a certain type of cognitive performance that is related to socioeconomic status, but not to occupational success. This argument deals more with the issue of how to measure intelligence than it does with the issue of whether g exists; it only indicates that the tests that were used did not accurately predict occupational success.

Even though the "g" theory assumes a broader range of intelligence than some other theories, it still views intelligence as a rather narrow cognitive ability in comparison to the Vedic view. As defined by Jensen, Eysenck, and others, "g" is identified primarily with the intellect, to a lesser degree with the mind, and limited to the abstract mental manipulations of the waking state. As has been explained in Chapters 1, 2, 3, and 4, Maharishi's Vedic theory of intelligence views intelligence as comprising a much deeper range than this, including the transcendental source of intelligence, pure intelligence, and all the various levels of the mind.

Nonetheless, the concept of g as a common underlying factor in expressions of intelligence is useful, for, in

principle, it is related to the principle of pure intelligence underlying all its diverse expressions. As mentioned in Chapter 2, *g* can be viewed as a smaller-scale version of the principle of pure intelligence.

2. Are there multiple intelligences or one intelligence?

Jensen and other proponents of the "g" theory agree that, by definition, there is only one general intelligence, or *g*, even though other general factors can be extracted from groups of tests of more specific abilities such as long-term memory, sensory abilities, or motor abilities, for example. Hence, the theory does not address the issue of how to explain the variety of expressions of intelligence on all the levels of the mind: ego, feeling, intellect, mind, senses, behavior, physiology, and collective intelligence.

As has been discussed in Chapter 2, according to Maharishi's Vedic theory of intelligence, intelligence has both a unified and multiple structure--unified at its deepest level, and diverse in its expressed values as the levels of the mind, depicted in Figure 2.

3. How does the theory explain knowledge acquisition?

The theory of *g* does not attempt to explain the phenomenon of knowledge acquisition. It concerns itself only with the ability to engage in complex mental manipulation.

In Chapter 3, Maharishi's Vedic theory of intelligence described the process of knowledge acquisition in detail,

including how it takes place within the structure of intelligence and how it relates to the development of intelligence in higher states of consciousness.

4. How does the theory explain the integrated functioning of intelligence at many levels in nature?

The theory of *g* purposely focuses primarily on defining intelligence as it is expressed at the level of the human mind and intellect, and does not in general attempt to deal with the functioning of intelligence on other levels of the mind, such as the level of the senses or the level of feeling, for example. However, Jensen does consider *g* to be the basis of intelligence in animals:

The essential features of mental tests designed for humans that most manifest *g* are also found in various tests of animal intelligence, suggesting that *g* is a concept with relevance not only to individual differences in humans but also to understanding species differences in behavioral capacity. Consideration of the common features of experimental tests developed by comparative psychologists that more clearly distinguish, say, chickens from dogs, dogs from monkeys, and monkeys from chimpanzees suggests that they are roughly scalable along a *g* dimension. Various animal tests of problem solving which discriminate among species and show individual differences among chimpanzees also show the same rank order difficulty among human children...The idea that *g* can be viewed as an interspecies concept with a broad biological and evolutionary basis culminating in the primates, particularly homo sapiens, stands in striking contrast to the limited popular view of intelligence measured by IQ tests as a purely human artifact of modern Western industrial civilization (1979, p.18).

In Chapter 4, Maharishi's Vedic theory of intelligence explains in detail the relationship of pure intelligence and

the integrated functioning of its expressions, observed at all levels of the mind in the individual and in the rest of nature, collectively as well as individually. In Maharishi's Vedic theory, intelligence is present and operative at every level of nature, from the level of fundamental forces of nature such as the electromagnetic and gravitational forces, to the functioning of the DNA molecule, to the behavior of plants, animals, and man, to the trends of entire nations, to the motions of galaxies.

5. How and how much can intelligence be developed?

According to Jensen and other proponents of the g theory, intelligence is not very amenable to development. As evidence, they point to repeated failures of interventions aimed at improving intelligence. These interventions are discussed in Chapter 5, with Jensen's evaluation of them. Jensen stated that despite more than half a century of repeated efforts to improve the intelligence of children, there was still no clear evidence that it could be done.

Jensen has made this point in several papers, the most famous of which is entitled, "How and how much can we boost IQ and scholastic achievement? (1969)" Since Jensen brought forth evidence of racial differences in IQ, the scientific debate of the issue has been clouded by racial and political controversy. However, until Shacter's study in 1978, there was no hard evidence to refute the prevailing view regarding malleability of g . As was discussed in detail in Chapter 5,

there is now evidence that performance on tests considered to be measures of *g* improves among subjects who practice the TM and TM-Sidhi program.

6. Which is more important in the determination of intelligence, heredity or the environment?

Jensen and other proponents of the *g* theory believe that intelligence has a biological basis and is for the most part hereditarily determined:

"The substantial heritability of all highly *g* loaded tests is, of course, proof of a biological basis for individual differences in *g*..." (Jensen, 1979, p.18)."

"...These results are consistent with the hypothesis that psychometric *g* reflects to some extent a biological aspect of intelligence that acts as a fitness character which has been subjected to natural selection in the course of human evolution (p.29)".

Even though Jensen considers *g* to be hereditary, he does not rule out the possibility that *g* can be influenced by environmental conditions, as was pointed out in Chapter 6. He rejects the notion that heredity is synonymous with immutability (1969, p.45); however he points to the many failed attempts to improve *g* as evidence that it is highly resistant to permanent change.

As Chapter 6 pointed out, even though the aspects of intelligence that are measured by IQ tests are strongly influenced by heredity, this does not rule out the possibility that human intelligence can be unfolded by allowing individuals systematically to open their awareness

to the field of pure intelligence. As Chapter 5 showed, this hypothesis has been repeatedly confirmed by research. Hence, it appears that Maharishi's Vedic Science and Technology facilitates the expression of genetic potential that is already present.

7. How can intelligence be measured, and can g be operationally defined?

Jensen's definition of g is an answer, of sorts, to both these questions. " G " is defined in terms of the outcome of factor analysis of mental tests. Defining intelligence as the outcome of a mathematical operation achieves a certain degree of precision and concreteness and provides an objective measure of performance. In principle, the only limitation of this measure as a measure of intelligence is in the choice of tests that go into the factor analysis. If, for example, we could somehow devise valid and reliable objective tests of each of the human abilities that are expressions of pure intelligence, including abilities that relate to each level of the mind (transcendental consciousness, ego, feeling, intellect, mind, desire, senses, physical health, and behavior), then we would have an accurate measure of human intelligence. However, the operational definition proposed by current proponents of " g " theory shows itself to be severely limited as a measure of intelligence. In other words, g appears to be a measure of a common element in mental ability, albeit a highly specific

type of mental ability--abstract reasoning.

II. Howard Gardner's Theory of Multiple Intelligences

Psychologist Howard Gardner (1983) has proposed a theory of multiple intelligences or "Competences" (M.I. theory).

1. What is intelligence?

Gardner's M.I. theory defines an intelligence as follows:

A human intellectual competence must entail a set of skills of problem solving-- enabling the individual to resolve genuine problems or difficulties that he or she encounters and, when appropriate, to create an effective product-- and must entail the potential for finding or creating problems-- thereby laying the groundwork for the acquisition of new knowledge. These prerequisites represent my effort to focus on those intellectual strengths that prove of some importance within a cultural context... The prerequisites are a way of ensuring that a human intelligence must be genuinely useful and important, at least in certain cultural settings (Gardner, 1983, 60-61)."

M.I. theory posits seven intelligences: linguistic, musical, logical-mathematical, spatial, bodily-kinesthetic, and two personal intelligences, intrapersonal and interpersonal.

M.I. theory proposes eight criteria for an intelligence:

1. Potential isolation by brain damage;
2. The existence of idiots savants, prodigies, and other exceptional individuals;

2. The existence of idiots savants, prodigies, and other exceptional individuals;
3. An identifiable core operation or set of operations-- one or more basic information-processing operations or mechanisms, which can deal with specific kinds of input (e.g., sensitivity to pitch relations, ability to imitate movements, etc.);
4. A distinctive developmental history, along with a definable set of expert "end-state" performances;
5. An evolutionary history and evolutionary plausibility;
6. Support from experimental psychological tasks;
7. Support from psychometric findings (tasks that assess one intelligence should correlate highly with one another, and less with those that purportedly assess other intelligences.);
8. Susceptibility to encoding in a symbol system;

According to M.I. theory, examples of a high level of development of each intelligence are as follows:

1. Linguistic Intelligence: poets, authors;
2. Musical intelligence: musicians, composers;
3. Logical-Mathematical Intelligence: mathematicians, scientists, expert chess players;
4. Spatial Intelligence (ability to perceive and manipulate spatial relations): artists, chess players, inventors, scientists;
5. Bodily-Kinesthetic Intelligence (ability to sense the

position of the body in space and to use the body in an efficient, graceful, and effective way): Dancers, actors, athletes;

6. Personal intelligence 1 -- ability to know oneself:

poets, novelists, wise people;

7. Personal Intelligence 2 -- ability to know others:

political and religious leaders, skilled parents and teachers, individuals engaged in "helping" professions, e.g. psychologists, etc.

While unlike the theory of g in positing multiple intelligences instead of a single intelligence, Gardner's theory is similar to the theory of g in that it views intelligence in a horizontal way. That is, intelligences are viewed as abilities that may span several levels of the mind, but still no source of these abilities is identified, and the theory is unable to account for broader abilities that are generally considered "deeper" aspects of human nature. For example, Gardner considers musical intelligence to be expressed on the level of feeling, intellect, mind, senses, and behavior, even though it is not explained in these terms. However, there is no conception of a source of this ability, let alone a conception of a common source of all seven abilities. Gardner is not able to account for how the diverse abilities are integrated.

Maharishi's Vedic theory, on the other hand, posits a common source of all mental abilities that are expressed at

the various levels of the mind--pure intelligence. This view of a common source of all the diverse impulses of intelligence is expressed in two verses from the Rig Ved:

Know your minds to be functioning together from a common source
In the same manner as the impulses of creative intelligence, in the beginning, remain united near the source... (X,12,40,191)"

"The verses of the Ved exist in the... transcendental field [pure intelligence], in which reside all the impulses of creative intelligence, the laws of nature responsible for the whole manifest universe. He whose awareness is not open to this field, what can the verses accomplish for him? Those who know this level of reality are established in evenness, wholeness of life (I,164, p.39)."

Pure intelligence as the common source that integrates all mental abilities is discussed in detail in Chapter 4.

How does Maharishi's Vedic theory of intelligence explain the different abilities cited by Gardner? The Vedic theory considers such abilities to be different channels of expression of intelligence rather than different intelligences per se-- they are seen as talents or aptitudes rather than intelligences. In addition to development in the channel of a particular sense and combination of senses, a given talent involves refinement of all levels of the mind in that particular channel of expression of intelligence. However, Gardner does not conceive of distinct levels of the mind and admits he cannot account for the structure of intelligence as layered.

Considering the abilities cited by Gardner in terms of

Maharishi's Vedic theory--musical ability is associated with the sense of hearing, but there is also refinement of feeling, intellect, and mind in that particular channel of expression. Hence a musically talented individual, for example, displays a refined sense of rhythm, melody, harmony, and is able to feel the emotional qualities of a piece of music in a very subtle and powerful way. His intellect can appreciate the structure of music he hears, perhaps reorganizing the elements of the music and creating musical structures of his own. His mind constantly takes in, stores, and attends to melodies.

Linguistic ability involves the sense of hearing as musical ability does, but also the sense of sight plays a role in literary imagination and creation of literary images. It also involves a refined quality of feeling, intellect, and mind in that channel of expression. All that was just observed about a piece of music in the channel of musical talent could equally apply to a literary piece or a speech in the channel of linguistic talent.

Gardner's bodily-kinesthetic ability is a skill that represents the expression of intelligence in a channel related to the sense of touch. However, as in the other talents under discussion, ego, feeling, intellect, and mind are involved as well. For example, an actor projects himself into a role on the level of the ego, and feels his relationship to the other actors and the scene on the level

of feeling; his intellect comprehends the sequence of motions that comes next; his mind thinks of what word to say or what motion to make next, and he senses how to position his body so that he will project the character to the audience.

Gardner's concept of logical-mathematical ability involves primarily the intellect and the mind, as he describes it in terms of the successful manipulation of logical and mathematical relationships.

Gardner's spatial ability involves primarily the sense of sight and the sense of touch, and, as in the case of the other abilities, the levels of ego, feeling, intellect, and mind are involved as well. For example, an artist projects himself into the painting on the level of ego; he expresses his feelings in the form and subject matter of the painting. His intellect computes what elements are needed to realize his concept, and he visualizes his subject on the deeper levels of the sense of sight.

Gardner's intrapersonal ability involves primarily the levels of ego, feeling, and intellect, since he refers to it as knowledge of one's sense of self and one's inner feelings.

Gardner's interpersonal ability involves primarily the levels of feeling, intellect, and the combination of these two, which is known as intuition, since he describes it as the ability to understand and deal successfully with other

people. It involves the ability to sense what other people are thinking and feeling, and to wisely and skillfully judge other people's behavior and intentions.

In this way, Gardner's seven "intelligences" can be explained as talents or aptitudes resulting from development in particular channels of expression of intelligence. Each channel can involve several levels of the mind simultaneously. The more refined and integrated the functioning of the various levels of the mind, the more developed a talent can be.

The above explanation of Gardner's talents in terms of levels of the mind is not intended as an endorsement of his concept of seven talents or "Intelligences". Rather than merely seven channels of development, Maharishi's Vedic Psychology asserts that the human mind has the capacity to develop and express intelligence in innumerable other channels, such as business, agriculture, government, law, medicine, etc. These patterns of expression of intelligence, which amount to professions or life-styles, each involve the functioning of intelligence in certain channels more than others.

Probably the only way that Gardner's theory could explain the five channels of expression of intelligence listed above is to say they are combinations of his intelligences; for example, he might say that business talent, or "business sense" is really a combination of

logical-mathematical, interpersonal, linguistic, and bodily-kinesthetic. As another example, he might say that agricultural talent is a combination of logical-mathematical intelligence, spatial intelligence, etc. In this way, he might continue defining these other unique talents in terms of combinations of his categories. However, with each new attempt to explain a new talent, the categories lose more of their explanatory power.

Furthermore, in each of the careers or skills listed above, as in many others, there is some unique talent that is just as universal as Gardner's seven talents and cannot be reduced to a combination of them. In addition to that universal talent called "business sense", how, for example, can Gardner's categories explain the special skill of a successful horticulturist or a farmer-- someone with a "green thumb"? As in business sense, this talent is holistic, involving a special sense of weather conditions, the changes of the seasons, soil conditions, special qualities and needs of each type of plant, moisture conditions, sunlight, etc. In this talent, some special development is evident on every level of the mind.

Furthermore, as Gardner himself is quoted as saying later on in this chapter, his theory of multiple intelligences cannot adequately explain the deeper, more comprehensive aspects of intelligence such as feeling or intuition, metaphorical ability, and creativity, for

example, that apply across some or all of Gardner's categories.

Finally, Gardner's theory cannot explain experiences of higher states of consciousness. In this sense, however, Gardner's theory is no more incomplete than any of the other twentieth century theories of intelligence, for they all share the last two shortcomings. Now the second issue in intelligence theory will be considered.

2. Are there multiple intelligences or one intelligence?

Gardner clearly believes there are multiple intelligences, as explained above.

As has been explained in detail in Chapters 2 and 4, Maharishi's Vedic theory describes intelligence as simultaneously unified and diverse.

What of Gardner's neuroanatomical argument for seven intelligences, based on evidence of seven areas of the brain, each of which, when damaged, results in permanent loss of an ability? The logic of neural architecture could just as well be used to support the Vedic view that intelligence is unified at the deepest level of its structure and diverse in its expressions, since, after all, humans have one brain with many well-integrated parts, rather than seven brains.

This view is supported by the work of neuropsychologist

Karl Lashley (1963), who found after extensive research in which he removed large cortical areas from rats, found that maze learning ability could not be localized in any area of the brain. It is also supported by A.R. Luria's work (1977, 1978). Based on his extensive research, Luria has cautioned against assuming a structural-functional isomorphism between psychological constructs and brain architecture. Luria and others have proposed an interaction model of psychophysiological functioning, in which the entire cortex functions in an integrated way. In this model, a particular area of the cerebral cortex acts as a temporary focus of activity in the interaction of dynamically organized systems of neuronal populations, rather than as a fixed "seat" of that faculty.

3. How does the theory explain knowledge acquisition?

Gardner's theory does not address this issue, except in very general terms:

I believe that, at the core of each intelligence, there exists a computational capacity, or information-processing device, which is unique to that particular intelligence, and upon which are based the more complex realizations of that intelligence... the normal human being is so constituted as to be sensitive to certain informational content: when a particular form of information is presented, various mechanisms in the nervous system are triggered to carry out specific operations upon it. And from the repeated use of, elaboration of, and interaction among these various computational devices, eventually flow forms of knowledge that we would readily term intelligent (Gardner, 1983, p.279).

In taking this position, the theory of multiple intelligences makes the same omission that other twentieth century theories of intelligence do-- it ignores the intrinsic self-sufficiency, self-awareness, creativity, liveliness, dynamism, and organizing power of intelligence, i.e., it leaves self-referral consciousness, the knower, out of the equation-- and thereby fails to satisfactorily account for mental ability on the human level of competence. This point has been discussed earlier in this chapter with regard to twentieth century theories of intelligence in general.

Gardner admits the counter-intuitive nature of his assertion:

"It may seem odd that so venerated a concept as intelligence be thought of as composed of "dumb" mechanisms (that is, ones insensitive to larger meanings, ones that simply operate in quasi-reflexive fashion when stimulated by certain components or inputs)"...(p.279).

To support his position, Gardner quotes the philosopher Robert Nozick:

"If there is to be an explanation of how our intelligence functions, it will have to be in terms of factors that, taken individually, themselves are dumb, for example, in terms of a concatenation of simple operations that can be done by a machine. A psychological explanation of creativity will be in terms of parts or processes that aren't themselves creative..." (p.279).

Gardner proposes to explain intelligence as an "emergent" phenomenon that is somehow created by a collection of inert parts:

"Nonetheless, it is a burden of the following chapters to indicate the ways in which, building upon 'dumb' computational capacities, we may still end up with intelligent and even highly creative behavior" (p.279).

In an attempt to explain how a lively quality can emerge from a collection of inert components, Gardner discusses socialization through symbols, yet this discussion is very general. Although he is aware of this lack of self-awareness, self-sufficiency, and liveliness in his concept of intelligence, he is never able to overcome it:

"There may be 'dumb' capacities at the center of intelligence; but it is equally true that these capacities must be made 'smarter' if one is successfully to interact with the surrounding society (p.297)."

In defense of multiple intelligence theory, it should be pointed out that no other theory in twentieth century psychology has been able to satisfactorily explain the self-referral, liveliness, self-sufficiency, dynamism and creativity of intelligence either, using reductionistic models. As has been discussed earlier in this chapter, according to Maharishi's Vedic theory of intelligence this is because twentieth century psychologists have not been exposed to any technology which would allow them to directly experience the ultimate nature of intelligence, and hence they have not been able to verify for themselves its nature as self-referral, self-sufficient, lively, creative, and dynamic.

4. How does the theory account for the integrated functioning of intelligence at many levels of nature?

Gardner's multiple intelligence theory is not able to account for phenomenon, even though it does implicitly accept the idea that intelligence operates at more than one level of mind simultaneously. Gardner's categories of intelligence are related to each other horizontally, not vertically.

For example, according to Gardner the difference between linguistic and musical intelligence is not that one involves a deeper level of experience than the other-- both a song and a poem may express and evoke deep feelings and thrill the intellect. Rather, according to M.I. theory, the difference between intelligences is more in the their neural substrate, content and mode of expression. In the Vedic theory of intelligence, on the other hand, the levels of the mind are related to each other "vertically", i.e., according to their relative degree of manifestation or concreteness with relation to their unmanifest source, pure intelligence, which pervades and integrates them all.

Gardner is aware that his theory cannot explain the generalized, unified nature of intelligence, which is more apparent at deeper levels of the mind and a common element in the diverse expressions of intelligence:

There are...areas of human psychology that it [the theory] cannot encompass. Included here would be... affect or feeling,... motivation and attention... My own guess is that mechanisms of

motivation and attention will turn out to be rather general: in other words, proper theories of motivation and attention will turn out to have applicability across several intellectual spheres (p.285).

