UNIVERSITY of TASMANIA

University of Tasmania Open Access Repository

Cover sheet

Title
Australian Antarctic scientists : consciousness and behaviour

Author
Widolf, HE

Bibliographic citation
Widolf, HE (2007). Australian Antarctic scientists : consciousness and behaviour. University Of Tasmania. Thesis. https://doi.org/10.25959/23211098.v1

Is published in:

Copyright information
This version of work is made accessible in the repository with the permission of the copyright holder/s under the following,

Licence.

Rights statement: Copyright 2007 the author

If you believe that this work infringes copyright, please email details to: oa.repository@utas.edu.au

Downloaded from University of Tasmania Open Access Repository

Please do not remove this coversheet as it contains citation and copyright information.

University of Tasmania Open Access Repository

Library and Cultural Collections
University of Tasmania
Private Bag 3
Hobart, TAS 7005 Australia
E oa.repository@utas.edu.au CRICOS Provider Code 00586B | ABN 30 764 374 782 utas.edu.au

AUSTRALIAN ANTARCTIC SCIENTISTS: CONSCIOUSNESS AND BEHAVIOUR

by

Helena Ellinor Widolf, B. Soc. Sc., B. Antarctic Studies (Hons.)

Submitted in fulfilment of the requirements for the
Degree of Doctor of Philosophy
University of Tasmania (March, 2007)

DECLARATION

This thesis contains no material that has been accepted for the award of any other degree or diploma in any tertiary institution. To the best of my knowledge and belief, this thesis contains no material previously published or written by another person, except where due reference is made in the thesis text. To the best of my knowledge and belief, this thesis contains no material that infringes copyright.

Helena Ellinor Widolf

Date

STATEMENT OF AUTHORITY

This thesis may be made available for loan and limited copying in accordance with the Copyright Act 1968.

Helena Ellinor Widolf

Date

THESIS ABSTRACT

A growing number of contemporary authors are acknowledging that the quality of consciousness of global human society is less-than-ideal. Qualities affiliated with materialism, such as selfishness and greed, are recognised as root causes of the widespread exploitation of the Earth's natural resources. The nurturing of qualities such as high ethical standards, adherence to scriptural knowledge and concern about spiritual matters, is recognised as being increasingly forsaken for the development of qualities such as interest in economic advancement and concern about personal sense enjoyment. Deterioration of the Earth's natural environment has been acknowledged as a consequence of such poorer qualities of human consciousness. As environmental scientists play a key role in determining the direction of environmental management, an investigation was carried out into their quality of consciousness.

The study sample was the Australian Antarctic scientific community, whose research findings contribute towards both national and international environmental policy and management. Research methodology included the ancient Vedic triguna and the Buddhist Theravada Abhidharma, two systems of psychological evaluation that determine qualitative standards of consciousness in relation to behaviour. The triguna is comprised of three qualitative levels of consciousness: sattva guna, the mode of goodness (including characteristics such as *greater and real knowledge* and *showing compassion towards others*); rajas guna, the mode of passion (e.g. *adherence to mundane knowledge* and *sense enjoyment*); and tamas guna, the mode of ignorance (e.g. *inertia* and *destructiveness*). *Abhidharma* factors include Positive Mental Events (e.g. *decorum/consideration for others*), Negative Mental Events (e.g. *lack of a sense of propriety/inconsideration for others*) and Negative Emotions (e.g. *attachment*). *Paramitas* (perfections) representing ideal behavioural factors (e.g. *morality* and *loving-kindness*) were also included in collecting and processing data.

Data collection items included an inventory/questionnaire based on the triguna, an interview series based on scientists' perspectives on their own professional lives, an examination of Australian Antarctic science literature, and an additional questionnaire addressing ideal guna characteristics in relation to environmental science goals. Results revealed that Australian Antarctic scientists predominate within rajas guna and are predominated by Negative Mental Events. Symptoms of predominance within rajas guna include *distortion of the intellect due to too much activity*; *anxiety*; and *misery*. A predominance of Abhidharma Negative Mental Events means a decline in wholesome behaviours and an increase in unwholesome behaviours. Anticipated ramifications of such predominance on behalf of Australian Antarctic scientists, for Antarctic and global natural environments, include their increasing deterioration as they are managed under sub-standard policies.

ACKNOWLEDGEMENTS

I would like to thank my supervisors Julia Jabour, Marcus Haward, John Davidson and Ravi Gomatam who persevered with me over the past four and a half years. Without your help this thesis would not have eventuated. Your guidance was invaluable and your support was very much needed.

A big thank you to all IASOS staff for your help and friendship over the years.

Thank you to all Australian Antarctic scientists and other personnel who gave of their time to participate in the data-collection for my thesis. Without your cooperation this research project would not have been possible. Thank you to all non-Antarctic scientists who also gave of their time to participate in questionnaires.

Thank you to my referees who helped with triguna theory.

TABLE OF CONTENTS

CHAPTER ONE: INTRODUCTION

Chapter Outline ……..……19

1.1 Investigating the Problem

1.1.1 The Crisis of Our Times: A Crisis of Consciousness ……..……19
1.1.2 Quality of Consciousness and Australian Antarctic Scientists ……...22
1.1.3 Thesis Proposition and Thesis Objective ……....26
1.1.4 Thesis Research Design, Research Parameters, Restrictions and A Brief Thesis Outline ……..27

1.2 Chapter Conclusion …….29

CHAPTER TWO: LITERATURE REVIEW

Chapter Outline ……...30

2.1 In Search of Suitable Theoretical and Methodological Approaches
2.1.1 The Topic of Quality of Consciousness within Current Literature ……30
2.1.2 Eastern Approaches to the Topic of Quality of Consciousness: An Overview……...32

2.2 Vedic Literature
2.2.1 Vedic Literature: Introduction ……...35
2.2.2 Translations by A.C. Bhaktivedanta ……..……38
2.2.3 Specific Texts and Their Contents ……..41
2.2.4 Vedic Cognitive Science …….……46
2.2.5 Psychological Conditioning and the Three Modes of Material Nature (Triguna)……..……49

2.3 Buddhist Literature
2.3.1 Buddhist Literature: An Introduction …….……54
2.3.2 Specific Texts and Their Contents ……..……55
2.3.3 Enactive Cognitive Science ……57
2.3.4 Theravada Abhidharma Factors ……58

2.4 Chapter Conclusion ……63

CHAPTER THREE: CONSTRUCTING A FRAMEWORK FOR DATA COLLECTING AND PROCESSING

Chapter Outline ……...65

3.1 Data Collection and Processing Framework: An Overview
3.1.1 Framework Purpose and Suitability for the Thesis Objective ……...65

3.1.2 Framework Parameters ……..69

3.2 Data Collection Items
3.2.1 The Australian Antarctic Scientist Inventory ……70
3.2.2 The Ideal Guna Situatedness Questionnaire ……..……76
3.2.3 Interview Series ……..……78
3.2.4 Australian Antarctic Science Literature ……...……..82