There are cognitive capacities that seem to be 'higher-level'-- capacities like common sense, originality, or metaphoric capacity-- which clearly make use of mental skills but because of their seemingly broad and general nature seem inexplicable within terms of individual intelligences. In truth, it is by no means evident how each of these terms can be explained within multiple intelligence theory, and, if they cannot, how the theory must be modified if they are to be adequately accounted for (p.287).

It should be added that Gardner's concept of "self" is also based on a horizontal, or "waking state" view of human intelligence. Rather than viewing the Self as a transcendental, unbounded, universal field of pure intelligence at the source of the individual ego, intellect, mind, etc. as Maharishi's Vedic theory does, Gardner views the self as essentially the individual ego, with associated feelings and intellect. He believes that the self is an "emergent" phenomenon, built upon the basis of experiencing one's own inner feelings, and, more significantly for Gardner, social interaction:

I view the sense of self as an emerging capacity... In other words, in my view, every society offers at least a tacit sense of a person or self, rooted in the individual's own personal knowledge and feelings. However, this sense will inevitably be interpreted and possibly be remade by the individual's relation to, and knowledge of, other persons and, more generally, by the interpretive schemes supplied by the encompassing culture (p.276).

In pointing out the limitations of this concept of self, it should not be concluded that the Vedic view of intelligence considers the individual sense of self nonexistent or unimportant in everyday social interaction, or the processes of socialization unimportant. Rather, the aim here is to point out that there is a difference between the limited concept of individual self held by the vast majority of psychologists, and the comprehensive view of human personality held by Maharishi's Vedic theory. In the Vedic view, the unmanifest, transcendental Self is the most central aspect of the personality, and the individual ego, feelings, intellect, mind, senses, and body are expressions of it.

5. How and how much can intelligence be developed?

Gardner believes that intelligences can be developed more than is presently occurring in society. He believes this can be accomplished by using his theory to evaluate the presence of the intelligences in the individual at an early age, developing an "intelligence" profile for the individual, and tailoring education to his or her profile. Gardner does not yet claim to know how to reliably evaluate individual intelligences, nor how to educate an individual in such a way as to maximize the development of certain intelligences. At the time of this writing, he is engaged in a large research project with these goals.

Gardner's concept of intervention to develop intelligence is, like the theory, an essentially horizontal and informational approach; i.e., his type of intervention would rely on information and personal interaction with a teacher to learn literary or musical skills, for example.

As was discussed in Chapter 5, the Vedic psychological approach to developing intelligence, rather than only providing information about some area of knowledge such as literature or music, provides the individual with a means to transcend thinking completely and experience the unity of his or her individual intelligence with pure intelligence. This enables intelligence to develop in a holistic way, on all levels of the mind and in all domains simultaneously. The foregoing is not to imply that everyone who practices the TM and TM-Sidhi program will automatically become a great writer, musician, and athlete simultaneously. What it means in practice is that the individual will become completely developed in the holistic value of intelligence, and that all the levels of the mind--Self, ego, emotions, intellect, mind, senses, physiology, and behavior, will develop to their maximum capacity.

Due to differences in heredity, social position, and upbringing, each individual will naturally develop more in some of Gardner's areas than in others. According to Maharishi's Vedic theory, the most significant feature of the holistic development of intelligence is that whatever an

individual's tendencies and field of expertise in life, that person will realize his or her full potential in higher states of consciousness; the person will enjoy life in enlightenment and will contribute maximum creativity, intelligence, and happiness to the environment at all times, whether or not the individual is engaged in exercising some particular talent or not at any given moment.

6. Which is more important in the determination of intelligence, heredity or environment?

Gardner believes that heredity and early environmental influences both play substantial roles in the determination of intelligences, but does not specify which is more important:

"In my view, the preponderance of evidence points to the following conclusions. There is considerable plasticity and flexibility in human growth, especially during the early months of life. Still, even that plasticity is modulated by strong genetic constraints which operate from the beginning and which guide development along some paths rather than others (p.33)."

Even though Gardner assigns an important role to the influence of heredity, he does not see it as a barrier to fuller development of intelligence, particularly the intelligences in which one excels early in life. He believes that once reliable methods of evaluating an individual's "profile" of intellectual strengths have been developed, educational institutions should use that knowledge to tailor

the course of education to match each individual's profile as closely as possible. In this way, Gardner believes, each individual will be allowed to develop his or her intelligence along the most natural path and, as a consequence, contribute maximum to the progress of society.

As the discussion in Chapter 6 shows, Maharishi's Vedic theory of intelligence and Gardner's M.I. theory take a similar view of the influence of heredity on intelligence. Maharishi's Vedic theory views heredity as influencing the pattern of talents in the individual, i.e., how the channels of expression of intelligence described by Gardner are organized in the individual. However, according to Maharishi's Vedic theory, everyone, regardless of genetic endowment, has the ability to transcend thinking and directly experience pure intelligence. Hence, everyone has the potential for pure intelligence to be completely expressed in the structure of his or her unique personality, and consequently to live higher states of consciousness. This is emphasized as the most important aspect of education--to assure that every child learns how to transcend and enjoy the spontaneous unfoldment of intelligence while all the other necessary knowledge is being gained.

7. How can intelligence be measured?

Gardner believes that intelligences can be measured,

and even though the methods of measurement he proposes are not yet developed nor, for that matter, even clearly defined, they would differ radically from methods which have been employed in the past, such as IQ tests.

First, Gardner believes that intelligences should be assessed in different ways at different ages, beginning very early in life:

My own belief is that one could assess an individual's intellectual potentials quite early in life, perhaps even in infancy. At that time, intellectual strengths and weaknesses would emerge most readily if individuals were given the opportunity to learn to recognize certain patterns and were tested on their capacities to remember these from one day to the next. Thus, an individual with strong abilities in the spatial realm should learn to recognize target patterns quite quickly when exposed to them, to appreciate their identity even when their arrangement in space has been altered, and to notice slight deviations from them when they are presented on subsequent trials or subsequent days. Similarly, one could assess pattern-recognition abilities in other intellectual domains (like language or number) as well as the ability to learn motor patterns and to revise and transform them in adaptive ways. My own hunch about strong intellectual abilities is that an individual so blessed does not merely have an easy time learning new patterns; he in fact learns them so readily that it is virtually impossible for him to forget them. The simple melodies continue to play on in his mind, the sentences linger there, the spatial or gestural configurations are readily brought to the fore, although they may not have been tapped for a while (p.386)...

A principal reason for early assessment is to allow an individual to proceed as rapidly as seems warranted in those intellectual channels where he is talented, even as it affords an opportunity to bolster those intellectual endowments that seem relatively modest (p.386).

At a somewhat later age (all the way up

through the preschool years!) it should prove possible to secure a contextually rich and reliable assessment of an individual's intellectual profile. The preferred route for assessment at this age is to involve children in activities which they themselves are likely to find motivating: they can then advance with little direct tutelage through the steps involved in mastering a particular problem or task. Puzzles, games, and other challenges couched in the symbol system of a single intelligence (or of a pair of intelligences) are particularly promising means for assessing the relevant intelligence...(p.386)

Naturally the specific experiences favored for the assessment of intellectual potential will differ, given the age, the sophistication, and the cultural background of the individual. Thus, when monitoring the spatial realm, one might hide an object from the one-year-old, pose a jigsaw puzzle to the six-year-old, or provide the pre-adolescent with a Rubik's cube. Analogously, in the musical realm, one might vary a lullaby for the two-year-old, provide the eight-year-old with a computer on which he can compose simple melodies, or analyze a fugue with an adolescent. In any case, the general idea of finding intriguing puzzles and allowing children to "take off" with them seems to offer a far more valid way of assessing profiles of individuals than the current favorites world-wide: standard measures designed to be given within a half-hour with the aid of paper and pencil.

My own guess is that it should be possible to gain a reasonably accurate picture of an individual's intellectual profile-- be he three or thirteen-- in the course of a month or so, while that individual is in regular classroom activities. The total time spent might be five to ten hours of observing...(p.388).

Gardner's proposal for measuring intelligence is certainly innovative and appears to have some advantages, not the least of which is that it allows the individual freedom to be creative and reduces potential for the debilitating effects of test anxiety. However, it has

limitations regarding: a) what is being measured, and, b) practical implementation.

First of all, Gardner's method of measuring "intelligences" proposes to measure certain types of behaviors. The question is: Are these behaviors really indices of human intelligence, or are they simply the expression of aptitudes that vary from individual to individual, regardless of how intelligent he or she is?

As has been discussed in Chapter 7, the Vedic view of measurement of intelligence is a convergent approach, which includes assessment of the growth of higher states of consciousness. From the point of view of Maharishi's Vedic Psychology, intelligence is holistic, and its growth is reflected as higher states of consciousness, as well as improvements in a variety of objective measures related to the various levels of the mind. Hence, some index of the growth of higher states of consciousness is important in the measurement of intelligence.

Second, can Gardner's method of evaluation be practically implemented on a mass scale--in public education, for example? At first glance, it would appear unlikely for the following reasons: 1) it must be implemented on a one-to-one basis; 2) it is very time-consuming and labor-intensive on the part of the test administrator, requiring many hours for each student; 3) by Gardner's own admission, the testing method would need to be

custom-tailored for different cultures, (and possibly for different subcultures!) since the skills being evoked are culture-specific.

By contrast, the methods of evaluation proposed in this dissertation can be implemented on a mass scale, and they are not culture-dependent.

Summary

It is shown that Maharishi's Vedic theory of intelligence differs from other theories of intelligence in several fundamental ways:

1) Maharishi's Vedic theory views intelligence from a vertical as well as a horizontal perspective--it views intelligence as having an unmanifest, unified source in pure intelligence, with expressions in the form of levels of the mind--while twentieth century theories of intelligence view intelligence as a horizontal phenomenon, limited to the mental abilities associated primarily with the activity of the mind and intellect in the ordinary waking state. Since Maharishi's Vedic theory considers intelligence from a more fundamental standpoint than other theories, it is able to harmonize the diverse views of intelligence, each of which deals with some aspect of intelligence more than others.

2) Maharishi's Vedic theory considers the holistic nature of intelligence and proceeds to investigate

intelligence on that basis, rather than taking a partial, fragmented approach to the study of intelligence and investigating only one or two aspects of its nature. As a corollary, Maharishi's Vedic Psychology considers man's intelligence to be identical with nature's intelligence, the totality of natural law, rather than separate from it. As a consequence, Maharishi's Vedic Psychology considers the range of intelligence to extend throughout the universe, whereas modern theories have assigned a relatively narrow range of functioning to intelligence.

3) Maharishi's Vedic theory identifies many qualities of intelligence, including self-referral, self-sufficiency, infinite dynamism, infinite silence, perfect orderliness, infinite organizing power, infinite creativity, integration, bliss, evolution, etc., while twentieth century theories assign limited qualities to intelligence, all of which can be derived from the qualities described by Maharishi's Vedic theory: adaptability, integration, orderliness, efficiency, and progress.

4) In connection with point 1, the Vedic view identifies pure intelligence as the knower. It is described as self-aware, and hence self-sufficient and lively, rather than simply an epiphenomenon of physiological processes, or an "emergent" phenomenon arising out of the interaction of inert cognitive components or of social interaction involved in the socialization process.

5) The Vedic view of intelligence recognizes that the process of knowledge acquisition is inherent in the fundamental nature of intelligence; being intelligence or consciousness it can know itself, and thus embodies the tripartite nature of knowledge acquisition: knower, known and process of knowing.

6) The Vedic theory of intelligence asserts that intelligence can be fully unfolded through a practical, easily learned and universally applicable technology, the TM and TM-Sidhi program, while other theories are either doubtful that intelligence can be developed, or unclear as to how.

As a corollary, Maharishi's Vedic theory takes into account the fact that there are higher states of human consciousness that are part of the complete unfoldment of intelligence. According to Maharishi's Vedic Psychology, the functioning of intelligence is experienced differently in different states of consciousness.

7) The Vedic view of intelligence uses three methods of confirmation of theory: direct subjective experience of the nature of intelligence through the TM and TM-Sidhi program, verification of the nature of intelligence by ancient records of knowledge and experience, and objective observation of behavioral and physiological correlates of intelligence, whereas methods of twentieth century psychology use only the third method.

There are some points of agreement between Maharishi's Vedic theory of intelligence and twentieth century theories of intelligence.

1) As discussed, some of the qualities of intelligences described in both approaches, and all the qualities of intelligence described by twentieth century theories can be derived from qualities described Maharishi's Vedic theory.

2) The basic units of analysis used by various twentieth century theories are compatible with the basic unit used in Maharishi's Vedic theory. In fact, they can be seen as modified instances of that unit.

3) The concept of g , as described by Jensen, is compatible with pure intelligence as described by Maharishi's Vedic theory, in the sense that g is a principle of a unity of intelligence that underlies diverse expressions of intelligence. In principle, a g factor could be derived for the whole range of human intelligence, or for the whole range of intelligence in nature--a universal g .

4) Gardner's recognition of the partial nature of currently available measures of intelligence is shared by Maharishi's Vedic theory of intelligence. Gardner's interest in creating measures of intelligence that are more related to people's personal experience and goals, is also shared by Maharishi's Vedic theory.

We now turn to Part III of the dissertation, in which a hypothesis based on Maharishi's Vedic theory of intelligence

is tested.

PART III: TESTING A HYPOTHESIS
ABOUT THE GROWTH OF INTELLIGENCE

Chapter 1: Formulation of the Hypothesis

This part of the dissertation attempts to define a system of measures which, taken together, constitute a holistic measure of intelligence, and use it to test some of the points of the Vedic theory of intelligence.

As presented in Chapter 5 of Part II, research using traditional measures of "fluid" intelligence indicates that the practice of the TM and TM-Sidhi program is associated with improvements on these measures (Aron, Orme-Johnson & Brubaker, 1981; Dillbeck, Assimakis, Raimondi, Orme-Johnson, & Rowe, 1986; Kotchabhakdi, N.J., Pipatveravat, Kotchabhakdi, N., Tapanya, & Pornpathkul, 1982; Nidich, S. & Nidich, R., 1987; Shecter, 1978; Tjoa, 1975, 1977).

Furthermore, a review of the entire body of research on the TM and TM-Sidhi program provides impressive support for the theoretical statement of Maharishi's Vedic theory of intelligence, that the functioning of all levels of the mind can be improved through one simple method: the practice of the TM and TM-Sidhi program (see Table 3). This research suggests, in addition, that improvements in cognitive abilities associated with the various levels of the mind brought about by practice of the TM and TM-Sidhi program, take place in an integrated manner (Orme-Johnson, Wallace,

Dillbeck, Alexander, & Ball, 1981; Alexander, C., Alexander, V., Boyer, & Jedrczak, 1984; Alexander, C., Alexander, V., & Boyer, R., 1987; Dillbeck, Raimondi, Assimakis, Rowe, & Orme-Johnson, 1984; Orme-Johnson, Clements, Haynes, & Badawi, 1977; Orme-Johnson, 1976). However, to date there has been a scarcity of controlled, long-term longitudinal studies in this area. Accordingly, this study attempts to test the growth of intelligence-related measures under controlled conditions, in a long-term longitudinal design.

Specifically, this study is designed to verify two points of the Vedic theory of intelligence--Points 4 and 5-- and to present evidence to clarify points 1, 2, 4, 6, and 7 (see Table 2).

Point 5 states:

"Intelligence can be naturally developed by regularly transcending thought and allowing the awareness to identify itself completely with pure intelligence, the unified field of natural law..."

Point 4 proposes to explain the observation of the integrated functioning of intelligence on many different levels of manifestation:

"The simultaneously unified and diversified structure of intelligence with its qualities of self-referral, self-sufficiency, infinite organizing power, integration, infinite creativity, and infinite dynamism, activates and integrates all the diverse levels of mind, physiology, and their corresponding abilities."

To test these points, the following hypothesis is proposed:

An experimental group that is regularly practicing the TM and TM-Sidhi program will show a significant increase in abstract mental functioning, as reflected by the measures used, compared to a control group which is not practicing the TM and TM-Sidhi program. The measures will be determined in the following manner:

Principal components analysis will be performed on scores for a variety of measures that are hypothesized to be related to different levels of the mind. One of the measures is frequency of experiences of higher states of consciousness (HSOC measure). It is hypothesized that those measures which load with the HSOC measure on an unrotated principal component, will improve significantly between pretest and posttest.

A second source of support of the hypothesis is the direct experience of transcending, and of the functioning of intelligence. Some samples of this type of experience were provided in Chapters 1, 3, and 7. Additional reports will be provided in the results section of this research.

A third source of evidence, already provided in Chapters 1-5, is a compilation of statements and accounts from the traditional texts of Vedic literature, which record such experiences of higher states of consciousness throughout the ages.

It is hypothesized that those dependent measures which do not load on the same principal component as HSOC scores will also improve significantly between pretest and posttest, although not as much as the foregoing measures, as measured in standard deviation units, because they are less directly related to the growth of higher states of consciousness.

If measures are used that are associated with different levels of mind and physiology, and if simultaneous improvements are observed in several of these dependent measures after introducing the TM and TM-Sidhi program as an independent variable, strong empirical evidence will have been found in support of point 4. Point 4 postulates the existence of pure intelligence as a factor that underlies, supports, activates, and integrates all levels of the mind. The theory and evidence associated with point 4 logically explain how this supporting, integrating factor can be enlivened through the TM and TM-Sidhi program to improve the functioning of all levels of the mind. To date, this body of theory and supporting research is the only such knowledge that can logically explain such a multifaceted result, and to date there is no other intervention which has produced comparable results, under similar conditions, on even one of the dependent variables--fluid intelligence, for example--not to mention all the others measured here. Therefore, parsimony strongly suggests the acceptance of point 4 as a

valid explanation of the results.

Of course, improvements in several dependent measures would also provide support for point 5, which states that intelligence can be developed through the TM and TM-Sidhi program.

Confirmation of the hypotheses would lend support to point 2, which refers to the simultaneously unified and diverse nature of intelligence. Positive results would lend support to this point for the following reasons: The Vedic theory of intelligence describes pure intelligence as the substrate of all levels of subjective and objective nature. It describes the structure of pure intelligence as simultaneously unified and diverse, by virtue of which it gives rise to, sustains, and integrates all these levels, while maintaining its own integrity. Furthermore, the Vedic theory describes the TM and TM-Sidhi program as a method of contacting pure intelligence, thereby enlivening it at all levels of the mind, in much the same way as watering the root of a tree enlivens the sap, enriching every aspect of the tree. This theoretical position accounts for the repeated findings of improvement on all levels of the mind in subjects practicing the TM and TM-Sidhi program. Therefore, a finding of simultaneous improvement in several of the dependent measures described here will add support for the hypothesis of the simultaneously unified and multiple structure of intelligence.

Confirmation of hypothesis 1 or both 1 and 2 would also lend empirical support to another theoretical point: If the introduction of the TM and TM-Sidhi program is associated with an improvement in cognitive abilities which are shown to be significantly influenced by heredity (in this case, fluid intelligence and capacity for mental absorption), this result will suggest that heredity and practice of the TM and TM-Sidhi program both influence these abilities, thereby lending support for point 6, which states,

"Heredity (structure of the DNA) sets the individual pattern of expression of intelligence. Heritability, however, is not synonymous with immutability. Through Maharishi's Vedic Science and Technology, the functioning of the mind and the material and functioning of the physiology can be refined, so that the full potential of intelligence can be realized."

Confirmation of the two hypotheses would provide new evidence in support of subpoints of point 5 as well.

The Vedic view of human potential, expressed in Chapter 5, is that every human being has the innate ability to identify his or her awareness completely with pure intelligence, the infinite intelligence and organizing power of nature; hence anyone can naturally unfold great intelligence. Confirmation of the hypotheses will show that large groups of subjects with diverse backgrounds who practice the TM and TM-Sidhi program have increased their intelligence. This verifies that people of diverse backgrounds can all improve their intelligence.

Point 7 states:

"Maharishi's Vedic theory of intelligence holds that it can be operationally defined, and in principle, confirmed or disconfirmed. It also affirms that intelligence can be measured..."

This study provides additional evidence that Maharishi's Vedic theory of intelligence can be operationally defined.

Finally, evidence from personal experiences of the subjects during the practice of the TM and TM-Sidhi program, as reported on the HSOC measure can be used to support or refute part of point 1, which states,

"...At the deepest level of its nature, it [intelligence]...is also the deepest level of our Self."

The other points of Maharishi's Vedic theory of intelligence will not be tested in this study. However, they have already been confirmed by scientific research cited in Table 3 of Part II, and by the two other sources of data in Maharishi's Vedic Psychology: reports of subjective experiences and ancient records of experiences from the Vedic literature.

Chapter 2

Rationale for Choice of Dependent Variables

Ten dependent variables were chosen for measurement in this study. A variety of variables were chosen because: a) they are related to the levels of progressive manifestation of pure intelligence from abstract to concrete--i.e., levels of the mind (point 4); and, b) they represent various mental abilities which have been associated with intelligence by psychologists and laymen alike. The variables are clustered into six categories, as shown in Table 4.

Table 4

DEPENDENT VARIABLES TO BE MEASURED AND
ASSOCIATED LEVELS OF THE MIND

- I. Logical thinking--intellect
 - 1. Cattell's culture fair test of "g"
 - 2. Raven's advanced progressive matrices
- II. Creativity--ego, feeling, intellect
 - 3. Torrance test of creative thinking (TTCT): figural form A--Fluency
- III. Speed of mental processing--senses, mind
 - 4. Hicks' reaction time test (RTT)-- mean RT, simple reaction time (1-light condition)-- senses, mind
- IV. Efficiency of mental processing--mind, intellect
 - 5. Hicks' RTT--mean RT, choice reaction time (8-light condition)--mind, intellect.
 - 6. Hick's RTT--slope of RT vs. amount of information (0 to 3 bits or 1 to 8 lights)
 - 7. Hicks's RTT--standard deviation of RT over 20 trials.
- V. Field independence--senses, mind, intellect, ego
 - 8. Group embedded figures test (GEFT)
- VI. Experiences of higher states of consciousness--ego, transcendental consciousness (Self)
 - 9. Score on Questionnaire on Higher States of Consciousness
 - 10. Capacity for episodes of total attention-- score on Tellegen's Absorption Scale

Each category represents a mental ability associated with a particular level of the mind. For each level, the mental ability is listed on the left and the corresponding level of the mind is listed on the right. The choice of each of these dependent variables is explained as follows:

Logical Thinking

Performance on tasks requiring logical thinking has been most frequently associated with intelligence by theorists and researchers (McKean, 1985; Sternberg & Detterman, [Eds.], 1986; Sternberg & Gardner [reply to Sternberg], 1984; Fancher, 1982; Pellegrino, 1985; Jensen, 1978, 1984). Reasoning ability is one of the most popular and well-researched cognitive measures associated with intelligence.

Cattell's Culture Fair Intelligence Test (CFIT) was designed to be a test of "fluid Intelligence", or "g" (Horn & Cattell, 1966; Jensen, 1978, 1984). Fluid intelligence has been defined as the ability to perceive complex relations, to effectively use short-term memory, form concepts, and perform abstract reasoning. The CFIT involves figural symbolic and semantic content and is claimed by its creators to be independent of experience and education (Horn & Cattell, 1966). Research has shown that maximum scores on the CFIT are reached at about age 17, with a subsequent

decrease, and a gradual flattening out after age 40 (Barton, 1973; Horn & Cattell, 1966; Singh & Hundal, 1971).

As was discussed in Chapter 5 of Part II, studies of longer than three months' duration show significant increases in growth rate of fluid intelligence among high school students who learned the TM technique compared to controls (Nidich & Nidich, 1987; Shecter, 1978; Tjoa, 1972, 1977). However, as mentioned in Chapter 5, there are some design flaws in Tjoa's two studies. In Tjoa's first study (1972), the sample size was very small ($N = 7$ for meditators and $N = 6$ for nonmeditating controls). Second, the technique of data analysis used did not control for differences in between the two groups on pretest scores. In Tjoa's second study (1977), the data gathering techniques were not ideal (see Part II, Chapter 5). As Chapter 5 discussed, Shecter's (1978) study overcame the methodological problems encountered by Tjoa; however, Shecter's study was of relatively short duration--14 weeks.

As discussed in Chapter 5 of Part II, at the college level, two studies at Maharishi International University (MIU), where the entire student body practices the TM and TM-Sidhi program, found significant increases in scores on the CFIT. Aron, Orme-Johnson, & Brubaker (1981) found a significant increase of 8.3 points in mean IQ over 4 years at MIU ($p < .005$). In the second study, Dillbeck, Assimakis, Raimondi, Orme-Johnson, and Rowe (1986) found a significant

increase of nine IQ points ($p < .001$) on the CFIT after 3 to 5 years. Similar results were found among adults learning the TM program in Holland; over a 16-month period, regular participants showed a significant increase in fluid intelligence compared to those meditating irregularly (Tjoa, 1975).

Even though the results of these studies go against the populational trend of decreasing scores on the CFIT, it is possible that the trend has reversed in the fourteen years since the latest trend study was completed. This could happen, as Anastasi (1985) has argued, as a benefit of the vast increase in the amount of educational information available to children from television and the print media.

On the other hand, Dillbeck et al. (1986) point out that the studies cited by Anastasi where scores increased, used intelligence tests "that measure use of specific information and depend on stored knowledge that increases with experience ['crystallized intelligence']", while the CFIT does not. It is possible, however, that some of the effect found by Anastasi and others (Owens, 1966; Campbell, 1965; Schaie & Strother, 1968) could be due to growth of "g", since the WAIS intelligence test used in these studies is highly correlated with "g". The inclusion of a control group in the present study was intended to help resolve this question. If gains in IQ scores of the MIU groups could be explained by growth of intelligence in the surrounding

population due to cultural influences, the comparison group could be expected to show equal gains in intelligence as the MIU group.

The Raven's Advanced Progressive Matrices is very similar in form and content to the CFIT, and is also purported to measure fluid intelligence, or "g" (Jensen, 1978, 1984, 1985; Paul, 1986). This measure is included for several reasons: first, in previous studies, scores on Raven's were found to be significantly correlated with standard deviation scores on the Hick's paradigm, and in some cases, with RT and slope scores on the Hick's paradigm (Jensen, 1978, 1984, 1985a, 1985b; Jensen & Munro, 1979; Vernon, 1983). However, some investigators have obtained contradictory results (Bieger, 1968; Schmidtke, 1961; Amelang, 1985), and others (Longstreth, 1984; Carroll, in press) have criticized aspects of the methodology and statistical analysis employed. Jensen and Vernon (1986) have made comprehensive and empirically supported rebuttals to the latter criticisms. Accordingly, this study will investigate this hypothetical relationship between RT-related measures and IQ as measured by Raven's and Cattell's tests.

Second, the inclusion of Raven's test provides evidence that may help to determine the relative contributions of heredity and the practice of the TM and TM-Sidhi program to IQ scores. A study by Bouchard & McGue (in press) which

measured correlations between Raven's scores for 47 pairs of monozygotic twins reared apart, found correlations of approximately .75. Similar correlations were found for scores on the WAIS IQ test. If the present study finds a significant increase on Raven's scores for Experimental group 1, it will indicate some influence of the TM and TM-Sidhi program on the mutability of the inherited intelligence trait, and support point 6 of the Vedic view of intelligence.

Creativity

A test of creativity was included in this research because, while according to the Vedic view of intelligence, creativity is an aspect of intelligence, creativity, as measured by existing tests, seems to be a different dimension of intelligence than the capacity for logical thinking. E. Paul Torrance, the author of the Torrance Tests of Creative Thinking (TTCT), defines creativity as,

"...a process of becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on; identifying the difficulty; searching for solutions, making guesses, or formulating hypotheses about the deficiencies: testing and retesting these hypotheses and possibly modifying and retesting them; and finally communicating the results (Torrance, 1974)."

On the relationship between creativity and IQ, Torrance states,

"...if we identify as excellent or gifted those

who rank in the upper 20 per cent on a test of intelligence or scholastic aptitude we will miss 70 per cent of those who rank in the upper 20 per cent on a test of creative thinking (in Gowan, Torrance, & Khatena, 1981, p.48)."

This statement was based on Torrance's finding of correlations of less than .24 between IQ test scores and creativity test scores in the samples he studied.

Seeming to concur with this assessment, Sternberg (1985) comments, "Intelligence is a necessary but not sufficient condition for creativity (p.125)."

Both the CFIT and Raven's Progressive Matrices are tests which require closure, or "convergent thinking" (Torrance, 1974)--the ability to take a large amount of information and logically converge on the correct solution. For each item there is supposedly only one correct answer, and the subject is required to select it from among several possibilities. In contrast, tests which purport to measure creativity, such as the Torrance Tests of Creative Thinking (TTCT), are tests which measure "divergent thinking," the ability to generate new ideas. There are many possible answers, and the subject is asked to generate as many solutions as possible. The emphasis is on using one's imagination to find new meanings, uses, and contexts for material.

According to Torrance, the figural test represents three different creative tendencies: the tendency toward

"structuring and integrating", which includes the ability to delay closure so that the subject can make a "mental leap" and reach beyond an obvious, commonplace response; the tendency to elaborate and fill in gaps; and originality-- the tendency to disrupt old patterns of thinking in order to create something new. These three tendencies are said to interact in different ways, and their functional combination is represented in the four scores that are generated by the test: fluency, flexibility, originality, and elaboration (Torrance, 1974).

In the Vedic view of creative intelligence and in the observation of daily life, creativity is primarily associated with a deeper level of cognitive functioning than intellectual analysis. The intellect obviously plays a part in creativity, but the level of feeling plays a more central role in the creative process. As Maharishi Mahesh Yogi has observed (1969, 1972b), the level of feeling is more fluid and less bounded than the level of intellect. Feelings have a more pervasive, subtle influence on the individual's mental processes than logical thinking, as they do on others around the individual as well. Feelings are also associated with the ego, the sense of existence of the individual, which is connected at its source with the Self, pure intelligence (Maharishi Mahesh Yogi, 1969, 1972a, 1972b).

There have been several studies of the influence of the TM and TM-Sidhi program on creativity. Orme-Johnson & Haynes

(1981), found significant positive correlations between frequency of experiences of stabilized pure consciousness, self-reported level of accomplishment in the TM-Sidhi program, EEG brain wave coherence, and creativity scores for fluency, originality, flexibility, and novel uses on the verbal TTCT. Orme-Johnson & Granieri (1977) found significant increases in scores for originality and fluency on the figural TTCT among subjects who had learned the TM-Sidhi program in a six-month course.

In large samples of participants in the TM and TM-Sidhi program (Haynes, Hebert, Reber, & Orme-Johnson, 1977; Jedrczak et al., 1986; Orme-Johnson & Haynes, 1981), frequency of experiences of higher states of consciousness was significantly correlated with fluency scores on the TTCT.

Even though the studies discussed so far are interesting, the results are open to question because of weaknesses in design. The latter studies are correlational and thus cannot demonstrate causality. The third study (Orme-Johnson & Granieri, 1977), is open to claims of self-selection and maturation because it lacks a control group. Travis (1979) conducted a more rigorous study. An experimental group who learned the TM program and a control group who did not, were given the TTCT, both verbal and figural versions, before TM instruction and five months after the experimental group was instructed. The

experimental group scored significantly higher on figural flexibility ($p < .006$), and figural originality ($p < .0005$) at posttest. Travis' study is less open than previous studies to the argument of self-selection, because all the subjects tested were interested enough in learning TM to attend the preliminary lectures.

A study by Shecter (1978) also employed random assignment of subjects to experimental and control conditions. Shecter found that subjects who practiced the TM program for 14 weeks improved significantly on the Match Problem creativity test, compared to controls.

Capacity for Mental Absorption

Tellegen and Atkinson (1974), while studying factors related to hypnotizability, discovered a factor they called "capacity for episodes of total attention." Among subjects studied, this factor was correlated with "enhanced perception of the self." Tellegen's Absorption Scale (TAS) is a questionnaire which purports to measure this capacity. Absorption appears to be related to practice of meditation; Davidson, Goleman, & Schwartz (1976) found among subjects who had been practicing various forms of meditation, including the TM technique, that the longer a group of subjects had been practicing meditation, the higher the score on the TAS, and the lower the level of anxiety as

measured by the State Trait Anxiety Inventory (STAI).

Alexander (1978) found that scores on the TAS were significantly correlated with more frequent experiences of higher states of consciousness. Interestingly, Alexander found that experiences of higher states of consciousness were uncorrelated with hypnotizability, as measured by the Harvard Group Scale of Hypnotic Susceptibility, even though both higher states and hypnotizability (Tellegen & Atkinson, 1974) tend to be associated with capacity for absorption.

In a second correlational study which replicated the previous results, Alexander et al. (1987) concluded that "Subjects who experience higher states more frequently appear to have a greater capacity for attention, but apparently are not more susceptible to hypnotic suggestion."

Absorption was selected for study for two reasons: first, absorption appears to be a different capacity from factors such as logical thinking or speed of mental processing. Absorption seems to be an essential requirement for situations that require deeper, more reflective thought, such as certain types of problem solving and creative activities. Absorption appears to be related to the degree to which the mind is settled and free from agitation and anxiety.

Second, while absorption is related to attention and conscious activity of the mind, it also appears to be related to the level of feeling, the ego, and possibly the

level of transcendental consciousness, i.e., the degree to which one's awareness is established in the inner Self. This hypothesis is supported by studies by Alexander (1978,1982) in which the investigator found that scores on the Tellegen's Absorption Scale (TAS) were significantly correlated with experiences of higher states of consciousness. As has been discussed in Chapters 3 and 5, higher states of consciousness are states in which the awareness of the subject is permanently established on the level of the inner Self, pure intelligence. Hence, absorption may provide a measure associated with a different level of the mind than the other measures discussed so far.

It should be noted, however, that the relationship between higher states of consciousness, intelligence, and capacity for mental absorption as measured by the TAS is speculative at this point. Absorption is obviously an aspect of deep thought. However, as Chapters 3 and 5 explained, growth of the fifth state of consciousness, cosmic consciousness, is characterized by "witnessing," which involves maintenance of the state of transcendental consciousness while experiencing waking, dreaming, and sleeping states of consciousness. Consequently, as cosmic consciousness and the other higher states of consciousness develop, the individual is increasingly able to experience objects and ideas without his or her awareness becoming completely absorbed in, or overshadowed by them.

In fact, freedom of the inner Self from the overshadowing influence of experience is one of the most important aspects of higher states of consciousness. Hence, it might be predicted that the sense of absorption in experiences will decrease with the growth of higher states of consciousness under the influence of the TM and TM-Sidhi program. Therefore, with regard to this measure, this study is exploratory rather than confirmatory.

Speed of Mental Processing

Two variables, simple (0-bit or 1-light) and choice (3-bit or 8-light) reaction time are included because the abilities they measure are associated with the senses, mind, and intellect (see tables 3 and 4). Improvements in these measures in the experimental group will indicate that the senses and the mind have increased in alertness and efficiency.

The study of reaction time (RT) has one of the longest histories of any measure in psychology. Simple reaction time was introduced to psychology more than a century ago by Donders, and the study of reaction time became very prominent in the last quarter of the 19th century. J.M. Cattell, having studied under Wundt in Germany, introduced the study of RT to American psychologists. With the advent of behaviorism, reaction time research declined. During the

1960's, when psychologists again focused on mental processes, reaction time came back into favor. Today, many types of cognitive research use choice reaction time (CRT).

In simple RT the subject makes a single response to a single stimulus, as contrasted with CRT, in which the subject must make differential responses depending on which one (or which combination) of two or more stimuli is presented. By breaking down CRT into stages, psychologists have attempted to confirm theories about stages of mental processing (Smith, 1968; Sternberg, 1966; Chase & Clark, 1972; Salthouse, 1981). Their research supports the hypothesis that minimal mental processing is involved in simple RT, while CRT involves more extensive, or "deeper" mental processing (Sternberg, 1966; Chase & Clark, 1972). With simple RT, the senses and elementary association process are involved, since the subject must perceive the stimulus (senses), associate it with the requirement for a response (mind), and respond. In choice reaction time, in addition to the processes of perception and association, there are elements of discrimination and decision (intellect).

Several studies have measured the effect of the TM and TM-Sidhi program on simple and choice reaction time. Shaw and Kolb (1971) found that subjects practicing the TM technique had shorter baseline RT's than control subjects; further, the TM practitioners improved their RT after 20

minutes of TM, while after 20 minutes of rest, the RT of the control group increased slightly.

Appelle and Oswald (1974) reported that subjects practicing the TM technique had significantly faster RT's before and after a session of the technique than controls had before or after either rest or a simple task. The TM practitioners showed no change in RT from before to after the session of the technique, but the variance was significantly reduced after the session. A study by Orme-Johnson, Kolb, & Hebert (in press) found that college-age subjects who practiced the TM technique had significantly shorter reaction times than controls. Furthermore, the TM meditators showed an improvement in RT performance after a session of TM, while showing no improvement following periods of rest which involved sitting with eyes closed or lying down with eyes closed. Control subjects showed no improvement after either type of ordinary rest.

Measuring college students, Schwartz (1979) found that long-term TM meditators had significantly shorter RT's than non-meditators. Six weeks after the non-meditating subjects were instructed in the TM technique, their reaction times decreased significantly.

Holt, Caruso, and Riley (1978) found a significant decrease in visual choice reaction time in TM meditators. The study measured three groups; a group of control subjects who rested between test sessions; a second group of TM

meditators who meditated between test sessions; and a third "pseudo-meditation" group, who practiced a partially imitative procedure between test sessions. Although all three groups showed a decrease in CRT between the first and second sessions, the "practice" effect was enhanced for the TM meditators.

While the number of studies associating shorter reaction time with the practice of TM is impressive, the design of the studies could have been more rigorous. Shaw and Kolb's study, Appelle and Oswald's study, and Orme-Johnson, Kolb, & Hebert's study are all open to criticisms of self-selection, since the subjects were not randomly assigned to groups, and the studies were not longitudinal. Since the present study is longitudinal and group differences are controlled for using ANCOVA, this design problem will be mitigated.

Efficiency of Mental Processing

Two measures, slope and intraindividual standard deviation of Hicks' RT, were chosen because they purport to measure a deeper mental process than do simple and choice reaction time. Roth (1964) applying Hick's law (Hick, 1952) found significant negative correlation between psychometric intelligence (g) and the slope resulting from the logarithmic increase in RT with increase in the number of

choices in the choice RT paradigm. This finding gave rise to a large body of research and theorizing about the phenomenon (Eysenck, 1985; Franck, 1971; Jensen 1980, 1982; Jensen & Munro, 1979; Jensen, Schafer, & Crinella, 1981; Lehrl, 1983; Oswald, 1971; Vernon, 1981, 1983).

Jensen's work in particular has aroused a good deal of criticism, as was mentioned in the preceding section on the measures of logical thinking ability, the Cattell's and Raven's IQ tests. In their theoretical work on this subject, both Jensen and Eysenck emphasize the role of the cortex as a limited-capacity channel of information processing.

According to Eysenck (1986),

"This limited capacity restricts the amount of incoming information (from external stimuli); it limits the number of operations that can be performed simultaneously on this information; and it restricts the amount of information that can be retrieved from short-term and long-term memory. Thus the model places great emphasis on the speed of mental operations, slowness leading to accumulating cognitive handicap."

The above theoretical viewpoint predicts negative RT-g correlations of reasonable magnitude, a negative slope-g correlation, and, as RT duration is linked with RT variability (intraindividual SD), it predicts a negative RT variability-g correlation.

The theory considers intraindividual RT variability as measured by intraindividual SD to be a measure of "noise" in the information processing system (Eysenck, 1987, Jensen, 1988); therefore a decrease in intraindividual SD of RT may

be taken as reduction of noise, and hence an increase in efficiency of mental processing.

The theory supports the concept of "g", a single factor in intelligence underlying both elementary cognitive tasks and complex cognitive tasks requiring abstract logical operations. Although published evidence suggests that IQ does correlate with slope of RT on bits of information attended to, and with the standard deviation of RT (Eysenck, 1985; Jensen, 1982, 1984, 1985; Jensen & Munro, 1979; Vernon, Nador, & Kantor, 1985), not all experiments have supported the theory. Vieger (1968) found only an insignificant correlation between Hick slope and the Amthauer (1955) intelligenz-Struktur-Test (IST); Schmidtke (1961) and Amelang (1985) failed to discover increases in correlation between RT and IQ with increase in bits of information. Most recently, Jensen has rejected slope of RT as a valid predictor of IQ, claiming that the most recent evidence supports intraindividual SD as a better predictor (1988).