3.3 Data Processing Using the Vedic Triguna
3.3.1 Triguna Evaluation and Presentation Guides ……....85
3.3.2 The Australian Antarctic Scientist Inventory ……90
3.3.3 The Ideal Guna Situatedness Questionnaire ……..……92
3.3.4 Interview Series ……..……92
3.3.5 Australian Antarctic Science Literature ……....94

3.4 Data Processing Using the Buddhist Theravada Abhidharma
3.4.1 Abhidharma Evaluation and Presentation Guides ……96
3.4.2 Interview Series ……..…99
3.4.3 Australian Antarctic Science Literature ……...101

3.5 Chapter Conclusion ……...102

CHAPTER FOUR: THE AUSTRALIAN ANTARCTIC SCIENTIST INVENTORY AND THE IDEAL GUNA SITUATEDNESS QUESTIONNAIRE

Chapter Outline ……103

4.1 Australian Antarctic Scientist Inventory (AASI): Distribution and Initial Results
4.1.1 AASI Distribution, Participation Rate and Procedure ……103
4.1.2 Raw AASI Results ……104
4.1.3 Summary of AASI Results According to the Three Gunas as Separate Categories……..105
4.1.4 AASI Results According to the Stratified Hierarchical Presentation of Scores……111

4.2 Examination of AASI Scores for Individual Gunas
4.2.1 Examination of AASI Scores for Sattva Guna ……..114
4.2.2 Examination of AASI Scores for Rajas Guna ……...122
4.2.3 Examination of AASI Scores for Tamas Guna ……130
4.2.4 Examination of the Consistency of AASI Scores ……..138

4.3 Ideal *Guna* Situatedness Questionnaire (IGSQ)
4.3.1 IGSQ Distribution, Participation Rate and Procedure ……139
4.3.2 IGSQ Results ……139

4.4 Chapter Conclusion ……...144

CHAPTER FIVE: AUSTRALIAN ANTARTIC SCIENCE INTERVIEW SERIES

Chapter Outline …….145

5.1 Introduction
5.1.1 Interview Series Participation Rate and Procedure …….145
5.1.2 Interview Series Transcription Procedures ……..146

5.2 Processing Using the Vedic Triguna
5.2.1 Identification of Quantifiable Responses to Interview Questions ……146
5.2.2 Results of Quantification, Significant Statements and Overall Appraisals of Individual Scientist Responses to Interview Series Questions, According to the Triguna ……...147
5.2.3 Summary of Interview Series Results According to the Triguna ……..162

5.3 Processing Using the Buddhist Theravada Abhidharma
5.3.1 Identification of Quantifiable Responses to Interview Questions ……166
5.3.2 Results of Quantification, Significant Statements and Overall Appraisal of Individual Scientist Responses According to the Abhidharma …….167
5.3.3 Summary of Interview Series Results According to the Abhidharma ……...184

5.4 Chapter Conclusion ……...186

CHAPTER SIX: AUSTRALIAN ANTARCTIC SCIENCE LITERATURE FEATURES

Chapter Outline …….188

6.1 Processing Using the Vedic Triguna
6.1.1 Analysis of the Contents of the Antarctic Animals Ethics Committee Animal Experimentation Guidelines ……188
6.1.2 Results from Interview Series Question No. 7, Regarding Peer-review: Discussion ……192
6.1.3 Peer-reviewed Journal Articles: Text-category 1: Physical Science ……...195
6.1.4 Peer-reviewed Journal Articles: Text-category 2: Biological Science ……200
6.1.5 Peer-reviewed Journal Articles: Text-category 3: Human Impact Studies ….204
6.1.6 Summary of Results from the Examination of Science Literature Features, According to the Triguna …….208

6.2 Processing Using the Buddhist Theravada Abhidharma
6.2.1 Analysis of the Contents of the Antarctic Animals Ethics Committee Animal Experimentation Guidelines ……216
6.2.2 Results from Interview Series Question No. 7, Regarding Peer-review: Discussion ……218
6.2.3 Peer-reviewed Journal Articles: Text-category 1: Physical Science ……...219
6.2.4 Peer-reviewed Journal Articles: Text-category 2: Biological Science ……220
6.2.5 Peer-reviewed Journal Articles: Text-category 3: Human Impact Studies ….222
6.2.6 Summary of Results from the Examination of Science Literature

Features, According to the Abhidharma ……..223

6.3 Chapter Conclusion ……...226

CHAPTER SEVEN: ANALYSIS OF ALL THESIS DATA

Chapter Outline …….227

7.1 Overall Findings: The AASQCP
7.1.1 Findings from Results of All Data Collection Items: Construction of the Australian Antarctic Scientist Quality of Consciousness Profile (AASQCP) ……227
7.1.2 The AASQCP in Relation to the Findings from IGSQ Results …….232
7.1.3 The AASQCP in Relation to the Thesis Proposition and Thesis Objective…...233
7.1.4 Correlation Analysis: AASQCP, Research Results from Other Triguna Research and Anticipated Consequences of AASQCP According to a Selection of Buddhist Readings ……234

7.2 Chapter Conclusion ……...238

CHAPTER EIGHT: CLOSING DISCUSSION AND FURTHER RESEARCH

Chapter Outline …….240

8.1 Thesis Closing Discussion
8.1.1 Significance and Implications of Overall Findings ……..240

8.2 Further Research
8.2.1 Further Research for Australian Antarctic Science …….243
8.2.2 Further Research for Triguna Studies …….246
8.2.3 Further Research for Abhidharma Studies ……..247

8.3 Chapter Conclusion ……...248

REFERENCES ……..250

PERSONAL COMMUNICATIONS ……261

LIST OF TABLES

TABLE 2.3.4.1: Systematisation of Abhidharma Factors ……...62

TABLE 3.1.1.1: Data Collection and Processing Framework (DCPF)……67

TABLE 3.3.1.1: Significance and Implications of Guna Situatedness (SIGS) ……...89

TABLE 3.4.1.1: Significance and Implications of Representation of Abhidharma Factors (SIAF) ……..98

TABLE 4.1.3.1: Percentages of AASI Responses Showing Scientist Support for Each Guna ……..105

TABLE 4.1.4.1: AASI Results According to Adapted SHPS Model/ Intrinsic versus Instrumental Value of the Natural Environment ……..112

TABLE 4.2.1.1: Examination of AASI Scores for Sattva Guna ……...115

TABLE 4.2.2.1: Examination of AASI Scores for Individual Rajas Guna ……...123

TABLE 4.2.3.1: Examination of AASI Scores for Tamas Guna ……..131

TABLES 5.2.2.1.1 to 5.2.2.21.1: Interviewees' Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna ……147-161

TABLE 5.2.3.1: Results of the Quantification of All Interview Responses to Questions 1, 2, 3 and 9, According to the Triguna ……162