Maharishi's Vedic theory of intelligence would predict decreases in slope of RT (in the 3-bit or 8-light conditions) and intraindividual SD of RT in the 8-light condition as a result of practice of the TM and TM-Sidhi program, since with the enlivenment of intelligence on all levels of the mind and physiology, the capacity to process information at each level should improve.

Furthermore, growth of ability to maintain awareness in the state of transcendental consciousness, a completely quiet yet alert mental state, should result in decreased intraindividual SD of RT, since it is defined as a measure of "noise" in the information processing system.

In addition, it is predicted that slope of RT and intraindividual SD will correlate significantly negatively with IQ scores, since the functioning of the different levels of the mind corresponding to abstract thinking capacity (measured by IQ tests) and elementary decision-making capacity (measured by intraindividual SD) are hypothesized to be integrated in their functioning.

Field Independence

Field Independence is understood to be an expression of increased psychological differentiation (Werner, 1957), a developmental process that underlies the ability to use one's internal frame of reference for perceptual and social comprehension of the environment (Witkin, Dyk, Faterson, Goodenough, & Karp, 1974). Field independence correlates positively with such developmental measures as Piaget's formal operations stage (Rubenstein, 1980) and Piaget's and Kohlberg's moral reasoning stages (Arbuthnot, 1971; Caring, 1971; Schleifer, 1971).

Field independence is also positively correlated with

"fluid" intelligence and various measures of both verbal and performance intelligence (Goldstein & Blackman, 1978; Hulfish, 1978; Mckenna, 1984).

Research has shown that, like fluid intelligence, field independence increases developmentally in all individuals up to age 17, then levels off (Witkin, Goodenough, & Karp, 1967). As with fluid intelligence, field independence tends to decrease as age reaches the upper end of the scale (Lee & Pollack, 1978; Markus, 1971; Schwarz & Karp, 1967).

It might be argued from the perspective of Maharishi's Vedic Psychology that field independence is primarily associated with the senses and the ego, although to a degree it involves all levels of the mind. Field independence involves both perception of the environment and the sense of self that is associated with the deepest level of feeling, the "I", the internal frame of reference. To the degree that one's awareness is in touch with the deeper, more "internal" levels the mind, field independence should be more in evidence. Since the purpose of the TM and TM-Sidhi program is to allow the individual to identify his or her awareness with progressively deeper, more "internal" levels of the mind, which are held to be increasingly stable and less excited, practice of these techniques should result in increased field independence.

Studies consistently report significant increases in field independence among practitioners of the TM and TM-

Sidhi program. Randomly assigning subjects in a Solomon four-group design, Pelletier (1974) found improved performance on the rod-and-frame test and the embedded-figures test over a 3-month period among college students learning the TM technique.

Orme-Johnson, Raimondi, Vesely, Dillbeck, & Wallace (in press), in another longitudinal study, tested two groups of female TM teachers randomly assigned to one of two groups. One group was tested before and after a 6-month TM-Sidhi course, while the other received posttest only as a control for learning effects. The first group scored significantly higher on the Group Embedded Figures Test ($p < .0005$) at posttest than at pretest. In addition, the second group scored similarly to the first group at posttest, suggesting that the TM-Sidhi course produced an increase in field independence over 6 months.

Jedrczak and Clements (1984), in a cross-sectional study, found that practitioners of the TM and TM-Sidhi program scored higher than norms on the FRCT, a hidden-figures test of field independence.

In another longitudinal study Dillbeck, Assimakis, Raimondi, Orme-Johnson, and Rowe (1986) tested undergraduate students on the Group Embedded Figures Test at MIU upon entry and at graduation three to five years later. The students averaged 10 months' practice of the TM-Sidhi program and 60 months' practice of TM at pretest. Field

independence increased significantly between pre- and posttest. Since field independence generally decreases in the normal population among subjects of comparable age, Dillbeck et al. concluded that maturation could be ruled out as a possible explanation for their findings. Regression toward the mean can be ruled out on all the longitudinal studies of the TM program and field independence, since TM meditators generally score quite high on tests of field independence at pretest. For this reason, some researchers have reduced by half the time allowed for the GEFT to avoid ceiling effects (Gelderloos et al., 1987).

In a cross-sectional study by Gelderloos, Lockie, and Chuttoorgoon (1987), 82 subjects, ages 7 to 11 years, were given the Children's Embedded Figures Test. The 48 subjects who were practicing the TM program as part of their curriculum, scored significantly higher on field independence than the other 34 subjects.

In connection with this last point, it should be noted that while the GEFT is a convenient measure of field independence, since it is short and can be administered to a group, it is a less reliable measure of field independence than a more rigorous, individually administered measure such as the rod-and-frame test.

Furthermore, since practitioners of the TM and TM-Sidhi program tend to score highly on the GEFT, ceiling effects are a potentially serious problem. Attempting to overcome

this problem by halving the time of the test is not an ideal solution, since the time of the test is already relatively short (10 minutes). It is very possible that, when reduced to 5 minutes, the test becomes more of a measure of test-taking speed rather than a measure of field independence. Hence, this concern must be addressed in administration of the test and analysis of results.

In this study the decision was made to allow full time for the test at pretest, and examine the distribution of scores before administration of posttest. Since the data analysis would control for pretest scores, it was reasoned that the time of the test could be shortened for posttest if necessary.

Higher States of Consciousness

Higher states of consciousness comprise a central feature of the Vedic view of intelligence, as was discussed in Chapters 1, 3, 6, 5, and 7 of Part II. According to Maharishi Mahesh Yogi, founder of Vedic Psychology, higher states of consciousness represent natural stages of the progressive unfoldment of creative intelligence (Maharishi Mahesh Yogi, 1972). The TM and TM-Sidhi program is designed to hasten the development of higher states of consciousness, and hence, it may be predicted that individuals who practice the TM and TM-Sidhi program would experience higher states

of consciousness more frequently than those who do not practice the TM and TM-Sidhi program.

Because higher states of consciousness represent the most profound, holistic kind of development of the individual, to the extent the variables chosen are related higher states of consciousness, they should be positively influenced by the unfoldment of higher states of consciousness. In different individuals, different capacities will certainly develop to different degrees due to individual differences in genetic structure, environmental influences, and motivation. However, according to Maharishi's Vedic theory of intelligence every capacity of the individual should improve to some degree with the development of higher states of consciousness.

Until recently, subjective reports of experiences of higher states of consciousness were available in Vedic literature, and in contemporary literature only on an informal basis. In 1982, Alexander developed and began to use the States of Consciousness Inventory (SCI), a numerically scoreable questionnaire designed to measure frequency and quality of such experiences. Since that time, Alexander has used the SCI with several groups in different research designs.

In a cross-sectional study of 103 prison inmates, approximately one-third of whom were practicing the TM technique, (Alexander 1982) active long-term TM meditators

reported significantly greater frequency of experiencing higher states of consciousness than subjects interested and subjects not-interested in learning TM. Regularity of meditation in advanced meditators also was highly correlated with reported frequency of experiences of higher states.

The subjects were measured again after 15 months; both new and advanced TM practitioners increased significantly in experiences of higher states of consciousness in comparison to wait-list controls, non-active practitioners and non-practitioners. Even after statistically controlling for potential demographic and self-selection factors that may have otherwise biased the outcome, the longitudinal findings were statistically significant. Comparable samples from two counseling programs and two other self-improvement groups did not increase in reported frequency of experiences of higher states relative to non-practitioners of these programs. In all groups, the higher states of consciousness factor was highly stable over the period of the study.

A cross-sectional study (Jedrczak, Clements, & Alexander, 1986) of a large group of advanced practitioners of the TM and TM-Sidhi program in Great Britain found that length of practice of the TM and TM-Sidhi program was significantly correlated with reported frequency of experience of higher states of consciousness, as measured by a short form of the SCI.

A second cross-sectional study used the SCI short form

with another British sample (Jedrczak & Alexander, 1986). Reported frequency of experiences of higher states in long-term practitioners of the TM and TM-Sidhi program (average 10.2 years TM practice and 5.6 years practice of the advanced TM-Sidhi program) was compared with reported frequency in short-term practitioners (2.5 years TM practice) and with nonmeditating control subjects. There was a highly significant difference in reported frequency of experiences of cosmic consciousness and unity consciousness in the long-term and shorter-term meditators combined, compared to the nonmeditating controls. Furthermore, the advanced TM and TM-Sidhi program group reported more frequent experiences of both cosmic consciousness and unity consciousness than the shorter-term group, who in turn had more experiences of cosmic consciousness and a trend toward more experiences of unity consciousness than nonmeditating controls.

According to Maharishi's Vedic Psychology, the most unambiguous subjective criterion for identifying the first permanent higher state of consciousness, cosmic consciousness, is the experience of witnessing deep sleep, the experience of the settled inner wakefulness of transcendental consciousness along with sleep (Maharishi Mahesh Yogi, 1969, 1972). Evidence of this phenomenon was recently provided by surveys of subjects who practice the TM and TM-Sidhi program regularly.

Orme-Johnson and Edwards (1982) obtained reports of witnessing deep sleep in a questionnaire given to 235 volunteer students and staff at Maharishi International University (MIU) in Fairfield, Iowa who regularly practiced the TM and TM-Sidhi program. Eighty-two per cent of the sample reported having experienced witnessing deep sleep at least once or twice. Forty per cent reported having the experience once a week or sporadically; seven per cent reported having frequent experiences of witnessing; eight per cent of the sample reported regular experiences of clear inner awareness of transcendental consciousness throughout a night's sleep. Seventeen per cent reported either vague or no experiences of witnessing deep sleep.

A more recent study (Gackenbach, Cranson, & Alexander, 1986) reported similar findings: eighty-two per cent of the meditating first year students at MIU reported the experience of witnessing dreaming or sleep at least once (Gackenbach, Cranson, & Alexander, 1986).

The evidence gathered so far through the subjective means of investigation, supports the hypothesis that practice of the TM and TM-Sidhi program is associated with the unfoldment of higher states of consciousness. This study will attempt to add further evidence to either confirm or disconfirm this hypothesis, through comparison of two groups: 1), a group that is not practicing the TM and TM-Sidhi program, and, 2) a group that learns the TM and TM-

Sidhi program and practices it for two years. The measure to be used is a short questionnaire on frequency of experiences of higher states of consciousness developed by Alexander, Cranson, and Gackenbach (see Appendix B). The questionnaire required subjects to provide examples of experiences they reported, in order to demonstrate their working knowledge of the state of consciousness in question. The next chapter is the methods section of the study.

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Chapter 3: Method

Subjects

Subjects were students who enrolled in introductory psychology classes at two universities in Iowa. The experimental group consisted of 25 males and 20 females at Maharishi International University (MIU). The mean age was 25.2 years, $SD = 6.74$. The comparison group consisted of 22 males and 33 females at the University of Northern Iowa⁴. Mean age was 19.0 years, $SD = 1.8$. An attempt was made to match the groups as closely as possible on demographic variables. The two universities were located in the same region of Iowa. Both groups had enrolled in introductory psychology courses, UNI students as an elective and MIU students as part of a required first year curriculum

In addition to age, there were several demographic differences between the MIU and UNI samples. First, because some of the MIU students had previous college experience, the mean education level was 2.5 years of college for MIU

⁴ A fairly high attrition rate for the first two years of enrollment is characteristic of both MIU and UNI, the two universities being typical of American universities in this regard. Hence, 97 subjects were pretested at MIU and 125 at UNI. As expected, by posttest these numbers had decreased to 45 at MIU and 55 at UNI. Analyses were performed to address the question of whether attrition could have been responsible for any observed differences at posttest, and these are reported at the end of the Results section.

($SD=3.1$ yrs.) vs. 1.5 for UNI ($SD=.82$ yrs.).

Second, Father's education averaged 4 years of high school for MIU ($SD=2.2$), while it averaged 3 years for UNI ($SD=1.6$). The possible contributions of these demographic differences were controlled for in the data analysis through use of MANCOVA.

Two other possible differences between the experimental and control groups that could be cited as possible causes of differences in results are differences in level of interest in meditation for the two groups, and the differences in the structure of the curriculum at the two universities. These two factors will now be considered.

Since practice of the TM program is customary for students who enter MIU, all the MIU students naturally had a high level of interest in meditation, while this was not the case with UNI students. Consequently, an additional 24 subjects were selected for the UNI sample on the basis of their high level of interest in meditation, and tested one month after the other subjects were tested. A stepwise regression analysis was then performed to test the effect of interest in meditation on performance of the entire group of UNI subjects at posttest.

The curriculum at MIU is organized according to the block system, under which one subject is studied at a time, instead of many subjects simultaneously. Two other colleges in the United States currently use the block system:

Colorado College in Colorado Springs, and Goddard College in Mt. Vernon, Iowa. Discussions with the evaluations administrators at these two colleges revealed no evidence of improvements in cognitive measures as a result of the block system. In support of the hypothesis of no effect of the block system on cognitive performance, a study by Shecter (1978) indicated that presentation of intellectual knowledge without the practice of TM did not result in cognitive benefits; however, cognitive performance did improve when the practice of the TM technique was added. While practice of TM did. Presumably, this lack of effect would apply to intellectual knowledge in general, regardless of the order in which the knowledge is presented, i.e., many subjects at a time or one subject at a time.

Variables

The independent variable was participation or non-participation in the educational program at MIU, whose main innovative feature is the twice daily practice of the Transcendental Meditation (TM) and TM-Sidhi program. All of the MIU students had been practicing the TM program prior to their enrollment; length of time practicing TM ranged from 1 month to 15 years, with a mean of 6 years, 10 months. Fifty-eight percent of the MIU students had been practicing the TM-Sidhi program as well, with a range of 2 months to 9

years, and a mean of 3 years, 5 months. Once they enrolled at MIU, their practice was done as a group, since it was a part of the educational program. Most who were not practicing the TM-Sidhi program upon admission to MIU learned the TM-Sidhi program during their first three months at MIU.

Considering the fact that all the MIU subjects were already practicing the TM program and many were practicing the TM-Sidhi program as well at pretest, a ceiling effect might have been expected for change in MIU scores from pretest to posttest, in contrast to control subjects, who were not practicing the TM and TM-Sidhi program. Nonetheless, the investigator hypothesized that the effect of practicing the TM and TM-Sidhi program was sufficiently robust that performance of the MIU students would continue to improve over the two-year period of the study.

The dependent measures were: frequency of experiences of higher states of consciousness, as reported in a questionnaire (see Appendix B); Cattell's Culture Fair Intelligence Test (CFIT); Raven's Advanced Progressive Matrices (Raven's); simple and choice reaction time (Hick's 1-light and 8-light configurations); intra-individual SD of Hick's 8-light RT; slope of Hick's 1-light/8-light RT; the Tellegen Absorption Scale (TAS); the Group Embedded Figures Test (GEFT); and the Torrance Test of Creative Thinking (TTCT), figural forms A and B.

Design

The design for comparing the experimental group and the control group was an untreated nonequivalent control group design with pretest and posttest (Cook & Campbell, 1979, pp. 103-104). The experimental group (MIU first-year students) received pretest on the measures listed in Table 4 during the first three weeks of their first term, then received two years of education at MIU, including the twice-daily practice of the TM and TM-Sidhi program.

The control group received pretest concurrent with the experimental group, and posttest after the first two years of a standard university education. Both groups were posttested during the first three weeks of the fall term--the same period in which they were pretested.

Since random assignment to experimental and control groups was not possible, data was gathered from both groups on variables known to be related to performance on IQ tests. The data included subject's age and education level, father's education level, and father's annual income.

Regarding age, according to normative data, the higher mean age of the experimental group would not give the experimental group an advantage for performance on the CFIT. Performance on the CFIT, other psychometric tests, and RT measures generally decreases with age (Botwinick, 1967, 1973; Horn & Cattell, 1967; Welford, 1969), and although

this may not apply for the age range of the experimental and control groups, it certainly does not favor the experimental group; if anything, the age difference would predict poorer performance in the experimental group.

In addition to the covariates mentioned above, frequency of dream recall was included as a covariate, since previous research (Gackenbach, Cranson, & Alexander, in press) indicated a correlation between frequency of dream recall and experiences of higher states of consciousness. The implication of the research was that higher reported frequency of experiences of states of consciousness might be more a function of: 1) better ability to recall experiences of states of consciousness than actual increased frequency of experiences; 2) a reporting bias; 3) subject variables, i.e., some subjects think and talk about their experiences more than others. However, mean dream recall was the same for both groups at pretest-- 5.0. See Appendix B for an example of the scale used.

Lastly, to control for the possible influence of self-selection in the experimental group, data was gathered from both groups regarding subject's level of interest in meditation. See Appendix C for an example of the scale used. Since interest in meditation was uniformly high for the experimental group but varied within the control group, the effect of level of interest on posttest scores for all variables was analyzed for the control group alone. With the

exception of this variable, all the above variables were introduced as covariates in the analysis of both experimental and control groups, which appears in the results section.

Instruments

A self-report questionnaire was used to measure frequency of witnessing deep sleep (Appendix C)⁵. The question asked was, "During dreamless sleep, have you experienced a quiet, peaceful inner awareness or wakefulness?" The subject was asked to check a box next to the number which most accurately represented how frequently the experience occurred over the previous two years. The subject was asked to write down a concrete example of the experience from memory on a space provided on the reverse side of the questionnaire, in order to show that he or she

⁵ Although the questionnaire on higher states of consciousness had other items on experiences of "lucid dreaming" and "witnessing" dreaming, these items were not included in the analysis because the investigators found that subjects confused the experience of lucid dreaming with the experience of witnessing dreaming, and hence the data on witnessing dreaming were unreliable.

understood the concept⁶. The examples provided by the subjects were blind-scored independently by two researchers, and marked "yes" or "no", signifying whether or not the subject understood the concept. Responses which did not include a sample experience were deleted from the analysis. Inter-rater reliability for scoring sample experiences was .96.

Apparatus

The apparatus for measuring reaction time (RT) was modeled after an apparatus used by Jensen (1987). It consisted of a panel, 13 in. x 17 in., painted black and tilted at a 30 degree angle. At the lower center of the panel was a red pushbutton, 1/2 in. in diameter, called the "home" button. Eight red pushbuttons, all equidistant (6 in.) from the "home" button, were arranged in a semicircle around it. A 1/4 in. green light was mounted half an inch above each of the buttons in the semicircle. The console was connected to an Apple IIe computer through the game port, and a computer clock (Mountain Hardware Apple model) was used to measure RT.

⁶On the basis of initial responses to the questionnaire, it was estimated that many of the subjects probably had the experience in question but did not give a sufficiently detailed account of the experience for it to be scored. Therefore, one month after the initial testing, subjects were approached again and asked to provide more detailed accounts of their experiences from memory, which they did.

Procedure

For both the experimental and the control group, Hick's reaction time tests were given in a quiet, dimly lit room, so that the subject could see the board clearly, but the room lighting did not obscure the lights on the apparatus. An assistant sat with the subject and read the instructions aloud, making sure the subject understood the instructions before proceeding. The assistant remained sitting quietly next to the subject during the trials.

Subjects were instructed to place the index finger of the preferred hand on the home button. This caused an auditory warning signal (a high pitched "beep") to sound, followed (after a random interval of from one to four sec.) by one of the eight green lights going on. The subject was previously instructed to turn off the light as quickly as possible by pressing the red button directly below the light. In the one-light condition, on each trial the same light went on (right of top center). In the eight-light condition, the particular light that went on in each trial was random and hence unpredictable. RT was the time the subject took to remove his finger from the home button after the green light went on. Movement time (MT) was independently measured as the time taken to move the finger from the home button to the button under the green light. On each trial RT and MT were registered automatically in

milliseconds by the computer clock with an accuracy of within one msec and recorded by the computer. Upon completion of the 20-trial set for each subject, the mean RT and standard deviation of RT for 20 trials were computed and recorded by the computer.

Each subject was given 5 practice trials in the one-light condition (the same light came on for every trial), and subsequently 20 trials in that condition. Then each subject received 5 practice trials in the eight-light condition (any one of the eight lights came on randomly) and 20 trials in that condition.

Cattell's CFIT was administered according to the standard procedure given in the test instructions-- form A at both pretest and posttest. The same form was used at both pretest and posttest on advice of the Institute for Personality Assessment and Testing (IPAT), publishers of the test, who affirmed that recall of the test items is negligible two years after the test is taken, and that test-retest reliability is higher when the same form is used for both pretest and posttest.

The Raven's test was a split-half version of the 36 item Raven's Advanced Progressive Matrices. Items from the two halves of the test were matched for difficulty on the basis of normative data from S.E. Paul (1986), who calculated the frequency of correct responses on each item for a sample of 300 university students. The same half was

used in this study for both pretest and posttest in order to assure high pretest-posttest reliability. Since this version contained 18 items, 20 minutes was allowed for the test instead of the usual 40 minutes. The instructions and practice items were given as usual.

The Torrance test of Creative Thinking (TTCT), forms A and B (A at pretest, B at posttest), the Group Embedded Figures Test (GEFT), and the Tellegen Absorption Scale (TAS) were all given according to the instructions in the test manuals.

The measures were given in the following order for both the experimental and the control groups: Cattell's CFIT, Torrance test of creative thinking, HSOC questionnaire, Raven's, GEFT, and Tellegen Absorption Scale. The Hick's reaction time test was given after all the other measures, on a different day. Subjects were tested individually on this measure for 15 minutes; to test the entire group required three weeks.

Chapter 4: Results

Factor Analyses of Dependent Variables

Posttest scores⁷ on the following measures were submitted to principal components analysis: HSOC questionnaire (question on witnessing deep sleep only), Cattell's CFIT, Raven's, Hick's 1-light RT, Hick's 8-light RT, GEFT, TTCT, and Tellegen's TAS. Neither all of the reaction time measures nor all of the TTCT subscales could be included in the first stage of the analysis since, as Jensen (1987b) has pointed out, in both cases, RT and TTCT, the group of measures is derived from the same original data. Hence, mean 8-light and mean 1-light reaction times were used in the analysis to represent the Hick's group and figural fluency was used to represent the TTCT group. Figural fluency was chosen for the TTCT group since, in past research, improvement in this measure was most consistently found to be related to the growth of higher states of consciousness (Haynes et al, 1977; Orme-Johnson & Haynes, 1981; Orme-Johnson, 1982).

Loadings on the three unrotated principal components

⁷ Posttest scores were analyzed by principal components rather than pretest, because the very low frequency of high scores on the HSOC measure at pretest was expected to reduce the variance. Successful intervention would increase the frequency of high scores at posttest, assuming no pretest-posttest decline among controls.

are presented in Table 5. As can be seen from the table, HSOC scores, GEFT, CFIT, Raven's, and 8-light RT scores loaded on the first principal component. TAS scores, TTCT figural fluency, and Hick's 1-light RT loaded on the second principal component. Scores from all the measures used loaded on either the first or second principal component. Furthermore, the first and second components each accounted for more of the variance--31.38% and 16.45% respectively--than the third principal component (13.86%); hence the third principal component was not used in the subsequent analysis.

TABLE 5
LOADINGS FOR POSTTEST SCORES, EIGEN VALUES,
AND PERCENTAGE OF TOTAL VARIANCE EXPLAINED
BY FIRST THREE PRINCIPAL COMPONENTS

LOADING	COMPONENT		
	1	2	3
FREQUENCY OF WITNESSING SLEEP	0.605*	0.151	0.506
GEFT	-0.734	-0.150	-0.181
RAVEN'S APM	-0.671	-0.145	-0.413
CATTELL'S CFIT	-0.780	-0.070	-0.385
TELLEGEN'S TAS	-0.179	-0.610	0.060
X 8-LIGHT RT	0.638	0.301	0.438
X 1-LIGHT RT	0.283	0.644	0.079
TTCT FLUENCY	-0.168	-0.607	-0.547
EIGEN VALUES	1.316	1.108	2.51
PERCENT OF TOTAL VARIANCE EXPLAINED BY COMPONENTS	31.38	16.45	13.86

* Signs here have been reversed for the sake of consistency with later discussion of results.

An examination of Table 5 suggests that the two principal components can be characterized as follows. The first component appears to be related to consciousness and abstract cognitive functions, since HSOC scores, CFIT scores, and choice RT scores all loaded on it. The second appears to be related to speed and concrete psychomotor functions, since 1-light (simple) RT loaded on it. In the discussion section in Chapter 5, the relationship between 1-light RT, creative fluency, and Tellegen's TAS is reconsidered. It is explained why all three may be related to mental and psychomotor speed.

Covarying for Demographics

As mentioned in the design section, potential confounds related to performance on IQ tests and other measures were tested as covariates. These covariates were: level of interest in meditation, frequency of dream recall, subject's age, subject's education level, father's education level, and father's annual income.

To test for an effect of interest in meditation on posttest scores of the control group on each dependent variable, stepwise regressions were performed with pretest scores and level of interest in meditation as the covariates. The alpha level was .05 to enter and .05 to remove. Pretest scores entered the stepwise regressions

first. Interest in meditation was not kept in any of the regressions; therefore the effect of interest in meditation was not significant in any of the regressions. Hence, for the control group it was concluded that level of interest in meditation had no effect on posttest scores on any of the measures which loaded on the first principal component.

To test for the effect of dream recall on HSOC scores, a stepwise regression was performed for experimental and control groups combined, with pretest scores and frequency of dream recall at pretest as covariates. The alpha level was .05 to enter and .05 to remove. Pretest scores entered the stepwise regression first, and dream recall was not kept in the regression. Hence, the result indicated that frequency of dream recall had no effect on HSOC posttest scores.

Next, stepwise regressions were performed to assess the importance of potential covariates. These analyses combined experimental and control groups and were performed for each of the dependent variables which loaded on the first principal component-- Frequency of witnessing sleep (HSOC scores), GEFT, Raven's APM, Cattell's CFIT, and Hick's 8-light RT. Subject's age, education level, and father's education level were included as predictor variables, in addition to pretest scores for the appropriate dependent variable. Since data on father's annual income was available for only about half the subjects, a separate stepwise

regression was performed for each dependent variable using pretest scores and father's annual income as predictors, in order to maximize the number of available cases for analyses using the other predictors.

For each variable in the first principal component group, pretest scores entered the stepwise regression first. Subject's age and father's education were also kept in the regression for posttest scores on the HSOC questionnaire at the $p < .05$ level. Father's education was kept in the analysis for CFIT posttest scores; age and father's education were kept in the analysis for scores on Hick's 8-light choice reaction time. Hence age and father's education were entered as covariates into the test of the assumption of homogeneity of slopes in preparation for one-way MANCOVA on posttest scores for HSOC, CFIT, Raven's, 8-light RT, and GEFT.

Father's annual income was kept as a covariate in the stepwise regression for Raven's posttest scores at $p < .05$; however, father's annual income was not entered as a covariate in the above test of the assumption of homogeneity of slopes, since it would have substantially reduced the number of available cases in the analysis. Rather, father's annual income was entered into a separate MANCOVA test to test the homogeneity of slopes assumption for the five dependent variables.

As with the first principal component, stepwise regressions were performed for posttest scores on the

dependent measures which loaded on the second principal component-- Tellegen's, Torrance TTCT figural fluency, and mean 1-light RT-- with level of interest in meditation and pretest scores as the predictors. Pretest scores loaded first in the regressions. Level of interest in meditation was not kept in any of the three regressions; hence it was concluded that for the control group, level of interest in meditation had no effect on posttest scores on any of the variables which loaded on the second principal component.

Next, for the second principal component stepwise regressions were performed for posttest scores on the three dependent variables with subject's age, education level, and father's education level as the covariates. In each stepwise regression, pretest scores entered the regression first. Subject's education level was also kept as a predictor in the stepwise regression for Tellegen's posttest scores. Hence, subject's education level was entered as a covariate along with pretest scores into the test of the assumption of homogeneity of slopes, in preparation for one-way MANCOVA on posttest scores for Tellegen's, Hick's 1-light RT, and TTCT figural fluency. In separate stepwise regressions for Tellegen's, Hick's 1-light RT, and TTCT figural fluency, father's annual income was not kept in any of the regressions as a covariate; hence no further analysis was performed using father's annual income as a covariate.

For the group of variables which loaded on the first

principal component, the test of the assumption of homogeneity of slopes showed a statistically significant ($p < .044$) interaction between subject's age and the grouping variable. Since only one interaction was observed, MANCOVA was performed with age and father's education as covariates. Since age did not reach significance at $p < .05$ in the MANCOVA, it could be concluded that age differences between the experimental and control groups did not significantly influence changes in scores on the dependent measures from pretest to posttest. The same could be concluded for father's education, since it was not significant as a covariate either ($F = .960$, $DF = 5, 23$). Hence, age and father's education were dropped from the analysis. Pretest scores for Cattell's CFIT, Raven's, Hick's 8-light CRT, and GEFT were not statistically significant as covariates; however, they were all kept in the analysis.

Next, the assumption of homogeneity of slopes was tested with HSOC posttest scores, CFIT scores, Raven's scores, 8-light RT scores, and GEFT scores as the dependent variables as before. However, this time father's income and pretest scores on the dependent variables were entered as covariates. The assumption of homogeneity of slopes was supported; hence, one-way MANCOVA was performed with father's annual income as a covariate. The covariate did not reach significance at the $p < .05$ level ($F = .454$, $DF = 5, 13$).

MANCOVA for Variables Loading on
First Principal Component

Since neither subject's age, nor education, nor father's education, nor father's income reached statistical significance as covariates, the MANCOVA for posttest scores on the dependent variables which loaded on the first principal component was performed again without the four covariates. Wilks' lambda was 0.545 and the F -statistic was 5.506 ($p < .001$, $DF=5,33$). Hence, the null hypothesis of no effect of the grouping variable on the five dependent variables was rejected. The effect was in the direction of improvement on the five dependent measures in the experimental group.

MANCOVA for Variables Loading on
Second Principal Component

Next, the assumption of homogeneity of slopes was tested with posttest scores on those dependent measures that loaded on the second principal component--Tellegen's TAS, Hick's 1-light RT, and TTCT figural fluency--as the dependent variables. Since subject's education was kept in the regression for posttest scores on Tellegen's, it was entered as a covariate. The assumption of homogeneity of slopes was supported; hence one-way MANCOVA was performed

with pretest scores on the three dependent variables and subject's education as the covariates. Subject's education was not statistically significant as a covariate ($F=.935$, $p=.430$), so one-way MANCOVA was performed again without the covariate. The effect for group was significant (Wilks' Lambda=.855, $F=3.217$, $p<.03$, $DF=3,57$). Hence the null hypothesis of no effect of the grouping variable on the three dependent variables was rejected. The difference in F values for the two principal components suggests that the effect of the intervention was more pronounced on those dependent measures that represent more abstract levels of the mind (e.g., IQ test, HSOC scores, choice reaction time), as opposed to measures representing more concrete levels of the mind (e.g., simple reaction time).

One-way ANCOVA'S for Individual Dependent Variables

The next step was to perform individual one-way ANCOVA'S, testing the assumption of homogeneity of slopes for the five dependent variables that loaded on the first unrotated principal component, and the three dependent variables that loaded on the second unrotated principal component. Table 6 presents the results of these analyses.

TABLE 6
RESULTS OF TESTING THE HYPOTHESIS OF HOMOGENEITY OF SLOPES
FOR EACH COVARIATE, FOR EACH DEPENDENT VARIABLE

Dep. Variable	Covariate	df	F	p
HSOC scores	pretest score	(1,56)	6.011	0.017
Culture Fair Test	Pretest score	(1,87)	1.332	0.252
Raven's APM	Pretest score	(1,77)	1.123	0.293
Hick's 8-light mean RT	Pretest score	(1,76)	0.503	0.480
Hick's 1-light mean RT	Pretest score	(1,77)	2.699	0.105
SD of Hick's 8-light RT	Pretest score	(1,65)	0.049	0.826
Slope of 1 & 8-light RT	Pretest score	(1,77)	0.062	0.804
GEFT	Pretest score	(1,81)	4.595	0.035
Tellegen's TAS	Pretest score	(1,75)	1.443	0.233
Torrance TTCT	Pretest score	(1,73)	.381	0.539

HSOC Scores

The assumption of homogeneity of slopes was supported for all dependent variables on the first principal component with the exception of HSOC scores and GEFT scores. Hence, for HSOC scores, repeated measures ANOVA was performed with group (MIU or UNI) as the grouping factor and pretest-posttest scores as the trials factor. Results indicated that the main effect for group was significant ($F=15.34$, $p<.0001$, $DF=1,58$), the main effect for pretest-posttest was not significant ($F=2.14$, $p=.149$, $DF=1,58$), and the interaction between pretest-posttest and group was significant ($F=11.35$, $p<.001$, $DF=1,58$). Hence, the result showed that there was a significant pretest-posttest change in HSOC scores for at least one of the two groups-- either the MIU group or the control group, or both. To further verify whether this result could be attributed to positive change in MIU scores, negative change in UNI scores, or a combination of these two, independent t -tests on pretest/posttest scores were performed separately for the MIU and UNI groups. The results indicated that scores for the MIU group did change significantly ($t=3.12$, $p<.0025$, one-tailed test), while UNI scores did not ($t=1.48$, $p=.149$, two-tailed test). For the sake of clarity, the scale was then reversed with respect to the original questionnaire (see Appendix C), so that a score of 1 now indicates the subject claimed never to have had the experience, and a score of 11 indicates the subject reported

having the experience all night, every night. The MIU mean for HSOC pretest scores was 2.9 and the posttest mean was 4.7. Pretest mean for UNI was 2.2 and posttest mean was 1.6. Hence, the results showed that performance on the HSOC measure improved significantly from pretest to posttest for the MIU group compared with the UNI group, and it did not change significantly for the UNI group.

GEFT Scores

Repeated measures ANOVA was next performed for GEFT scores, with group (MIU or UNI) as the grouping factor and pretest-posttest scores as the trials factor. Results indicated that the main effect for group was significant ($F=17.17$, $p<.0001$, $DF=1,83$), the main effect for pretest-posttest was significant ($F=36.20$, $p=.0001$, $DF=1,83$), and the interaction between pretest-posttest and group was significant ($F=7.58$, $p<.007$, $DF=1,83$). Hence, the result showed that there was a significant pretest-posttest change in GEFT scores for both groups-- and the change was more in one group than the other. To further verify whether this result could be attributed to change in MIU scores, change in UNI scores, or a combination of these two, independent t -tests on pretest/posttest scores were performed separately for the MIU and UNI groups. The results indicated that scores for the MIU group did change significantly ($t=-5.80$, $p<.0001$, two-tailed test), while UNI scores did as well

($t=2.57$, $p=.013$, two-tailed test). The MIU mean for HSOC pretest scores was 14.84 and the posttest mean was 12.11. Pretest mean for UNI was 10.67 and posttest mean was 9.29. Decrease in scores from pretest to posttest could be expected for both the experimental and the control group, since the time allotted for completion of posttest was half the time for pretest. Due to this confound, the results are not easily interpretable, since the test conditions created by the extremely short time of the posttest called the validity of the measure into question. For a more detailed discussion of this point, see the discussion section in the following chapter.

Scores on All Other Dependent Measures

The results of the one-way ANCOVA'S for the other dependent variables that loaded on the first principal component indicated that the null hypothesis could be rejected for scores on all of them except for Raven's, and they all improved in the MIU group compared to the UNI group with the exception of Raven's.

Even though the result for Raven's scores was statistically significant ($t=2.37$, $p<.01$), the pretest-posttest changes in the mean for the experimental and control groups show that the result was not necessarily due to a positive change in the experimental group, but could have been due to a decline in scores of the control group.

This result may well be due to unreliability of the Raven's measure. As mentioned in the Instruments section, a split-half version of Raven's Advanced Progressive Matrices was created for this research using norms from Paul (1986). Only one of the halves was used, containing 18 items instead of the usual 36. There are no normative data for such a modified version of Raven's APM. Since the validity of this altered form of Raven's could not be assured, and since the complete, standard form of the Cattell's test was used in addition to this test, the results of the Cattell's test were used and not the results of the modified version of Raven's.

In the one-way ANCOVA'S for the three dependent variables that loaded on the second principal component, only Hick's 1-light RT showed a significant decrease for the MIU group compared to the control group. Table 7 presents the results of all the ANCOVA'S. The F -test value was converted to a t -test value in order to obtain one-tailed p -values for testing the directional hypothesis of an improvement in the experimental group relative to controls (see Rosenthal and Rosnow, 1984, pg.244).

In summary, all dependent measures changed in the predicted direction (pretest-posttest improvements in the MIU group vs. no change in the control group), except for Tellegen's TAS and the Torrance TTCT.

TABLE 7
 ONE-WAY ANALYSES OF COVARIANCE FOR EFFECT OF GROUP
 ON CFIT, RAVEN'S APM, HICK'S RT MEASURES,
 TELLEGEN'S TAS, AND TTCT FIGURAL FLUENCY

Variable or Covariate	Group	xpre	SD pre	xpost	SD pst	Adj.x post	df	F	t	p
Cattell's CFIT	Exper.	26.82	5.19	29.03	5.26	29.17				
	Control	27.32	3.84	27.02	4.34	26.91	88		2.79	<.005
Pretest covariate							88	50.24		<.0001
Raven's APM	Exper.	10.91	2.81	11.33	3.26	11.72				
	Control	11.57	2.37	10.47	3.08	10.31	78		2.37	<.01
Pretest covariate							78	36.61		<.0001
Hick's 1-light RT	Exper.	311.46	46.52	278.70	47.23	275.62				
	Control	300.61	57.71	290.39	36.86	292.98	78		2.11	<.025
Pretest covariate							78	26.05		<.0001
Hick's 8-light RT	Exper.	350.57	47.11	320.14	30.53	335.05				
	Control	467.27	107.11	492.75	76.03	480.21	77		9.10	<.0001
Pretest covariate							77	8.65		<.004
SD of Hick's RT	Exper.	106.63	136.51	45.25	19.90	45.30				
	Control	263.22	167.45	289.73	112.13	289.67	66		11.4	<.0001
Pretest Covariate							66	.000		.992
Slope of 1-8 lt RT	Exper.	17.37	13.54	14.45	10.45	14.09				
	Control	66.31	45.62	67.46	27.11	67.76	78		9.17	<.0001
Pretest covariate							78	0.04		.846
Tellegen's TAS	Exper.	23.37	5.97	23.27	5.91	22.05				
	Control	20.53	5.48	22.08	5.41	22.65	75		0.54	.593
Pretest covariate							75	34.07		<.0001

TABLE 7 (Continued)
 ONE-WAY ANALYSES OF COVARIANCE FOR EFFECT OF GROUP
 ON CFIT, RAVEN'S APM, HICK'S RT MEASURES,
 TELLEGEN'S TAS, AND TTCT FIGURAL FLUENCY

Variable or Covariate	Group	xpre	SD pre	xpost	SD pst	Adj.x post	df	F	t	p
Torrance	Exper.	18.10	6.81	16.80	6.49	11.72				
TTCT	Control	13.95	5.51	15.38	5.44	10.31	74	0.03		.857
Pretest covariate							74	8.58		<.005

Analysis of RT Measures

Next, one-way MANCOVA was performed on the dependent variables in the RT group taken together--8-light CRT, 1-light RT, SD of RT, and slope of RT--since the effect for 8-light RT was significant. The Wilks' Lambda statistic was 0.451 and the F-statistic was 17.651 ($p < .000001$, DF=4,58); hence the null hypothesis of no effect of the grouping variable was rejected. Consequently, individual 1-way ANCOVA'S were performed on each of the three remaining RT measures-- 1-light RT, SD of 8-light RT, and slope of RT. As Table 7 shows, a statistically significant result was found for each of the dependent variables, and hence it was concluded that the independent variable had a significant effect on all of them, in the direction of improvement in MIU scores compared with UNI scores.

Analysis of TTCT and TAS Scores

The remaining dependent measures--TTCT scores for fluency and scores on the Tellegen Absorption Scale--loaded on the second principal component, as shown in Table 5. Hence, MANCOVA was performed on all the TTCT scores-- fluency, originality, elaboration, and abstractness of titles--and TAS scores.

The assumption of homogeneity of slopes was supported; hence, one-way MANCOVA was performed. The Wilks' lambda

statistic was 0.943 and the F -statistic was 0.659 ($p = 0.656$, $DF=5,55$); therefore, the null hypothesis was accepted for effect of the grouping variable on TTCT scores and scores on the Tellegen Absorption Scale.

Figure 5 presents pretest-posttest change in HSOC scores--reported frequency of witnessing deep sleep--for the experimental and control groups. Again, for the sake of clarity, the scale has been reversed with respect to the original questionnaire, so that a score of 1 now indicates the subject claimed never to have had the experience, and a score of 11 indicates the subject reported having the experience all night, every night. The change in MIU HSOC scores from 2.9 to 4.7 represents a change in frequency of witnessing deep sleep from less than once a year to once every six months. The change in UNI scores from 2.2 to 1.6 represents a non-significant change in frequency of witnessing sleep from once in a lifetime to between once in a lifetime and never.