TABLE 5.2.3.2: Results from the Overall Appraisal of All Interviews, According to the Triguna ……..163

TABLE 5.2.3.3: Comparison of Results from TABLES 5.2.3.1 and 5.2.3.2 ……164

TABLE 5.2.3.4: Interview series Results: Guna Characteristics Represented the Most Frequently Within Each Guna ……165

TABLES 5.3.2.1.1 to 5.3.2.21.1: Interviewees' Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma ……167-184

TABLE 5.3.3.1: Results of Quantification of All Interview Responses to Questions 3, 5, 6 and 8 ……..185

TABLE 5.3.3.2: Interview Series Results: Abhidharma Factors Represented Most Frequently Within Each Factor Group ……186

TABLE 6.1.6.1: Results from Analysis of the AAEC's Animal Experimentation Guidelines (2006) According to the Triguna ……208

TABLE 6.1.6.2: Quantification of Overall Appraisals of Peer-Reviewed Science Publications Using the Triguna ……210

TABLE 6.1.6.3: Guna Characteristics Represented the Most Frequently within All Australian Antarctic Science Literature ……...211

TABLE 6.2.6.1: Results from Analysis of the AAEC's Animal Experimentation Guidelines (2006) According to the Abhidharma …….223

TABLE 6.2.6.2: Summary of Abhidharma Factors Present within Peer-Reviewed Journal Articles ……224

TABLE 6.2.6.3: Abhidharma Factors Appearing Most Frequently within All Science Literature Features …….225

LIST OF CHARTS, DIAGRAMS, FIGURES AND GRAPHS

DIAGRAM 2.2.1.1: Vedic Literature …….36

FIGURE 2.2.2.1: Sample of Layout of Bhaktivedanta's Texts ……...39

FIGURE 2.2.4.1: Vedic Model of the Materially Embodied Self (VMMES) ……47

FIGURE 2.2.5.1: Model of the Prioritisation of the Needs of the Jiva (PNJ) …….54

FIGURE 3.3.1.1: Stratified Hierarchical Presentation of Scores (SHPS) ……...87

PIE CHART 4.1.3.1: AASI scores for Sattva Guna ……..105

PIE CHART 4.1.3.2: AASI Scores for Rajas Guna ……..106

PIE CHART 4.1.3.3: AASI Scores for Tamas Guna ……106

GRAPH 4.1.3.1: Line Graph Depiction of Results ……...107

GRAPH 4.1.3.2: Histogram Presentation of Individual Scientists' AASI Results for Sattva Guna ……..108

GRAPH 4.1.3.3: Histogram Presentation of Individual Scientists' AASI Results for Rajas Guna ……108

GRAPH 4.1.3.4: Histogram Representation of Individual Scientists' AASI Results for Tamas Guna ……..109

GRAPH 4.3.2.1: IGSQ Results for Goal 1: To maintain the Antarctic Treaty System and enhance Australia's influence within the System ……...140

GRAPH 4.3.2.2: IGSQ Results for Goal 2: To protect the Antarctic environment ……...140

GRAPH 4.3.2.3: IGSQ Results for Goal 3: To understand the role of Antarctica in the global climate system ……141

GRAPH 4.3.2.4: IGSQ Results for Goal 4: To undertake scientific work of practical, economic and national significance ……..141

GRAPH 4.3.2.5: IGSQ Results for Goal 5: To ensure that emerging environmental problems of wide international significance receive appropriate and adequate considerations by Governments ……...142

GRAPH 4.3.2.6: IGSQ Results for Goal 6: To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature ……..142

APPENDICES (entered on CD- see pocket inside back-cover)

A: Complete Guna Characteristics Guide (CGCG)

B: Complete Abhidharma Factor Guide and Guide for Assessing Correlation Between the Triguna and the Abhidharma (CAFG-GACTA)

C: Australian Antarctic Scientist (AASI) Statement Formulation and Listing

D: AASI and Ideal Guna Situatedness Questionnaire (IGSQ) Data Collecting Procedures

E: Raw AASI Scores Including Their Percentage Value

F: AASI Scores Presented in Excel

G: Pearsons' Correlation Analysis for AASI Scores

H: Further Processing of AASI Scores

I: Alternative Processing to Determine Consistency of AASI Scores within Each Individual Guna

J: IGSQ Raw Scores

K: Further Processing of IGSQ Results

L: Guna Representation of Individual IGSQ Goals, Analysed against IGSQ Results

M: Full Interview Transcripts

N: Guna Designation of Responses to Interview Questions 1, 2, 3 and 9

O: Significant Statements by Interviewees According to the Vedic Triguna

P: Abhidharma Factor Representation of Responses to Interview Questions 3, 5, 6 and 8

Q: Significant Statements by Interviewees According to the Buddhist Theravada Abhidharma

R: The Antarctic Animals Ethics Committee's *Animal Experimentation Guidelines* (2006)

S: Responses to Interview Series Question No. 7

T: Bhaktivedanta's Lectures, Conversations and Letters Cited in the Thesis Text

Sanskrit Glossary

Abhidharma Pitaka
One of three core categories of original Buddhist literature. A philosophical treatise on worldly phenomena in relation to the functioning of the human mind, emotions and behaviour.

Acarya
One who teaches by example.

Bhakti-yoga
The science of devotion to Lord Krishna.

Boddhisattva
One who has attained Buddha-hood/enlightenment according to Buddhism.

Buddha/buddhi
Literal meaning is 'intelligence.' Gautama Buddha is the Buddha 'for this age' having appeared in India ca. 500 BCE.

Guna
One of three modes of material nature. The word *guna* also means 'rope' or binding substance, indicating that material nature ensnares the spiritual living being.

Guru
Spiritual master or spiritual teacher. *Guru* also means 'heavy' i.e. one who is heavy with spiritual knowledge and authority.

Jiva/atma
The non-material individual; the spirit; the soul; the self; the elementary unit of consciousness that comprises an individual living being (*atma* may also be interpreted as the mind or the body, depending on grammatical use).

Kali-yuga
The current cosmological age of "quarrel and hypocrisy," in which religion will decrease whilst materialism will increase.

Karma
Action and its subsequent reaction.

Krishna/krsna
Literal meaning is 'all attractive.' Lord Krishna appeared on Earth 5,000 years ago when He spoke the *Bhagavad-gita* (song of God).

Mahat-tattva or *pradhana*
The total material energies.

Mahayana
The Buddhist 'great vehicle' scriptures.

Paramatma
The Supersoul or localised Vishnu expansion of Lord Krishna.

Paramita
Literal meaning is 'perfection.' The term is used to describe specific personal qualities that are pursued in order to cross from sensuous life to Buddhist enlightenment.

Parampara
Disciplic succession through which Vedic knowledge is traditionally taught.

Prakrti or *prakriti*
Material nature.

Pratyaksa
Acquiring knowledge through the material senses (empiricism).