Figure 6 presents change in scores on the CFIT for the experimental and control groups. Since pretest means on the CFIT were identical for the experimental and control groups, regression to the mean was discounted as an alternative hypothesis to explain the results.

FIGURE 5
CHANGE IN REPORTED FREQUENCY OF WITNESSING SLEEP
OVER TWO YEARS

Frequency of Witnessing Sleep (Scale of 1 to 11)

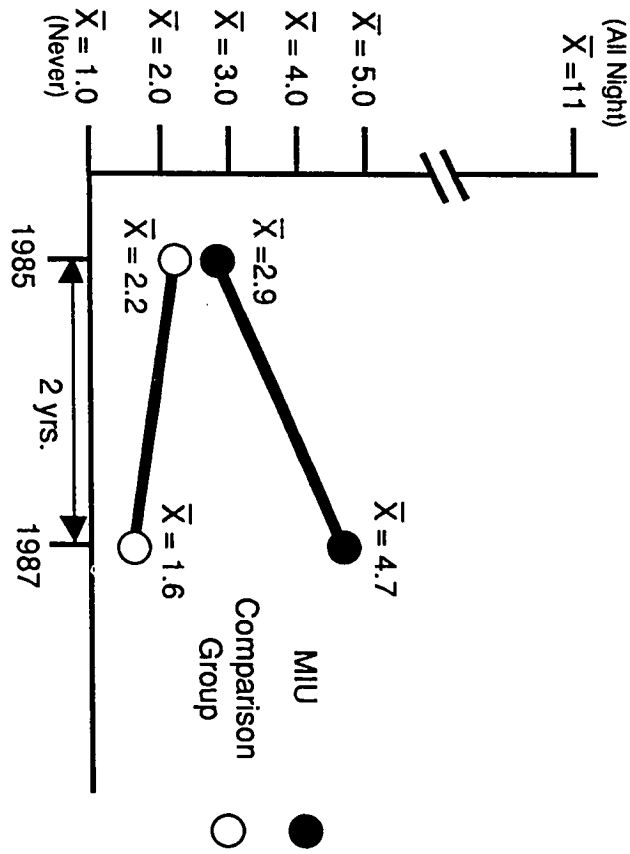


FIGURE 6
CHANGE IN SCORES ON CATTELL'S CULTURE FAIR IQ TEST
OVER TWO YEARS

Mean Scores on Cattell's CFIT

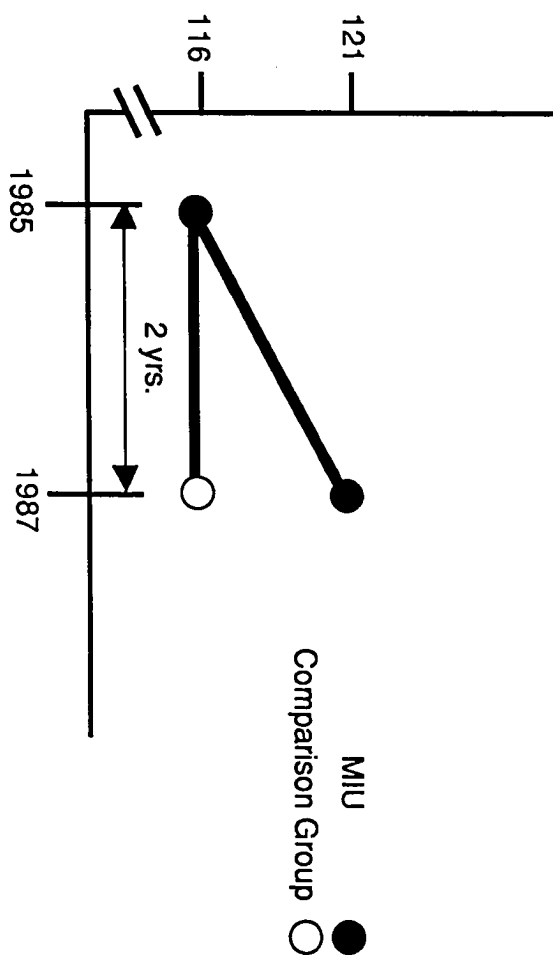


Figure 7 shows pretest-posttest change in scores on Hick's 8-light RT.

Figure 8 presents change in intraindividual standard deviation of Hick's 8-light RT.

Statistically significant negative correlations were found between frequency of witnessing sleep and Hick's 8-light RT ($N=72$, $r = -.400$, $p < .0001$); between frequency of witnessing sleep and slope of RT ($N=72$, $r = -.331$; $p < .001$); and between frequency of witnessing sleep and standard deviation of 8-light RT ($N=61$, $r = -.327$; $p < .001$)⁸.

A statistically significant positive correlation was found between frequency of witnessing sleep and scores on the CFIT ($N=79$, $r = .248$; $p < .01$). Finally, statistically significant negative correlations were found between CFIT posttest scores and 8-light RT ($N=79$, $r = -.290$, $p < .005$); and between CFIT posttest scores and SD of 8-light RT ($N=67$, $r = -.255$, $p < .025$).

⁸The sign of the correlation coefficients here is negative because the post-conversion HSOC scale is used here, in which greater frequency of witnessing deep sleep is a higher number on the scale.

FIGURE 7
CHANGE IN HICK'S 8-LIGHT REACTION TIME OVER TWO YEARS

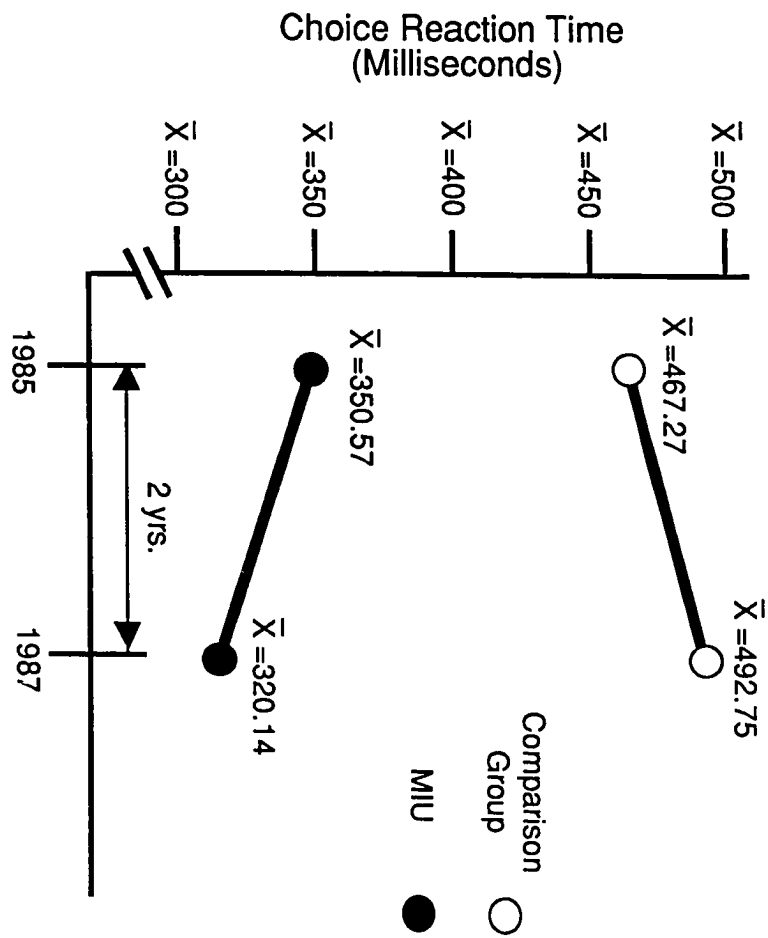
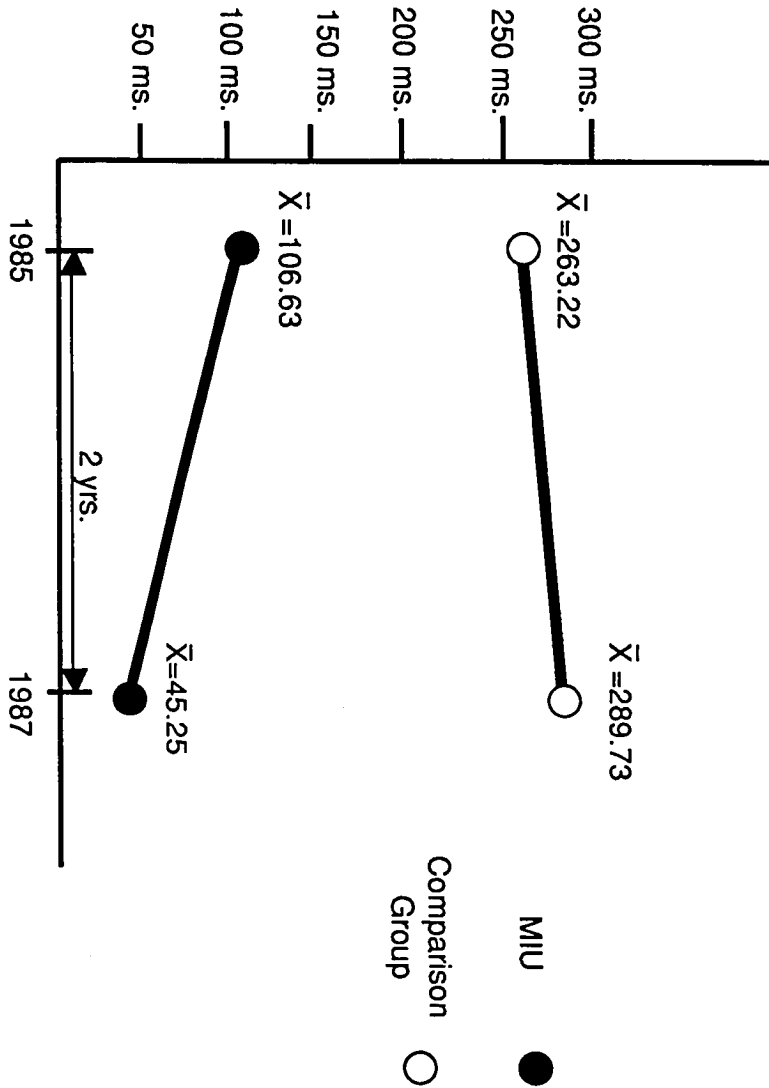


FIGURE 8
CHANGE IN SD OF HICK'S 8-LIGHT
REACTION TIME OVER TWO YEARS

SD of Reaction Time (in milliseconds)



No Effects of Attrition and
No Regression Towards the Mean

The possibility that subject attrition between pretest and posttest affected posttest scores will now be considered. Because of the size of the attrition rate, MANOVA was performed with group and pre-post completion/non-completion as the independent variables. Dependent variables were pretest scores for HSOC, CFIT, Raven's, 1-light RT, 8-light RT, TAS, GEFT, and the TTCT. The main effect of completion/non-completion was not statistically significant (Wilks' Lambda=.933, $F=1.01$, $p=.432$, $DF=8,113$), nor was the interaction between group and pre-post completion/non-completion (Wilks' Lambda=.913, $F=1.35$, $p=.226$, $DF=8,113$). Hence, the null hypothesis of no differences between subjects who completed or did not complete the tests was accepted.

The group effect was statistically significant (Wilks' Lambda=.558, $F=11.21$, $p<.0005$, $DF=8,113$), indicating that the experimental group (MIU) performed better on all tests taken together at pretest than the control group. This result argues against regression to the mean as the cause of significant change in MIU scores from pretest to posttest.

In summary, pretest-posttest improvements were observed in the experimental group compared to the control group on the following measures: reported frequency of witnessing

sleep, Cattell's CFIT, Hick's 8-light RT, Hick's 1-light RT, intraindividual SD of 8-light RT, and slope of RT. Thus, for results that could be interpreted on the first principal component (excluding Raven's), the experimental hypothesis was supported, i.e., 3 out of 4 measures that loaded with HSOC on the first principal component improved significantly. The exception was the GEFT. Possible causes of this result will be discussed in the following chapter.

The hypothesis was not supported for the second principal component, as those dependent measures did not improve from pretest to posttest in the experimental group compared to controls--with one notable exception, 1-light RT, which improved. Possible causes of this result will also be considered in the following chapter.

Finally, in addition to the fact that the HSOC measure and other measures that are associated with intelligence loaded together on the first principal component, statistically significant correlations were observed between all of them, *viz.*, Cattell's CFIT, choice reaction time, SD of reaction time, and slope of reaction time, and between the IQ test scores and RT measures.

Additional Evidence of Growth of
Higher States of Consciousness
From Experiences of Witnessing Deep Sleep

Experiences will now be presented which indicate the growth of the fifth state of consciousness in subjects in the experimental group. The following examples were taken at posttest from the questionnaire reproduced in Appendix C:

- 1) "I thought I had just awakened, but then I realized my body wouldn't move and I was aware that my breathing was very deep and heavy. I felt fully awake and aware, but my body was totally asleep. I had the feeling of being totally alive but inside a dormant body."
- 2) "I close my eyes and try to sleep and I have thoughts about the day. Then I feel very drowsy and I know I must be asleep, but I have an alert feeling and I know that the breath I'm aware of is my body asleep, yet there is the feeling of being awake within it."
- 3) "Sometimes I experience deep silence, very comfortable, like the sleep of deep, deep sleep with a sensory awareness of movement in the room and my own deep breathing and paralyzed body. There is a very deep inner silence and wakefulness."
- 4) "At times I experience this inner awareness when I am not dreaming. It begins with an awareness that I am not dreaming, and I know I am not awake. I become aware of a whirlpool of vast energy and sound-- rising and falling-- oscillating within itself. I experience it as a natural part of myself. I feel completeness, as though I had arrived home after a long and tiring journey. I feel a deep silence, even in the midst of all this motion, and at this point I have a strange awareness that the life I live here on earth is just a dream, and that this vast field of energy is who I really am. Through all of this I don't forget who I am as a person, nor the fact that I know I am not dreaming."

5) "I know that I'm supposed to be asleep, but somehow I feel I'm awake and have an awareness of the room I'm in."

The reports presented above are a few examples from the experimental group. These experiences provide evidence of growth of higher states of consciousness from subjective means of investigation, Maharishi's Vedic Science and Technology. A discussion of the results follows.

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Chapter 5: Discussion

Confirmation of the hypothesis in the case of six of the dependent measures supports the following statements of Maharishi's Vedic theory of intelligence:

1. The practice of the TM and TM-Sidhi program is an effective means of improving measures that are associated with intelligence (point 5 of the Vedic theory of intelligence).

2. The TM and TM-Sidhi program appears to accomplish this by allowing the individual mind to identify itself with pure intelligence (point 1).

3. As a result of this contact of the mind with pure intelligence, established through practice of the TM and TM-Sidhi program, multiple abilities associated with different levels of the mind are improved. These levels include ego (HSOC measure), intellect (CFIT, Hick's eight-light RT, SD of RT, slope of RT), mind (CFIT, Hick's eight-light RT, SD of RT, Hick's 1-light RT), and senses (Hick's 1-light RT). This finding suggests the following additional point:

a. Pure intelligence integrates and supports the activity of all levels of the mind (point 4);

4. Although a substantial portion of cognitive ability may be accounted for by heredity, cognitive ability can be positively influenced by the regular practice of the TM and TM-Sidhi program. Hence, rather than being completely determined at a certain level at birth, intelligence can be

unfolded during one's lifetime (point 6).

5. Because a large group of university students experienced improvements on the measures as a result of practicing the TM and TM-Sidhi program, the results also suggest that human beings have the innate ability to identify their awareness completely with pure intelligence, and hence man can naturally unfold greater intelligence, as proposed in Chapter 5 of Part II.

Furthermore, the fact that the HSOC measure and traditional measures of intelligence loaded together on the first unrotated principal component, lends support to the point stated in Chapters 3, 5, and 7 in Part II--that the growth of intelligence and unfoldment of higher states of consciousness are related.

The fact that measures that loaded on the first principal component improved more than the other measures, is predicted by Maharishi's Vedic theory of intelligence. In this sense, this study has helped to clarify the constellation of changes that would be expected as a result of enlivenment of "subtler, more abstract" levels of the mind.

As has been discussed in Part II of this dissertation, according to the Maharishi's Vedic theory, pure intelligence is the source of intelligence at the basis of all levels of the mind, and the experience of transcendental consciousness occurs at this most abstract level of the mind. Growth of

the more abstract functions of the mind should therefore be more highly correlated with growth of experiences of higher states of consciousness.

Furthermore, those levels of the mind which represent more expressed values of intelligence, e.g., senses and psychomotor functions, are already more highly developed in adults than the deeper levels such as intellect, feeling, and transcendental consciousness. Consequently, measures related to the surface levels of the mind, i.e., measures that loaded on the second principal component, such as simple reaction time, would be expected to improve less than measures related to more abstract levels of the mind.

It may be that some measures which loaded on component 2, previously thought to represent abstract levels of the mind, actually represent more surface functions. The capacity for absorption measured by Tellegen's TAS, for example, may actually be the ability to be absorbed in the "here and now"--the immediate sensory environment--as opposed to a capacity for deeper reflective thought or enlivenment of more abstract levels of consciousness suggested by the loadings on the first component. Similarly, the figural fluency measure on the TTCT is a highly speeded test with a very simple format, and may therefore be more a measure of psychomotor speed than the ability to engage in abstract creative thinking.

In summary, Maharishi's Vedic theory of intelligence

would predict that those measures which represent more abstract levels of the mind--e.g., feeling and intellect as compared with senses and behavior--should correlate more highly with the HSOC measure than with measures related to more concrete levels of the mind, and performance on the former measures should improve more than the latter.

Furthermore, according to Maharishi's Vedic theory of intelligence, growth of higher states of consciousness and growth of intelligence are synonymous. Therefore, it may be expected that those measures which are generally held to be better measures of intelligence would correlate most strongly with a measure of the experience of higher states of consciousness.

Of the results, the changes in choice reaction time, SD of choice reaction time, and slope of simple/choice reaction time in the MIU group are most striking. Effect sizes for these three measures, shown in Table 8, are large compared to changes in the other measures. Effect sizes were calculated according to the method used by Glass, McGaw and Smith (1981, pg. 126).

TABLE 8
EFFECT SIZES FOR HSOC, CFIT, HICK'S 1- AND
8-LIGHT RT, SD OF 8-LIGHT RT, AND SLOPE OF 1-8 LIGHT RT

Variable	n_e	n_c	t	Effect Size
HSOC scores	35	48	3.12	.69
CFIT	40	52	2.79	.59
Hick's 1-light RT	41	44	2.11	.46
Hick's 8-light RT	41	44	9.10	1.98
Hick's <u>SD</u> of 1-8 RT	41	32	11.4	2.69
Slope of Hick's RT	41	44	9.17	1.99

These results, along with improved performance on the CFIT, can be explained as one of the effects of the TM and TM-Sidhi program on consciousness: the TM and TM-Sidhi program culture the ability to spontaneously maintain a state of broadened awareness, a more quiet and comprehensive style of mental functioning. Long-term practitioners of the TM and TM-Sidhi program appear to be capable of spontaneously maintaining broadened awareness while simultaneously focusing their attention on a task (Dillbeck, 1982; Dillbeck et al., 1984; Travis, 1988). This ability to maintain a broad, comprehensive style of awareness while simultaneously focusing on the parts of a problem may account for the observed improvements in performance on choice reaction time and tests of figural reasoning, since both tests emphasize the ability to perceive and analyze relations of parts with one another and with a larger whole, and to respond accordingly.

The large effect sizes for choice reaction time-related measures suggests that they are more sensitive measures of change in the MIU group than an IQ test such as Cattell's CFIT. At the same time, performance on the RT measures is significantly correlated with performance on IQ tests, as shown by this research and previous research (Barrett, Eysenck, & Lucking, 1986; Eysenck 1986, 1988; Frearson & Eysenck, 1986; Jensen, 1979, 1982a, 1982b, 1985a, 1985b,

1987; Smith and Stanley, 1988; Vernon, 1983, 1987).

Furthermore, the correlation (+.400) between Hick's 8-light RT and scores on the HSOC measure indicates that the two factors are related, and all three measures--HSOC, Cattell's CFIT, and Hick's 8-light RT--loaded together on the first unrotated principal component.

Figure 8 shows a decrease in intraindividual SD of Hick's 8-light RT, considered by some to be an index of "noise" in the information processing system and, according to some investigators, the RT-related variable most strongly correlated with IQ measures (Eysenck, 1987; Jensen, 1987, 1989). In light of this theoretical perspective, it is interesting that scores on this measure improved substantially in the MIU group, decreasing by 58.29 msec., while increasing slightly (37.5 msec.) for the control group. The Pearson correlation between SD of RT and CFIT posttest scores was $-.255$.

This reduction in a measure related to noise in the information processing system is explained by Maharishi's Vedic theory of intelligence. According to theory, the TM technique directly reduces noise in the information processing system by allowing the individual to experience progressively quieter states of thought until his or her awareness becomes silent or noise-free in the state of transcendental consciousness (Maharishi Mahesh Yogi, 1963, pg.48; 1967, pp.278,282; 1972a). Hence, maintenance of the

state of transcendental consciousness along with the waking state, predicted to be achieved through practice, might be measured as a permanent reduction of the level of noise in the information processing system.

The findings indicate that intelligence can be developed, as measured by IQ tests and reaction time tests. The study does not refute the theory that intelligence is largely genetically determined (Bouchard & McGue, 1981; Bouchard & Segal, 1985; Jensen, 1969, 1985b; McGue & Bouchard, 1988; McGue, Bouchard, Lykken, & Feuer, 1984; Plomin, 1988), but rather suggests that the experience provided by the TM and TM-Sidhi program facilitates the expression of inherent potential. A well established principle in developmental neurobiology is that experience can affect neural development (Bennet, Diamond, Krech, & Rosenzweig, 1964; Blakemore & Cooper, 1970; Diamond, Ingham, Johnson, Bennet, & Rosenzweig, 1976; Hubel & Wiesel, 1979; Milgram, MacLeod, & Petit, 1987; Wallace, 1986). It appears that the TM and TM-Sidhi techniques provide experiences of quieter, more abstract mental activity that stimulate human development (Wallace, 1986).

Finally, the results cast doubt upon the alternative hypothesis that previous increases in CFIT scores among practitioners of the TM and TM-Sidhi program are due to an increase in fluid intelligence in the general university population. The results show that none of the measures

improved over two years in the control group.

Discussion of Results for GEFT, TTCT, and TAS Scores

Possible reasons for the negative change in GEFT scores for both groups and no change in scores which did not load with HSOC scores on the first unrotated principal component, will now be considered.

GEFT

First, concern over possible ceiling and speed effects on the GEFT appears to have been justified. The experimental group scored quite high on the GEFT at pretest ($X = 15.24$ out of possible 18 or 85 percent), compared to the norm of 11.4 or 63 percent for college students (Witkin, Oltman, Raskin, & Karp, 1971) and 10.6 or 59 percent for the control group. In view of this fact, the decision was made to halve the time of the GEFT for posttest and covary for pretest scores. As was mentioned in Chapter 2, this approach created a possible problem. The test consists of two sections, each five minutes in length. Even at this length, the test is a relatively fast test, as it involves frequent turning of the pages to consult sample figures on the back cover of the test booklet and remembering the sample figure for comparison with the test figure. When each section was shortened to 2.5 minutes, the test required a good deal of manual speed simply to turn the pages quickly and frequently enough to consult the figures at the back, as well as visual

memory.

Several of the subjects complained that the time allowed for the test was very short, even though they scored relatively high on the test. For subjects who tend to become anxious under speeded test conditions, the new format of the test could have provoked considerable anxiety, which might well have hindered performance, lowering their scores at posttest. Hence, under the format used at posttest, the GEFT may well have become a combined test of motor speed, visual memory and ability to perform quickly under time pressure--a complex measure with no norms--rather than a test of field independence. In light of these considerations, the lack of improvement by the experimental group relative to the control group on the GEFT cannot necessarily be interpreted as a lack of effect of the intervention. Future research with other, more reliable measures of field independence, such as the rod-and-frame task, should be able to resolve this issue.

TTCT and TAS

There are several possible explanations for lack of change in TTCT and TAS scores in the experimental group. One possible explanation is that practice of the TM and TM-Sidhi program has no effect on TTCT scores or Tellegen's TAS scores. In the case of the TTCT, this explanation appears to be the least plausible one, since an effect has been found

in several studies (See the section on TTCT in Chapter 2, "Rationale for the selection of dependent measures.") In the case of the Tellegen Absorption Scale, existing studies on meditation and the TAS are either correlational or cross-sectional; hence, the hypothesis of no effect of the present intervention cannot be entirely ruled out.

A second possible explanation for lack of results with TTCT and TAS is that the duration of the intervention was insufficient to allow the full effect to occur. This hypothesis is supported by evidence that changes in performance associated with practice of the TM and TM-Sidhi program are based on psychophysiological development, as discussed in Chapter 5 of Part II, since such changes occur gradually. This hypothesis deserves to be tested, since previous studies on the effect of the TM and TM-Sidhi program on TAS have been correlational, and studies on the TM and TM-Sidhi program and TTCT have been correlational with the exception of studies by Travis (1979), and Orme-Johnson & Granieri (1977), which recorded improvements in figural TTCT scores after five and six months, respectively. This last observation leads to consideration of a third possible explanation of this result.

The third possible explanation is that development of cognitive abilities takes place at different rates according to different stages of practice of the TM and TM-Sidhi program, and hence, performance on different measures may

improve at different rates according to the stage of advancement of the practice. Under this hypothesis, these measurements could have been made during a stage of practice of the TM and TM-Sidhi program when performance on these particular measures-- TAS and TTCT-- improve at a slow rate relative to performance on other cognitive measures such as the CFIT and reaction time measures. This hypothesis also deserves to be tested since, in the two studies on the TTCT mentioned above, measurements were made immediately before and after major stages in the practice of the TM and TM-Sidhi program. In the Travis study, subjects were pretested immediately before learning the TM program, and in the Orme-Johnson & Granieri study, pretest was given immediately before a six-month in-residence course involving especially intensive practice of the TM program.

A fourth possible explanation of results with regard to Tellegen's TAS and the TTCT is that these measurements used do not accurately represent the functioning of various levels of the mind they are chosen to represent, but instead measure some other skill or ability that may be wholly unconnected with the variable under investigation. This explanation appears very likely in the case of the TAS. In fact, the TAS is not a measure of capacity for mental absorption alone, but instead is a mixed measure which measures several ways of being absorbed. The measure is derived from and correlated with a measure of hypnotic

susceptibility (Tellegen & Atkinson, 1974); hence it may measure this factor more than mental absorption.

In addition, this argument may apply to the TTCT, and, incidentally, to the GEFT as well. Since both the latter tests are entirely visually and spatially oriented, it may be that both are biased in favor of subjects who have developed visual and spatial skills, and hence the tests measure visual adeptness rather than creativity or field independence. Cranson (1988) noted that in a group of 65 long-term practitioners of the TM and TM-Sidhi program, three individuals who produced very high scores on the TTCT all had perfect scores on the GEFT, and all had professional experience as graphic artists. In future research, it would be of interest to gather data on occupation and special skills for subjects taking the TTCT and the GEFT to control for this factor.

In the case of Tellegen's TAS, it may be that what Tellegen describes as the "capacity for episodes of total attention" is not directly related to growth of higher states of consciousness, or the ego, for the reason cited in Chapter 2; rather than being characterized by total absorption of attention in an experience, higher states of consciousness are instead characterized by increasing independence of the awareness from the overshadowing nature of experiences (Maharishi Mahesh Yogi, 1967, 1982a). Hence, an altogether different measure appears to be appropriate

with respect to this variable. How these difficulties may be overcome in future research will now be considered.

Implications for Future Research On Intelligence and Consciousness

The discussion of Maharishi's Vedic theory of intelligence in this dissertation, and the research which tested hypotheses about the growth of intelligence, offer some insights that can give direction to future research on intelligence. Perhaps the most obvious need in future research is to focus on the more abstract levels of the mind. The theoretical approach summarized by Figure 2 in Chapter 1, suggests that changes in ego function and feelings, as well as such abstract intellectual abilities as were measured here, should be investigated.

As higher states of consciousness develop and pure intelligence is increasingly expressed in the life of the individual, Maharishi's Vedic Psychology predicts enlivenment of intelligence in a progression from abstract to concrete levels of the mind. This progressive enlivenment begins with the experience of transcendental consciousness, in which the deepest level of the individual personality, the ego, is identified with the Self, or pure intelligence.

The unification of the ego with the self is completed with the realization of cosmic consciousness. In the

transition from cosmic consciousness to God Consciousness, the level of feeling and the intellect are enlivened, and the final transition from God consciousness to unity consciousness represents the full enlivenment of pure intelligence on the most concrete level of the senses and behavior; as has been discussed, in unity consciousness all objects are experienced as nothing but the Self, and all behavior is experienced as pure intelligence moving within itself.

The proposed approach to research on higher states of consciousness and intelligence would involve an interplay of theory and data to determine how higher states of consciousness will be articulated in terms of presently available psychological measures and how new measures of intelligence can be developed--measures that more accurately reflect abilities associated with various levels of the mind. The sequence of unfoldment of intelligence from inner to outer provides a general guideline of investigation.

Since Maharishi's Vedic Psychology considers creativity to be associated with more abstract levels of the mind, i.e., feeling and intellect, it is curious why there was no improvement in the measure of creativity used in this study. It may be that this particular measure, the TTCT, does not measure the more subtle function of creativity indicated in Figure 2, but rather a function of mental speed, as was discussed in the beginning of the results section after

Table 5. This area may be illuminated by future research.

Tellegen's TAS may measure an ability for mental absorption in the "here and now" of the sensory motor world, as was also discussed in the results section. The loadings of simple RT, TTCT, and TAS scores on the second principal component may be interpreted to mean that all three of these measures are directly related to mental and psychomotor speed, and hence measure concrete mental functions.

The findings of this study have two immediate implications for future research. First, it is clear that IQ tests are at best partial measures of what is understood as intelligence. In order to adequately measure the functioning of intelligence, future research on intelligence should include measures related to choice reaction time, as well as IQ tests and measures representing more abstract mental functions.

Second, future attempts to measure intelligence and its growth should incorporate measures of experiences of higher states of consciousness, since experiences of higher states of consciousness are related to the growth of intelligence empirically and theoretically.

Twentieth century psychologists and educators are becoming increasingly aware of the need for improved measures, and the consensus is that research on such measures has barely begun. In addition to addressing the nature of higher states of consciousness and taking a

perspective that comprehends the total range of intelligence, there is an obvious need for measures that more accurately reflect the demands of everyday life on capacities related to intelligence, including creativity and field independence. Just as traditional Vedic measures of growth of higher states of consciousness assessed the capacities of individuals in a natural and comprehensive way (as discussed in Chapter 7 of Part II), modern measures need to go beyond the limited, artificial format of timed paper-and-pencil tests.

Some psychologists have already begun to develop measures of "practical" intelligence, which attempt to elicit responses to situations typically encountered in everyday life (Wagner and Sternberg, 1985, 1987; Epstein, in press). Some have begun to structure the testing situation in a way that allows subjects to be more spontaneous and creative in their responses (Gardner, 1983). Holistic measures are also needed, on the model of traditional measures discussed in Chapter 7 of Part II.

Another way in which future research on Maharishi's Vedic theory of intelligence can improve is to address the hypothesis of differential rates of growth of ability according to the type of variable (e.g., field independence, creativity, reaction time) and according to stage of practice of the TM and TM-Sidhi program. One obvious way to achieve this is to measure improvements in the chosen

variables at progressive stages of the practice of the TM and TM-Sidhi program and at different ages. Proposed points of measurement are: 1) just before starting to practice the Transcendental Meditation (TM) technique; 2) one month after learning the TM technique; 3) before learning the TM-Sidhi program; 4) immediately after learning the TM-Sidhi program; 5) six months after starting the TM-Sidhi program; 6) two years after starting the TM-Sidhi program; 7) four years after starting the TM-Sidhi program; 8) upon admission to Maharishi International University; 9) 3 1/2 years after admission to Maharishi International University. By taking measurements at these points, it could be determined whether there are changes in the rate of development of intelligence as the practice of the TM and TM-Sidhi program advances. Changes in performance arising from the normal process of maturation could be accounted for in the data analysis. Now possible objections to the present study on methodological grounds will be considered.

Consideration of Possible Criticisms of the Present Study on Methodological Grounds

It may be claimed that improvements in the dependent measures were caused by the teaching methods and the information given students at MIU rather than their practice of the TM and TM-Sidhi program. Even though the

informational knowledge taught at MIU does include elements which relate the student's experience of the development of consciousness through the TM and TM-Sidhi program to the laws of nature studied by traditional academic disciplines, the faculty and students at MIU emphasize that the regular practice of the TM and TM-Sidhi program is most essential for the unfoldment of the student's full mental potential. According to the faculty and administration at MIU, the practice of the TM and TM-Sidhi program is the most important feature distinguishing the education at MIU from other universities.

Previous research by Shecter (1978) indicates that improvements in intelligence test scores result from the direct experience of the TM program rather than intellectual study of the development of consciousness. In Shecter's study, high school students who studied development of consciousness but were not assigned to begin practicing the TM technique did not improve their performance on Raven's, in contrast to those who did practice the technique.

It may be asked why the validity threat of self-selection was not fully addressed by this research, when this threat could have been eliminated through random assignment of subjects to experimental and control groups. There are two reasons why this was not done.

The first reason is an economic one. In theory, it would be possible to do a study with random assignment to

groups if the cost of instructing the subjects could be defrayed by the experimenters. However, since the cost of instructing 100 subjects, while quite reasonable for the benefits provided, nonetheless surpassed the budgets of experimenters, such a study could not be undertaken.

Prior to beginning the present study, the experimenter had the intention of randomly assigning subjects to experimental and control groups, and made every effort to do so. The intention was to include three groups in the longitudinal design: a sponsored experimental group, a treatment control group, a non-treatment control group, and a group already practicing the TM and TM-Sidhi program. However, due to financial constraints, only the third and fourth groups could be included.

The second reason is an ethical one. In some previous research on the TM technique, subjects were randomly assigned to experimental and control groups prior to instruction in the technique (Shecter, 1978; Travis, 1979). However, these were short-term studies of six months or less duration. With regard to the present study, to withhold the TM technique for several years from subjects who express interest in learning it is ethically unacceptable.

In light of the potential self-selection problem, the present design represents an attempt to match experimental and control groups as closely as possible; both groups were first-year students from universities located in the same

state, and the investigator made efforts to ensure that both groups would include subjects who had expressed interest in meditation. Furthermore, variables on which the two groups differ, and variables which are known to influence cognitive ability, e.g., age and socioeconomic background, were included as covariates in the data analysis. Through these measures, the internal validity threats of self-selection, maturation and history were minimized. In fact, age differences would predict different results from what was observed on the Cattell's IQ test. Since the mean age of the MIU group is higher than the UNI group, the MIU group could be expected to score the same or lower than the UNI group on both pretest and posttest. An improvement in CFIT scores in the MIU group at posttest would be in the opposite direction predicted from comparison with national norms on the test. The economic background of the MIU group was not significantly different from than the UNI group; on the basis of this consideration, the MIU group would not have been expected to outperform the UNI group at posttest.

Another possible challenge to the results of this study involves the use of procedures of the Maharishi's Vedic Science and Technology other than the TM and TM-Sidhi program by subjects in the experimental group. One of these procedures is the Maharishi Ayur-Ved Panchakarma Program, discussed in Chapter 5 of Part II. As was discussed, use of this program has been associated with improvements in

several cognitive variables by Chandler et al. (1987). In this study the investigators derived a "g" factor from the data by means of principal components analysis, and found a significant positive change in factor scores for the group which was involved in the Maharishi Ayur-Ved Panchakarma Program.

Since some of the MIU subjects in the present study took some treatments in the Maharishi Ayur-Ved Panchakarma program between pretest and posttest, it may be argued that a positive result of this study could be due to participation in the Maharishi Ayur-Ved Panchakarma Program, and not the TM and TM-Sidhi program. To determine whether this was the case, Pearson product moment correlation was performed for the MIU group between number of treatments taken in the Maharishi Ayur-Ved Panchakarma Program and pretest-posttest change scores for frequency of witnessing sleep, TTCT, 1-light RT, 8-light RT, SD of 8-light RT, and slope of RT. The number of treatments taken ranged from 0 to 4 over the course of the study. None of the correlations reached statistical significance at the $p < .05$ level. Even though previous research (Chandler et al., 1987) indicates that the Maharishi Ayur-Ved Panchakarma program has a positive influence on cognitive abilities, it is unlikely that participation in the Panchakarma program can account for all improvements in intelligence associated with practice of the TM and TM-Sidhi program, since in previous

studies that showed improvements in "fluid" intelligence among practitioners, none of the subjects involved had ever participated in the Panchakarma program. Since the time of those studies Maharishi Ayur-Ved, which is part of Maharishi's Vedic Science and Technology, has been introduced to the public as an integral part of a total program to improve all aspects of individual health, mental and physical. In the future it is likely that additional procedures of Maharishi's Vedic Science and Technology will be incorporated into this overall program as well. Thus, Maharishi's Vedic Science and Technology and its incorporated procedures is viewed by those who offer it to the public as a unified system for the holistic development of the individual and society. In research that investigates the Maharishi's Vedic Science and Technology as an intervention, it is best viewed in this way, as a total system.

Considering the effectiveness of the educational program at MIU as an intervention to improve intelligence in comparison with other interventions, the author submits that it is not so important at this point to distinguish various procedures within this intervention as it is to consider the effectiveness of the system as a whole, since the various procedures of Maharishi's Vedic Science and Technology that are optional parts of the educational program at MIU, are all based on the same model of intelligence. Clearly, the

results of this research indicate that the educational system in use at MIU does improve cognitive performance.

The implication of these results is, without exaggeration, revolutionary, and very encouraging for all mankind. The finding confirms that significant improvements can be made in the educational process in any educational institution without changing the classroom environment, teaching materials, or teaching techniques, but rather by directly unfolding the intelligence of the student. The obvious implication is that the TM and TM-Sidhi program should be implemented in educational institutions without delay.

On the basis of the theory and empirical findings presented in this dissertation, it is clear that principles that have guided scientific and lay thinking about intelligence until now should now be replaced by new principles that reflect new knowledge. These old and new principles developed from Maharishi's Vedic Psychology, are presented below.

OLD PRINCIPLE #1: Intelligence is essentially fixed at birth through heredity, and cannot be developed substantially in one's lifetime. (corollary: Each generation produces some men and women of genius; the rest of the population has to just do the best they can with what they are given by nature.)

NEW PRINCIPLE #1: Intelligence can be developed substantially during one's lifetime. (This principle is discussed at length in Chapter 5.)

OLD PRINCIPLE #2: If indeed intelligence can be developed at all, the best chance is through training in techniques of learning and problem solving during early childhood.

NEW PRINCIPLE #2: Intellectual knowledge alone does not unfold intelligence completely. Only through transcending thought can intelligence be developed in a natural, holistic complete, and permanent way. (This principle is discussed in Chapter 5.)

OLD PRINCIPLE #3: Intelligence is an epiphenomenon of brain activity.

NEW PRINCIPLE #3: The brain is an expression of pure intelligence which, through its own creative process of self-interaction, generates all levels of subjective and objective nature. (This principle is discussed in Chapters 2, 3, and 4.)

OLD PRINCIPLE #4: Being a product of brain activity, intelligence is therefore located within the boundaries of

each individual's brain.

NEW PRINCIPLE #4: At the deepest level, intelligence is a field that pervades the whole universe. The field influences individual thought and behavior, and can in turn be influenced by individuals (the Maharishi Effect). (This principle is discussed in Chapters 1, 2, and 4.)

OLD PRINCIPLE #5: Man's intelligence is a product of the laws of nature that govern the universe.

NEW PRINCIPLE #5: At the deepest level, our intelligence is the totality of the laws of nature. (This principle is discussed in Chapters 1, 2, 3, and 4.)

OLD PRINCIPLE #6: Intelligence cannot be known directly; it is a concept developed by psychologists to explain mental abilities (e.g., "Intelligence is what intelligence tests measure," or "Intelligence is "g", the positive manifold of a correlation matrix").

NEW PRINCIPLE #6: Pure intelligence can be known directly as the simplest form of our own awareness. (This principle is discussed in Chapters 1 and 5.)

OLD PRINCIPLE #7: Nature is like a great machine; it

operates mechanically through cause and effect. Man is a part of this machine, and his intelligence is enmeshed in this system of cause and effect.