Rajas guna
The material mode of passion.
Samsara
The wheel of repeated birth and death.
Sankhya
The ancient Indian system of philosophy which discusses in detail the material world and the nature of the non-material soul in relation to inert matter.
Sattva guna
The material mode of goodness.
Sloka
Sanskrit verse.
Skandha
An aggregate or element comprising psycho-physical experiential events (Buddhist use).
Smriti/smrti
That which is remembered.
Sruti
That which is heard.
Suddha-sattva
Pure goodness. The transcendental platform of consciousness on which an individual is not affected by any of the material modes of nature.
Tamas guna
The material mode of ignorance.
Theravada
The Buddhist 'small vehicle' scriptures referring to 'the way of the Elders.'
Triguna
The three material modes together as a system.
Tripitaka
Literal meaning is 'three baskets.' The term is applied to describe the three categories of Gautama Buddha's teachings: 1. *Vinyana Pitaka* (regulative principles for monastic life); 2. *Sutra Pitaka* (instructional discourses); 3. *Abhidharma Pitaka* (higher teachings: systematised philosophical ideas).
Vaishnava/vaisnava
Original Vedic knowledge maintains that Lord Vishnu, who is Lord Krishna's expansion as sustainer of the material cosmos and as maintainer of the material mode of goodness, is the highest worshipable deity, as He is Krishna Himself.
Veda
Knowledge; to know.
Vedanta
Conclusive meaning of Vedic knowledge.
Vedas/Vedic literature
Texts recorded 5,000 years ago in India. Topics include cosmology, astronomy, physics, psychology, philosophy, religion, sociology, medicine, biology and history, discussed within both metaphysical and mundane contexts.
Vyasadeva/Vedavyasa/Sage Vyasa
An incarnation of Lord Krishna who compiled original Vedic texts.

(Source: Bhaktivedanta 1998; Guenther and Kawamura 1975; Satsvarupa dasa Goswami 1990; Snelling 2000; Toropov and Buckles 2004)

Initialism/Acronyms

AAD *Australian Antarctic Division*
AAEC *Antarctic Animal Ethics Committee*
AASI *Australian Antarctic Scientist Inventory*
AASQCP *Australian Antarctic Scientist Quality of Consciousness Profile*
ACE CRC *Antarctic Climate and Ecosystems Cooperative Research Centre*
ANOVA *Analysis of Variance*
APCG *Abhidharma Profile Construction Guide*
APS *Australian Public Service*
ATS *Antarctic Treaty System*
BOM *Bureau of Meteorology*
CAFG-GACTA *The Complete Abhidharma Factor Guide* and *Guide For Assessing Correlation between the Triguna and the* Abhidharma
CCAMLR *The Convention on the Conservation of Antarctic Marine Living Resources*
CCCAMLR *The Commission for the Convention on the Conservation of Antarctic Marine Living Resources*
CGCG *Complete Guna Characteristics Guide*
CSIRO *Commonwealth Scientific and Industrial Research Organisation*
DCPF *Data Collection and Processing Framework*
DSES *Daily Spiritual Experience Scale*
ECS *Enactive Cognitive Science (sometimes presented as Enactive Cognitive Theory [ECT])*
EDR *Environmentally Desirable Responses*
GDEG *Guna Datum Evaluation Guide*
GPCG *Guna Profile Construction Guide*
IASOS *Institute of Antarctic and Southern Ocean Studies*
IGSQ *Ideal Guna Situatedness Questionnaire*
IRT *Item Response Theory*
NGO *Non-Government Organisation*
PNJ *Prioritisation of the Needs of the Jiva*
SDR *Socially Desirable Responses*
SHPS *Stratified Hierarchical Presentation of Scores*
SIAF *Significance and Implications of Representation of Abhidharma Factors*
SIGS *Significance and Implications of Guna Situatedness*
SPSS *Statistical Product and Service Solutions (formerly Statistical Package for the Social Sciences)*
UNEP *United Nations Environmental Program*
UTAS *University of Tasmania*
VCS *Vedic Cognitive Science*
VMMES *Vedic Model of the Materially Embodied Self*
VPI *Vedic Personality Inventory*
WWF *World Wide Fund for Nature*

In-text peculiarities

1) Throughout this thesis, Chapter sections are often referred to in other parts of the thesis text. Such referral is written as 'see section 1.3.4', meaning the first chapter, third subtitle, fourth sub-subtitle. The labelling of tables, diagrams and figures follows suit, with Table 4.2.3.3 indicating the third table situated within Chapter 4, under the second subtitle, within the third sub-sub-title;
2) As many publications by Bhaktivedanta (1987-8, 1989, 1996) comprise transliterations of original Vedic texts considered as being religious, several citations of his publications are presented according to the original ordering of Sanskrit verses instead of publication page numbers.

   For example, (Bhaktivedanta 1987-8, 10:4:16-22) means verses (or texts) sixteen to twenty-two of the fourth chapter of the tenth canto of *Srimad Bhagavatam* (1987-8), as this text is organised according to cantos, chapters and verses, respectively. Accordingly, (Bhaktivedanta 1987-8, 8:chap.5) means the whole of the fifth chapter of the eighth canto of the *Srimad Bhagavatam*. (Bhaktivedanta 1987-8, 4:*xi*) means page *xi* of the fourth canto of *Srimad Bhagavatam*, prior to the beginning of chapters and their verses.

   (Bhaktivedanta 1989, 4:10, 18) means the tenth and the eighteenth verses of the fourth chapter of *Bhagavad-gita As It Is* (1989) as this text has only chapters and verses (no cantos). (Bhaktivedanta 1989, *intro* 12-5, 3:2) means pages twelve to fifteen of the Introduction to *Bhagavad-gita As It Is*, prior to the beginning of chapters, plus the second verse of the third chapter.

   (Bhaktivedanta 1996, *madhya*: 4:17) means the 17th verse of the fourth chapter of the *madhya-lila* section of *Sri Caitanya Caritamrita* (1996). *Sri Caitanya Caritamrita* consists of three primary sections, namely *adi-lila, madhya-lila* and *antya-lila*.

   (Buddhaghosa 2004, X:83) means the eighty-third stanza of the tenth chapter of *The Path of Purification* (2004);
3) In order to distinguish guna characteristics and Abhidharma factors from the rest of the text, after their initial descriptions in Chapter Two, these have been italicised throughout the text. For example, 'careful study of the past and future' is a characteristic belonging to sattva guna. In-text it would read 'The sattvic characteristic of *careful study of the past and future* appeared in a number of peer-reviewed journal articles';
4) Although the word *situatedness* does not appear within *Webster's Third New International Dictionary* (1993) nor within any other standard English dictionary, it is used throughout this thesis. Its meaning is defined by the researcher of this thesis as 'the manner in which an item or a person is situated or positioned within a particular context.' For other definitions/usage of the word *situatedness* within the social sciences see Haraway (1988) and Smyth (2003); and
5) Lectures and letters by Bhaktivedanta cited in the thesis text have been entered into Appendix T from *The Bhaktivedanta VedaBase* (1998) as such material is not readily available in hardcopy or electronic format. All thesis appendices can be accessed on the CD attached to the inside of the back-cover of the thesis hardcopy.

It probably goes without saying that few of us would want to have our consciousness raised. It is a little like a trip to the dentist: It may be painful, but it is probably necessary. Of course, many of you already know about the biases of traditional science, in which case please join me in communicating these to our colleagues. Considerable communication is required, and many of us are not skilled at articulating the philosophical assumptions of research.

Professor Brent Slife, keynote paper presented to the
North American Federation of Adapted Physical Activity, Canada (1998)

CHAPTER ONE

INTRODUCTION: THE PROBLEM

At its root, then, the crisis of our times is not so much an environmental crisis, an economic crisis, a population crisis or a political crisis; it is in essence a consciousness crisis-a mismatch between our psychological development and our technological development.

Peter Russell in "Psychological Roots of the Environmental Crisis" (1989, 225)

Chapter Outline

Chapter One provides the background of the problem that the thesis investigates. This problem is essentially the deterioration of the global natural environment at the hands of humankind. The thesis proposition in turn produces the thesis objective, being to investigate whether or not a need exists for environmental scientists to enhance the quality of their own consciousness for purposes of enhancing outcomes of environmental conservation efforts. Ancient Vedic and Buddhist approaches to examining quality of consciousness are introduced as comprising the theoretical and methodological means by which the thesis objective will be achieved. The thesis research design, structure and research parameters are established.

1.1 Investigating the Problem

1.1.1 The Crisis of Our Times: A Crisis of Consciousness

According to a growing number of academic and non-academic authors, greed, a lack of compassion and the urge of many individuals to attain power over others are increasingly maiming global human society. Depreciation of respect and recognition of the worth of other living beings, human and non-human alike is postulated as stemming from the deterioration of the quality of human consciousness. Authors such as Earley suggest that the quality, condition or health of human beings' consciousness has gradually been worsening in the modern era. In "The Social Evolution of Consciousness" (2002) Jay Early states that:

> in the consciousness realm, our society has devalued participation and privileged understanding based on empirical data and logic, leading to deadness and detachment. By losing the sense of belonging to something larger than ourselves, many of us have lives bereft of meaning. A large number of people feel separate from nature, isolated from community, out of touch with the emotional and creative, or disconnected from the artistic and spiritual. Many people dedicate their lives to money, security, power, and appearances…. We frequently treat other people, other nations, and the natural world as objects to be controlled and used. Our culture allows wholesale destruction of species and habitats because we have lost empathy with the natural world. Lacking a sense of compassion, our society permits widespread oppression and exploitation. (Earley 2002, 121-2)

Russian born sociologist Pitirim Sorokin (1889-1968) argued that it is a predominance of material values, grounded in sensory stimulation, that underpins the current global crisis. Sorokin (1942; 1962) postulated that societies can be categorised as either ideational (seeing reality as being spiritual), sensate (seeing reality as being material or physical) or idealistic (seeing reality as being a mixture of the former two realities). According to Sorokin, beginning with the 16th century, contemporary Western societies are *sensate* in that the pursuits of their members are based on satisfying the senses through the pursuit of worldly, secular or material commodities, rather than pursuing idealistic or spiritual goals (Sorokin 1942, 20).

Such sentiments regarding the current predominance of material values over spiritual values in contemporary Western societies, including the ramifications of such predominance on global health and stability, are reflected in many recent publications such as Tim Kasser's *The High Price of Materialism* (2003). Kasser argues that "evidence exists that materialistic values are associated with low interest in environmental and ecological issues" (Kasser 2003, 92). He claims that:

> we have seen instances of how materialistic values conflict with concern for the wider world. For example, individuals focused on materialistic values care less about "beautiful cities and countryside." Similarly, the circumplex model of values shows that across many cultures, values for wealth oppose concerns to "protect the environment," to have a "world of beauty," and to attain "unity with nature." (Kasser 2003, 92)

In "Beyond Materialism: A Coevolutionary Reinterpretation of the Environmental Crisis" (1995) Richard B. Norgaard argues that "materialism, both as a vision of the good life and as a cosmological basis underlying epistemology and modern science, drives humanity's environmental crisis" (Norgaard 1995, 475). Norgaard further claims that trying to put an end to the environmental crisis by using material solutions is thereby futile, as it is our materialistic desires and values that are the very root cause of the crisis.

If materialistic values such as those addressed by Earley, Kasser and Norgaard can be described as being affiliated with qualities of consciousness such as greed, selfishness, carelessness and destructiveness, then qualities of consciousness such as unselfishness, compassion and heedfulness may be described as being affiliated with non-materialistic or spiritual values. If we accept that different individuals maintain different qualities of consciousness and that those differences may change over time, then we can understand that human beings today may not have the same quality of consciousness as human beings had in previous times.

In *The Last Hours of Ancient Sunlight: Waking Up to Personal and Global Transformation* (1999) Thom Hartmann stresses the need for members of contemporary societies to listen to ancient cultures in order to understand and respect their fellow beings, their environments and themselves (1999, 201-2). He argues the most important factor needed to minimise the hefty impact of current global human society on the Earth's natural environment is a transformation of human beings' consciousness. If these deliberations by Hartmann and other authors discussed above carry any value, then it is necessary to ask the question as to what this infers about the consciousness of our current global human society? If we need to retrace our steps to ancient times in order to learn how to not self-destruct, what does this say about our contemporary understanding of ourselves?

If indeed the quality of consciousness of human beings has deteriorated since ancient times, then questions as to why this is so and what the ramifications of such deterioration may be, should attract the interest of academics and governments. What

may a poorer quality of human consciousness mean for human efforts to resolve international tensions and to achieve environmental sustainability? Are these goals automatically hampered by a decline in the quality of consciousness of humankind? If so, what can possibly be done to improve the current quality of humankind's consciousness? Are there feasible ways in which to raise people's qualities of consciousness so that future generations of *all* species of life can enjoy a better standard of living than what many experience today? In order to answer such questions, consciousness itself and what constitutes inferior and superior quality of consciousness must first be determined.

The word *consciousness* has its roots in the Latin words *con* meaning "to know" and *scire* meaning "to know" or "to distinguish" (Barnhart and Steinmetz 1988, 968; Klein 1971, 159, 662; Simpson and Weiner 1989, 642-3, 757-8). Further meanings include "inwardly aware" (Barnhart and Steinmetz 1988, 209) and "internal knowledge or conviction; knowledge as to which one has the testimony within oneself; esp. of one's own innocence, guilt, deficiencies, etc." (Simpson and Weiner 1989, 756). Such definitions imply that our conscious states are characterised by an inner knowledge or awareness resting in morals, or at the very least, in self-awareness. If we accept the meaning of the word *quality* as being "degree of excellence" or "relative nature or character" (Kent 1998, 426) and the meaning of *consciousness* as being inner self-awareness; conscientiousness; or internal knowledge, then we can deduce that the quality of our consciousness plays a vitally important role in guiding us in our daily decision-making. Given these meanings the thesis definition of *consciousness* is:

AN INDIVIDUAL LIVING BEING'S AWARENESS

The thesis definition of *quality of consciousness* is:

THE DEGREE TO WHICH AN INDIVIDUAL'S CONSCIOUS AWARENESS IS AFFLICTED BY MATERIAL DESIRES AND MATERIAL CHARACTERISTICS. THE GREATER THE AFFLICTION, THE POORER THE QUALITY.

This second definition proposes that materialism is the root cause of poor quality of consciousness. Exactly how materialism is responsible for poor quality of consciousness will be expounded in Chapter Two.

In order to initiate an investigation into the quality of consciousness of environmental scientists, exactly what constitutes good/high and poor/low quality of consciousness must first be defined. As it is expected that different sectors of society within different cultures maintain different notions of what constitutes good and poor qualities of consciousness or awareness, a competent system of evaluation must be chosen to set the mark of where differences in quality exist. For example, whilst one culture may value tolerance of other cultures' peculiarities as praiseworthy, another culture may encourage intolerance of such peculiarities. Whilst one society may prioritise material advancement over spiritual advancement, another society may do just the opposite.

Contemporary literature addressing quality of human consciousness in relation to psychological and behavioural peculiarities is sparse. In *Why Good is Good: The Sources of Morality* (2002, 155-70) Robert A. Hinde states that there are numerous factors underpinning differences in humanity's perspectives on moral precepts. Some

of these factors include pragmatic considerations, hierarchies of moral precepts, multiplicity of consequences of different actions, individual versus societal ramifications of actions, values, beliefs, traditions and concepts of virtue. Whilst certain moral precepts may be accepted by most cultures as being underpinned by either higher or lower qualities of consciousness, recognition of other moral precepts may be endemic to only one or to a few cultures and societies.

Ancient Vedic and Buddhist texts both maintain that the quality of an individual's consciousness, mind and intellect directly determine the quality of his/her behaviour, as well as the general quality of his/her life experiences. They also both maintain that the only way in which humankind can prevent the destruction of the natural environment at our own hands, is for humankind to undergo a fundamental change of consciousness or awareness. This change involves ridding ourselves of qualities that are asserted as currently being prolific, including selfishness, destructiveness, irresponsibility, greed, laziness, ignorance, fearfulness, material desire and material attachments. In their place, qualities such as self-control, humbleness, tolerance, truthfulness, material simplicity and being spiritually focused are encouraged to be developed (Epstein 1992; Cremo and Mukunda Goswami 1995; Prime 2002).

In other words, both Vedic and Buddhist philosophies assert that current global human society is afflicted with a predominance of selfishness, materialism, ignorance etc. which is the cause of not only the suffering of its own members, but is also the cause of suffering for non-human living beings. Given these similar assertions by two of the word's most prominent religious and philosophical exegeses, Vedic and Buddhist conceptual frameworks of what constitutes good/high and poor/low qualities of consciousness for the materially embodied individual, will be applied in this thesis.

1.1.2 Quality of Consciousness and Australian Antarctic Scientists

Despite the tendency of environmental scientists to define conservation problems as problems that are soluble by environmental-science alone, the obscure and asymmetric nature of real-life environmental problems can not be vanquished. More often than not, such problems span across a number of different research areas with environmental-science-based aspects of problems comprising just one factor amongst many. Whilst it is acknowledged that the quality of consciousness of humanity at large contributes towards the condition of Earth's natural environmental, the quality of consciousness of environmental scientists is considered specifically important in view of the role that environmental scientists play in determining environmental management programs.

Whilst it is also acknowledged that environmental policy, that often directs environmental programs, is in turn influenced by contributors such as governments, non-government organisations (NGOs) and private enterprise stakeholders, the outcomes of scientists' activities nevertheless contribute significantly to environmental policy formulation. In the words of The Lord Dainton, "since, by definition, scientists and technologists are the first to know of scientific advances they can be described as 'the cartographers of the future'" (Dainton 1992, 119). As such, environmental scientists have a responsibility towards society at large to deliver accurate reports on the condition of the natural environment, including causal factors for threats to the environment and recommendations as to the urgency with which governments and societies at large need to act. For these reasons, this thesis proposes that the issue of the quality of consciousness of environmental scientists is outstanding in terms of its significance in contributing towards the global environmental condition. This issue is also considered outstanding in view of the

degree to which it has to date been neglected by contemporary environmental management programs.

Since scientific research was conducted in the Antarctic during the International Geophysical Year (IGY) (1957-1958) in which 66 countries participated, Antarctica has been treated by governments of many countries as a giant "scientific laboratory" (Law 1983, 267-72). An important reason for scientists' ongoing interest in the region is the exoticness of the Antarctic environment, in terms of its capacity to facilitate research that can not be facilitated elsewhere in the world. As stated by Walton:

> despite the remoteness of Antarctica, some of the research done there is immediately relevant to the more populated areas of the world. The most obvious example is the study of the increase in ultraviolet radiation – but there are others, such as research on the world sea level and on satellite communications. (Walton 2000, 174)

As much Antarctic research is directed towards solving global environmental problems, the geographical proximity of its recipients is in one sense irrelevant if attempting to assess its worth. Problems such as global warming affect all living beings, human and non-human, whether they live in remote or highly populated areas. The fundamental issue, then, in terms of the value of Antarctic science, has got little to do with numbers of recipients or the geographical proximity of recipients of research outcomes. The critical query is whether or not such science has the capacity to produce research outcomes that will truly benefit life on Earth. Can Antarctic science, in its current state, generate information on the real needs of the Earth's natural environment that is accurate, complete, necessary and relevant to all species of life and can it do so in an ethical and pragmatic manner? This thesis attempts to respond to such questions by evaluating the quality of consciousness of Australian Antarctic scientists.

Representing an integral part of an environmental management regime that maintains both national and international significance, the Australian Antarctic scientific community has been chosen as the study sample for this thesis. Currently, this community comprises a number of research organisations of which the following are situated in Hobart, Tasmania, Australia: The Australian Antarctic Division (AAD); The Bureau of Meteorology [Hobart branch] (BOM); the Commonwealth Scientific and Industrial Research Organisation [Hobart branch] (CSIRO); the Commission for the Convention on the Conservation of Antarctic Marine Living Resources (CCCAMLR); the Antarctic Climate and Ecosystems Cooperative Research Centre (ACE CRC); the Institute of Antarctic and Southern Ocean Studies (IASOS); and the University of Tasmania (UTAS). The current Australian Antarctic science program is described as follows:

> Australia's Antarctic Program is tasked to promote the value of the Antarctic and sub-Antarctic regions for the benefit of human kind, to protect the integrity of their unique wildlife, ecosystems and pristine environments, and to understand how these regions influence the physical processes that drive the climate and the ecology of our planet. Science is central to the achievement of these aims. (AAD 2004a)

In view of the above stated aims of Australian Antarctic science and in view of the need to clarify the meaning of quality of consciousness, the following points may be considered. In "Discovering Corporate Consciousness" (1996) Michael A. Campion and David K. Palmer give a working definition of *corporate consciousness* as:

> a set of consciously held, shared values that motivate and guide individuals to act in such a manner that the interests of the corporation are balanced against its obligation to be responsible for the effects of its actions upon society, the environment, and the host of interested stakeholders. (Campion and Palmer 1996, 395-6)

In this definition, consciousness is described as a set of values, specifically as values that are shared by the members of a corporation. These values are asserted as motivating and guiding members towards a specific goal of the corporation, namely to balance its interests and obligations to act responsibly. Whilst the word values is defined as "one's principles, priorities or standards" the word value is defined as "worth, desirability, or qualities on which these depend" (ed. Kent 1998, 587-8). In other words, Campion and Palmer see corporate consciousness as representing corporation members' collective character or integrity (underpinned by members' individual characters) which has to be guided towards meeting social and environmental responsibilities.

Whilst scientists may not overtly acknowledge how the peculiarities of their own cultural milieu impact on the scientific process, the role of such peculiarities have been well documented (Broad and Wade 1985; Lacey 1999). Whilst scientists may also not be aware of the qualities or characteristics of their own consciousness, they are nevertheless aware of predominant behavioural and attitudinal norms embraced by their own research orgainsations, as well as by broader Australian society.

Within the context of general workplace behaviour, all Australian Antarctic scientists must abide by the Australian Antarctic Division Organisational Behaviours, the Australian Public Service (APS) Values and the APS Code of Conduct. This code stipulates that employees must behave honestly and with integrity; act with care and diligence; be respectful and courteous; abide by the law; try to avoid conflict; avoid exploiting Commonwealth resources; and carry out duties properly (AAD 2002). Such idealistic characteristics requested by the APS of its employees may be described as promoting higher qualities of consciousness as opposed to lower qualities, which may in turn be described as characterised by dishonesty, the lack of integrity, carelessness, disrespect, law-breaking, conflict, exploitation and an unwillingness to carry out duties properly. Whilst the APS code undoubtedly restricts scientists in certain aspects of their behaviours, the question of whether or not such mechanisms are effective in raising scientists' quality of consciousness remains unanswered.

Perhaps the biggest challenge in implementing a program that evaluates and monitors the quality of scientists' consciousness would be the acknowledgement of the significance of such a program on behalf of scientists themselves. The topic of consciousness, whilst becoming more prevalent within contemporary academic literature, largely remains a highly controversial subject matter for scientists. Environmental scientists such as Australian Antarctic scientists certainly do not encounter the topic of consciousness within mainstream environmental science research literature any more than other environmental scientists working for the Australian Government do.

Currently, all research supported and conducted by the AAD must adhere to the four goals of the Australian Antarctic program. These goals include:

- Maintain the Antarctic Treaty System and enhance Australia's influence in it;
- Protect the Antarctic environment;

- Understand the role of Antarctica in the global climate system; and
- Undertake scientific work of practical, economic and national significance.

(AAD 2006a)

For the five-year planned period 2004/05-2008/09, all Australian Antarctic research is divided into four priority programs, namely:

- Ice, Ocean, Atmosphere and Climate;
- Southern Ocean Ecosystems;
- Adaptation to Environmental Change; and
- Impact of Human Activities in Antarctica.

(AAD 2004b)

The AAD's research programs includes the following research areas:

- Antarctic Marine Living Resources;
- Astronomy;
- Biology;
- Geosciences;
- Glaciology;
- Human Biology and Medicine;
- Human Impacts;
- Meteorology;
- Oceanography; and
- Space and Atmospheric Sciences.

(AAD 2006b)

Australia's Antarctic Climate and Ecosystems Cooperative Research Center's (ACE CRC) research programs are currently as follows:

- Climate Variability and Change;
- Sea-Level Rise;
- Ocean Control of Carbon Dioxide;
- Antarctic Marine Ecosystems; and
- Policy.

(ACE CRC)

From the above lists, the research program that perhaps comes closest to addressing the quality of consciousness of scientists themselves is the Human Impacts program. This program investigates the impacts of human activity on the Antarctic environment, especially the activities of Antarctic scientists. Yet scientists' psychological tendencies, what to speak of qualities of consciousness, are not included in relevant research agendas. Instead, the AAD's Human Impacts program focuses on analysing the consequences of scientific research such as pollution of the Antarctic environment and the harm caused wildlife populations by tourism. Little if any time is dedicated to seeking out the root-causes of the specific human behaviours responsible for such detrimental impacts.

Perhaps it can be argued that restrictions to Antarctic research such as constraints on time, funding and the seasonal unavailability of appropriate research facilities, all

determine relevant research directions. Whilst such restrictions may explain the omission of many potential research programs, the Australian Antarctic scientific community, like all other scientific communities, must respond to the expectations and needs of societies who are the recipients and supporters of their research. Environmental scientists thereby bear a responsibility of doing their very best to deliver to their societies, accurate information about the requirements of the natural environment. It could therefore be counter-argued that it is crucial that scientists' research programs address all potential factors, such as the quality of consciousness of scientists themselves that may be either creating new environmental management dilemmas or preventing the resolution of existing problems.

1.1.3 Thesis Proposition and Thesis Objective

In section 1.1.2, the problem being addressed within this thesis was defined as the failure of environmental management bodies such as the Australian Antarctic Division (and affiliated organisations) to adequately acknowledge the role of quality of consciousness in determining the quality of environmental conservation outcomes. It was acknowledged that the quality of consciousness of humanity at large contributes towards the condition of Earth's natural environmental. Environmental scientists, however, whose activities and outcomes of activities are at the forefront of conservation techniques and programs, were identified as playing a key role.

It is important here to state that whilst it is not expected that the quality of consciousness of Australian Antarctic scientists varies greatly with the quality of consciousness of the Australian public in general, certain differences may exist. For example, whilst all Australian Antarctic scientists adhere to empirical research methods to find answers to questions about the workings of the natural environment, the general Australian public contains several sectors which adhere to knowledge of the workings of the natural environment delivered through religious texts. Substantial societal sectors also exist that adhere to knowledge attained through idealism, pragmatism, phenomenalism etc. all of which are based on a variety of epistemological and ontological foundations. As such, findings from an investigation into the quality of consciousness of Australian Antarctic scientists is not expected to represent the quality of consciousness of the general Australian public exactly, but more specifically that of environmental scientists whom adhere to the empirical research method. In view of such considerations and in view of arguments put forth throughout this chapter, the thesis proposition is:

> THE QUALITY OF CONSCIOUSNESS OF ENVIRONMENTAL SCIENTISTS IS CURRENTLY POOR, WHICH IS IMPACTING ADVERSELY ON THE OUTCOMES OF ENVIRONMENTAL CONSERVATION ACTIVITIES.

As such, the thesis objective is:

> TO INVESTIGATE IF THERE EXISTS A NEED FOR ENVIRONMENTAL SCIENTISTS TO RAISE THE QUALITATIVE LEVEL OF THEIR CONSCIOUSNESS, FOR THE PURPOSE OF ENHANCING OUTCOMES OF ENVIRONMENTAL CONSERVATION ACTIVITIES.

This thesis asserts that within the context of human impact on the natural environment, the application of conservation techniques based solely on empirical data gathered from the physical environment may be likened to an adhesive Band-Aid

administered to one limb of a dying person: outrageously insufficient for the relevant malady. What is needed is a serious effort to divulge deeper underlying causal factors of human behaviour that are responsible for detrimental impacts. Until and unless such efforts are made, the exploitation and deterioration of the global natural environment are anticipated to prevail. The research conducted in this thesis is an attempt to fill this need.

The ancient Vedic *triguna* (the three modes of material nature) and the Buddhist *Theravada Abhidharma* (philosophical teachings on mental and emotional attributes) together form the theoretical foundations of the research methodologies that accommodate the thesis investigation into the quality of consciousness of the study sample. Whilst Chapter Two describes the process of selection of these approaches, it should be mentioned here that their selection was based solely on their anticipated capacities to satisfy the thesis objective. In other words, their anticipated capacities for determining whether or not a need exists for scientists to raise their qualitative levels of consciousness, for purposes of enhancing outcomes of environmental conservation efforts, have qualified them for selection. Other features of their overall profiles, such as their philosophical and religious foundations, have not been considered as significant for the purposes of this thesis investigation.

1.1.4 Thesis Research Design, Research Parameters, Restrictions and A Brief Thesis Outline

Thesis Research Design

This research thesis is designed to evaluate the quality of consciousness of a specific study sample: the Australian Antarctic scientific community. It does not aim at either validating or debunking theories chosen for data collection and processing, namely the Vedic triguna and the Buddhist Theravada Abhidharma. As this is so, theoretical and methodological strongholds maintained by these two philosophies are in this thesis accepted in their entirety. They are neither examined nor dismantled for purposes of either faultfinding or promotion. Nor are they examined for purposes of making improvements to existing theoretical constructs. In accord with such acceptance, broader ontological and epistemological premises maintained by the two philosophies are also accepted in their entirety for the purpose of employing the triguna and Abhidharma to satisfy the thesis objective. This approach has been taken for a number of reasons:

1) Both the Vedic triguna and the Buddhist Abhidharma constitute extremely complex theoretical systems of psychological evaluation. Both systems are voluminous and elaborate in design. As this is so, criticism for purposes of reconstructing existing structures would entail more work than what this thesis could accommodate. In addition to the complexity of the triguna and the Abhidharma, philosophical foundations underpinning both systems, which are integrally linked to the systems themselves, are also considered too elaborate to challenge within the limits of this thesis;
2) Both the triguna and the Abhidharma are claimed as being recorded in text thousands of years ago. They are both accepted as religious and/or spiritual texts. As these writings are described as originating from highly spiritually elevated personalities, whose understanding of this Earth is beyond that of

ordinary humankind, attempts made by academics to altar such writings is commonly considered as foolish; and

3) Both the triguna and the Abhidharma are estimated by the thesis researcher to encompass sufficient theoretical and methodological consistency for meeting the thesis objective. As this is so, time will not be invested in developing existing theoretical or methodological premises. Although this is the case, neither system of evaluation is accepted as necessarily being superior to other similar systems of evaluation, but rather that they are the best systems that could be accessed by the researcher at the time of conducting the relevant research.

Research Parameters and Restrictions

In view of points raised in the above discussion, this thesis does not maintain the capacity to discuss all current ontological and epistemological theories in relation to the topic of consciousness and the environmental crisis. Efforts have been made to give readers a rudimentary presentation of the issue of materialism in relation to quality of consciousness and environmental conservation behaviours, yet the researcher hereby acknowledges the logistical limitations of such a presentation in view of the broadness of relevant topics. As such, readers who expect to find detailed discussions on most, or on all current theoretical developments on the topic of consciousness will be disappointed.

As far as the researcher of this thesis is aware, no previous academic research has been carried out into the quality of consciousness of environmental scientists using the Vedic triguna and the Buddhist Abhidharma. Research carried out in this thesis is therefore original in its application of two, as-yet-little-researched methodologies in examining an environmental science community. In consideration of the obstacles posed by this challenge, all efforts have been made to maintain a high degree of rigor and theoretical consistency in the development of the research design.

A Brief Thesis Outline

Chapter One has introduced the topic of consciousness and given a broad overview of the meaning of quality of consciousness. The significance of quality of consciousness within the context of environmental science behaviours constitutes the thesis rationale. The thesis research design, proposition, objective and research parameters and restrictions have been established.

Chapter Two is the literature review chapter, outlining general sources of literature and discussing specific texts consulted in designing data-collection and data processing. Theoretical and methodological approaches to quality of consciousness taken by the Vedic triguna and the Buddhist Abhidharma are described in detail. Chapter Three is the methodology chapter. It describes how and why different components of triguna and Abhidharma theory will be applied to meeting the demands of the thesis objective. Data-collection items, data collection methods and data processing are described.

Chapter Four contains data collected on the quality of consciousness of the Australian Antarctic scientific community through the Australian Antarctic Scientist Inventory (AASI). It also contains data collected on the opinions of scientists' ideal qualities of consciousness for achieving environmental science goals, through the Ideal Guna Situatedness Questionnaire (IGSQ). All data processed in Chapter Four are processed only according to the Vedic triguna i.e. not through the Buddhist Abhidharma, as the AASI and the IGSQ are themselves designed according to triguna

theory. Chapters Five and Six contain data collected and processed via means of interviews (Chapter Five) and science literature (Chapter Six). Data in these two chapters are processed using both triguna characteristics and Abhidharma factors.

Chapter Seven analyses all results from data collection and processing. It draws together overall findings by creating a profile of Australian Antarctic scientists' current quality of consciousness. Discussion is carried out on overall findings in relation to the thesis proposition and thesis objective. Finally, findings are examined in contrast to results derived from other research using triguna theory, as well as to a number of authors' anticipated ramifications for environmental health, of behavioural qualities likened to certain Abhidharma factors. Chapter Eight concludes the thesis by discussing the significance and implications of overall findings. It also makes recommendations for Australian Antarctic science, triguna research and studies into the Abhidharma.

1.2 Chapter Conclusion

In the acknowledgement of the current lack of academic research into the quality of human consciousness, it is considered necessary to raise the following points. Consciousness is as yet little understood by contemporary Western psychologists and physicists. Whilst many academics are