NEW PRINCIPLE #7: Nature is not just an unintelligent machine. The infinite intelligence of nature, the source and support of the whole universe, is present at every point in creation. Being transcendental and unmanifest, it lies outside the realm of cause and effect. By realizing the unity of his own intelligence with nature's intelligence, man too can transcend the field of cause and effect and be master of the laws of nature rather than the victim of cause and effect. (This principle is discussed in Chapter 1.)

OLD PRINCIPLE #8: Intelligence develops independently of qualities like moral judgment, emotional well-being, social adjustment, and physical health.

NEW PRINCIPLE #8: Intelligence is holistic in nature. Being the source of all human qualities, when intelligence unfolds completely, all these abilities unfold simultaneously in a balanced way. (This principle is discussed in Chapters 1, 4, and 5.)

Future research, theory, and their application in the field of intelligence should incorporate these new principles.

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APPENDIX A

A CONSIDERATION OF THE HISTORICAL NOTION THAT A VALID
AND RELIABLE SUBJECTIVE MEANS OF GAINING KNOWLEDGE
IS IMPOSSIBLE TO ACHIEVE

This appendix will address the historical notion that a valid and reliable subjective means of gaining knowledge is not possible to achieve. First, arguments will be put forth to show why Maharishi's Vedic Science and Technology, particularly the TM and TM-Sidhi program, overcomes the shortcomings associated with past subjective approaches to gaining knowledge. Then objections to Maharishi's Vedic Science and Technology in particular will be addressed. Finally, it will be shown how Maharishi's Vedic Science and Technology supports and completes the objective approach to gaining knowledge by illuminating areas of scientific method that have not yet been addressed by the objective means of gaining knowledge.

Shortcomings of Previous Approaches to
Subjective Means of Gaining Knowledge

A. Standard of Verifiability

First, subjective means of gaining knowledge were based on inference, intuition, intellectual reasoning, faith, or combinations of these, and hence they provided no standard of verifiability or disconfirmation of theories, no basis for achieving consensus in the community of scholars and

scientists. The objective approach, first clearly explained by Francis Bacon in modern times, established the primacy of sensory experience, or sense data as the criterion for agreement and resolution of arguments. Because sense data existed independently of the private realm of subjective interpretation, they could serve as a universal basis for shared knowledge. If a hypothesis were put forth which said that a certain law of nature implied that given certain conditions, a certain measure would change-- a reading on a meter for example-- then it did not matter how many arguments were brought forth for or against the hypothesis, or how many interpretations of the law there were. If the meter reading was as predicted, the hypothesis was confirmed; if the meter reading was not as predicted, the hypothesis was disconfirmed. Everyone could always agree on what the meter pointed to. On the basis of these publicly shared observations, theories were supported, refuted, and modified, and thus a huge body of publicly shared knowledge of the laws of nature accumulated.

1. Providing a Universal Standard of Verifiability

Maharishi's Vedic Science, Science of Creative Intelligence, and Vedic Psychology provide a subjective means of gaining knowledge, the Transcendental Meditation and TM-Sidhi Program, which overcomes the previous inability of subjective approaches to provide a universal standard of

verifiability in two ways. First, it systematically opens to direct experience a universally available field which is invariant, at the basis of both the subjective and objective world. As discussed in chapters 2,3 and 4 of Part II, Maharishi's Vedic theory of intelligence states that the mind is structured in layers, from the more superficial level of senses to the deeper levels of intellect and ego. All the layers of the mind are said to be expressions of pure intelligence, which underlies and permeates them, just as waves are expressions of the water that underlies and permeates them. Hence, according to Maharishi's Vedic theory of intelligence, pure intelligence is at the basis of subjective and objective creation. Later in the discussion on verifiability it will be shown how this theory has produced test implications by which it can be verified.

As discussed in chapter 1 of Part II, the model of subjective reality in which the mind is structured in layers from gross to subtle directly parallels the structure of objective reality described in quantum physics. Progress in modern physics has been based on the discovery of increasingly fundamental layers of physical existence, from the gross level of macroscopic structures through more abstract molecular, atomic and subatomic levels to underlying quantum fields. Quantum physics views all forces and particles which comprise the physical universe as

fluctuations or excitations of an underlying field. Similarly, the knower or the subject is perceived as isolated and changing on the relatively superficial levels of thinking at which theorizing and speculation take place. However, according to Maharishi's Vedic Science and Technology, when the subtlest level of mental activity is transcended, the consciousness of the subject is left to be aware only of itself, in a completely silent state beyond fluctuations, the field of pure intelligence which is the source of all the fluctuations of intelligence that are experienced as thoughts, perceptions, feelings, ideas, theories, etc. All processes of thought and perception are then understood as fluctuations or qualified states of the underlying unqualified field of pure consciousness (Maharishi, 1984b).

Ultimately then, both the objective approach of modern science and the subjective approach represented by Maharishi's Vedic Science and Technology describe a fully unified field at the origin of matter and mind respectively, which gives rise to all possible expressions the field. Both approaches describe the unified field as lying beyond the boundaries of time, space, and causality, and in both approaches the various states of matter and thought respectively are seen as fluctuations of the underlying unified field. As mentioned in Chapter 1 of Part II,

several physicists (Hagelin, 1987) have proposed that this extremely close parallel in the description of the origin and unfoldment of mind and matter is most simply explained by assuming that both are true and simply represent observations from objective and subjective approaches respectively, of the same underlying reality.

Hence, the standard of verifiability provided by the subjective means of gaining knowledge in Maharishi's Vedic Science and Technology is verifiability of the field nature of the ultimate reality it has discovered, which appears to be identical with the ultimate reality glimpsed by the objective means.

2. Generation of Objectively verifiable Predictions

The second way in which Maharishi's Vedic Science and Technology overcomes the problem of verifiability which characterized previous subjective means of gaining knowledge, is that it is able to generate predictions about observable phenomena which can be tested using the empirical or experimental means of gaining knowledge. Examples of such predictions are the many sociological experiments which employed the group practice of the TM and TM-Sidhi program as an intervention. These experiments have clearly produced the predicted results. As an example on the individual level, observed improvements in intelligence test scores were predicted in advance (Dillbeck et al., 1984; Aron,

Orme-Johnson & Brubaker, 1982). Hence there is strong objective support for the subjective experience and theory of a unified field of pure intelligence or pure consciousness as the source of the individual mind, the body, the environment, the entire universe.

B. Systematic, Universal Method of Subjective Investigation

A second objection raised in the past against the subjective means of gaining knowledge was that it could not provide a systematic method by which an invariant, universal field of experience could be gained by anyone. This kept all theories and statements based on this form of investigation in the realm of philosophy, speculation, conjecture, fancy, or mysticism. Maharishi's Vedic Science and Technology is free from this shortcoming because it does offer a systematic, direct method of experiencing the source of thought, pure intelligence, which Maharishi's Vedic Science and Technology equates with the unified field of natural law. The technique is such that anyone can practice it and, if they practice it properly for the prescribed period, experience the same result. The results have been verified by millions of people in all parts of the world during the past 30 years.

As discussed in Chapter 1 of Part II, Vedic Science, the tradition of knowledge from which Maharishi's Vedic

Science and Technology and Vedic Psychology come, is thousands of years old; however, it was not introduced to the western world in a systematic, testable form until 34 years ago when Maharishi Mahesh Yogi introduced the Transcendental Meditation technique to the West. As was discussed in Chapter 2, the Ved is held by Vedic Science to be the language of nature, the unmanifest activity of the unified field within itself, from which the creation arises. The oral and written records of Vedic Science, known as Vedic literature, testify to the experience repeatedly gained through the procedures of Maharishi's Vedic Science and Technology over a span of at least five thousand years. Many examples of these written accounts of experiences and descriptions of the nature of intelligence have been provided in chapters 1-7 of Part II.

These descriptions of the results of the practices included in Maharishi's Vedic Science and Technology are cited just to illustrate the fact that the subjective means of gaining knowledge associated with Maharishi's Vedic Science and Technology and its predicted results have been used, and the results recorded throughout the ages by a small number of Vedic scientists in India; the unfortunate fact is that the tradition of Vedic Science has been widely misinterpreted throughout the ages and was practiced in incomplete forms which failed to produce the desired

results. Consequently, Vedic Science and Technology never reached the western world in its original form, and even in the east remained unknown to the general public until it was revived by Maharishi Mahesh Yogi.

C. Practical Applications of Benefit to Society

A third objection to previous subjective means of gaining knowledge was that they never produced any practical applications of benefit to the individual or society, whereas the objective approach did. This is certainly a valid argument; evidence of improvements in everyday life due to philosophical arguments and introspection is hard to come by, whereas the objective approach has made so many contributions to improving the quality of material life that they are too numerous to mention. In this area also, Maharishi's Vedic Science and Technology succeeds where past subjective approaches have failed because, unlike them, it has produced practical benefits for the individual and society. These benefits, reported in more than 400 scientific research studies from research institutes around the world, are summarized in Table 3 of Part II and in a book entitled five volumes entitled: Scientific Research on

the Transcendental Meditation and TM-Sidhi Program:

Collected Papers (1977, in press). Some of the benefits to the individual referenced in the above volumes and in Table 3 of Chapter 1, Part II include: a) improvements in physical health: reduced infectious disease, reduced stress, reduced insomnia, reduced absenteeism, normalization of blood pressure, reduced alcohol and drug use, increased exercise tolerance, increased vital capacity, and reversal of aging; b) improvements in mental ability: increased intelligence, creativity, memory, and learning ability; improved academic performance; improved problem solving ability; and increased field independence; c) development of personality: reduced anxiety, reduced neuroticism, increased self-actualization, improved self concept; d) improved social behavior: improved marital relations, improved relationships with supervisors, improved relationships with co-workers.

These are just a few of the hundreds of observed benefits for the individual. Some of the benefits for society as a whole are: increased positive trends of national life, including increased economic prosperity and political harmony and achievements, increased national creativity including increased patent applications, increased gross national product; and reduction of negative trends including crime, armed conflict, sickness and reduced

traffic and air accidents (see Table 3, Part II, Chapter 1).

How can such a simple process which allows the mind to experience the source of thought, pure intelligence, produce such powerful and diverse benefits? If the Maharishi's Vedic theory of intelligence is true, this wide range of benefits is exactly what would be expected from the procedures of Maharishi's Vedic Science and Technology. The theory of Maharishi's Vedic Science and Technology has been discussed in length in Chapters 1-5 of Part II. It was explained how pure intelligence, the source and ultimate nature of individual intelligence, is an unbounded field which generates and sustains all levels of individual intelligence, collective intelligence, the physiology, and the material universe. In Chapters 1-7 it was discussed how making contact of the individual mind with this field improves and enlivens all these levels, subjective and objective.

Chapters 1-7 illustrate how and why the subjective approach to knowledge represented by Maharishi's Vedic Science and Technology, unlike previous subjective approaches, has produced profound and wide-ranging benefits for mankind. There could be numerous other examples of benefits which are equally significant, but they are omitted for the sake of brevity. Many physiological and psychological mechanisms which mediate the benefits of

Maharishi's Vedic Science and Technology have been investigated and explained by objective science (e.g., the mechanics of gaining deep rest, the release of stress, restoration of physiological balance, etc.) However, their detailed explanation is beyond the scope of this dissertation. For detailed knowledge about these mechanisms and processes the reader is referred to several collections of scientific research on the TM and TM-Sidhi Program: Scientific Research on the Transcendental Meditation and TM Sidhi Program: Collected Papers, Vols. 1-5.

II. Maharishi's Vedic Science and Technology Provides Universal, Direct Experience

as Distinguished from Interpretation or Imagination

Given the subjective nature of the Transcendental Meditation and TM-Sidhi Program, the practices associated with Maharishi's Vedic Science and Technology, it may be argued that knowledge gained through such practices is only a vague, private interpretation of an experience and not a direct experience, i.e., not a vivid, lively encounter with data in a well-ordered domain of experience; hence, it remains in the realm of speculation. To this objection it can be answered that the TM and TM-Sidhi program is a means to systematically reduce the activity of the mind until the attention transcends the thinking process completely and is left in a state of transcendental pure consciousness, which

is beyond mental activity of any kind, including speculation, interpretation, and imagining. Following is description of this experience by a practitioner of the TM and TM-Sidhi program:

"During the practice my mind settles down, thoughts become less, and then suddenly all thought and activity ceases and I slip into an unbounded ocean of awareness which is pure, quiet, unexcited and infinitely extended beyond space and time. Simultaneously my body settles down, breathing becomes refined, and I feel relaxed (Gackenbach, Cranson, & Alexander, 1987)."

The description of pure consciousness as being simple, unbounded, and quiet is a report of a direct experience, as contrasted to and interpretation or imagination of an experience.

In the same vein, it may be argued that the so-called experience of pure consciousness is only an imagined experience due to an anticipatory set, i.e., that people who practice Maharishi's Vedic Science and Technology expect to have an inner experience, and this expectation leads them to have some feeling or mood of an experience only. If this were the case, the supposed experience of transcendental consciousness would not be expected to have a precise temporal correlation with physiological and electroencephalographic changes of a magnitude and variety that is usually associated with a completely different state of consciousness. This is in fact the case with the

reported experience of transcendental consciousness. Laboratory experiments have been performed in which practitioners of Maharishi's Vedic Science and Technology pressed a button immediately after they felt they were experiencing transcendental consciousness. Inspection of the data revealed that the button press coincided with the onset of a completely different pattern of EEG activity characteristic of an alert and yet restful state, while breathing was virtually suspended during this period, suggesting a very quiet and yet alert state of mental and physiological functioning. Such a clear and precise awareness of the onset and offset of a mental state, coupled with a unique and holistic pattern of psychophysiological functioning, can much more parsimoniously be explained as an experience of a state of consciousness rather than an interpretation, idea, or mood; superficial ideas and moods are not accompanied by such total changes in psychophysiological functioning.

Another observation in support of this argument is the following: At initial instruction in the TM technique, beginners are advised not to anticipate any particular experience at all, since it has been found that anticipating an experience tends to keep the mind engaged in active thinking, which prevents it from settling down to experience less excited states of a thought on the way to transcending

thought altogether. Such an instruction does not support the argument that practitioners of Maharishi's Vedic Science and Technology experience only a mood created by a anticipation of an experience. These observations are to point out that the experience of pure consciousness is just that-- a simple, clear, lively, direct experience as distinguished from an interpretation, an expectation, or a fanciful idea.

Finally, if the experience of transcendental consciousness as a non-changing, unified, omnipresent field and the total potential of natural law were only a product of fancy or anticipation, how could one account for the fact that great thinkers throughout the ages, including the greatest objective scientists of modern history, made reference to this reality and held it in highest regard? For example, Aristotle, considered the father of classical science, talked of an ultimate level of life beyond change, which he considered to be the source of all change, the "unmoved mover", "unity", "all-pervading", "simple" and "self-knowing" (In McKeon, 1941, 1072a,1003b,1072b). Sir Isaac Newton spoke of a "subtle spirit which pervades all bodies," which is the source of all activity in the universe, the abode of "truth...ever to be found in simplicity," "which he only can know how to estimate who shall experience it (in Mott, Trans., 1934, 547) Johannes

Kepler, the great astronomer also perceived a subtle harmony underlying the order of the visible world, a "transcendental world in which everything is as it should be, in which will and law agree and truth in its beauty reveals itself to the perceiving mind," a field which, "by knowing itself and in itself all things stirs up discursive intellect, and by dispersing and unfolding its simplicity into them, makes everything to be understood." He spoke of an "experience which is so clear that only someone who has not tested it himself can deny (in Caspar, Ed., 1959, 224). Albert Einstein spoke of "the eternal, the unfathomable...being," "the source of all true art and science (In Shilpp, 1931, 6-7)." How can this experience, which has been a constant source of joy, wonder, order, knowledge, inspiration, and creativity to great scientists throughout the ages, be attributed to a superficial expectation or fanciful idea?

Conclusion

This discussion has considered that Maharishi's Vedic Science and Technology represents the addition of a subjective means of gaining knowledge which is both valid and reliable, to the objective approach of modern science. Maharishi's Vedic Science and Technology therefore refutes the notion that a valid and reliable subjective means of gaining knowledge is impossible to achieve. Specifically,

it provides a universal standard to verifiability where previous subjective approaches have not; second, it generates objectively verifiable predictions; third, it provides a systematic, universal method of subjective investigation of nature; fourth, it produces practical applications for the benefit of mankind. Finally, it provides a universal, direct experience as distinguished from interpretation or imagination.

Because it overcomes the problems of previous subjective approaches to gaining knowledge, Maharishi's Vedic Science and Technology supplements and supports the objective means of gaining knowledge in four ways: 1) by providing a means of observing that which the objective method by itself cannot observe-- the observer himself, described as pure consciousness or pure intelligence, which transcends the duality of observer and observed; 2) by providing a systematic method of discovering laws of nature-- something objective science has never been able to offer; 3) by accounting for how scientific judgment, insight and intuition take place, and providing a systematic means to develop them to their fullest capacity; 4) by providing a truly invariant, universal field of reference for observation and consensus-- a completely bias-free basis of observation.

APPENDIX B
QUESTIONNAIRE ON HIGHER STATES
OF CONSCIOUSNESS



RESEARCH PARTICIPATION SCREENING

1. Name: _____
2. Sex: M F Age: _____ Handedness: Right _____ Left _____ Mixed _____
3. How many dreams do you recall on the average per week?
- | | | | | |
|-----------|-----------|------------|--------------|---------------|
| ___ none | ___ four | ___ eight | ___ twelve | ___ sixteen |
| ___ one | ___ five | ___ nine | ___ thirteen | ___ seventeen |
| ___ two | ___ six | ___ ten | ___ fourteen | ___ eighteen |
| ___ three | ___ seven | ___ eleven | ___ fifteen | ___ nineteen |
| | | | | ___ twenty + |

4. Please indicate the degree to which the following conditions apply to you:

5 4 3 2 1

severe moderate none at all

- A. A history of ear problems: specify _____
- B. A major physical handicap which impairs movement: specify _____
- C. A vision problem not correctable by glasses: specify _____
- D. A history of motion sickness: specify _____
5. Check one of the following regarding your experience with and interest in meditation.
- a. no experience, no interest
 - b. no experience, moderate interest
 - c. no experience, very interested
 - d. some experience, no interest
 - e. some experience, moderate interest
 - f. some experience, very interested
 - g. currently regularly meditate (If checked "g" please give details such as technique and amount of time spent in meditation daily): _____

6. Please indicate the frequency with which you experience each of the following types of dreams using the scale below. On the reverse side of this sheet please give a sample dream (or sleep experience) of each of the types of dream sleep experiences you have had. Please make your samples as complete as possible in order to ensure that you understand the concept.

FREQUENCY: 1. all night 2. most of the night 3. 1+/night 4. 1+/week
 5. 1+/month 6. 1+/3 months 7. 1+/6 months 8. 1+/year
 9. less than one/year 10. once in my lifetime 11. never

- A. During the dream you come to a point where you are actively thinking about the fact that you are dreaming.
- B. While dreaming you experience a quiet, peaceful innerawareness or wakefulness that is completely separate from the dream.
- C. During dreamless sleep, you experience a quiet, peaceful inner-awareness or wakefulness.

SAMPLE SLEEP/DREAM EXPERIENCES

- A. During the dream you come to a point where you are actively thinking about the fact that you are dreaming.**
- B. While dreaming you experience a quiet, peaceful inner awareness or wakefulness that is completely separate from the dream.**
- C. During dreamless sleep, you experience a quiet, peaceful inner awareness or wakefulness.**

APPENDIX C
REACTION TIME DATA SHEET

PSYCHOLOGY EXPERIMENT

Date _____ Name _____
 First Last M.I.

Student I.D. No. (Social Security) _____ Gender _____
 M F

Age _____ Education Level (No. years in high school or college) _____ Major _____ Highest Degree _____

School Address _____
 Street City and State Zip

Telephone _____
 Work Home

Parents' Education level (highest degree) Father _____ Mother _____
 Parents' Occupation Father _____ Mother _____

Parents' Yearly income Father _____ Mother _____

Do you practice the Transcendental Meditation technique? Yes _____ No _____

Do you practice the TM-Sidhi program? Yes _____ No _____

Number of months practicing the TM program _____

Number of months practicing the TM-Sidhi program _____

Permanent Address _____
 Street City and State Zip

Permanent telephone _____
 Area Number Area Number
 (Work) (Home)

1 Light 8 Lights

Mean RT

Std. Deviation

Slope

Comments:

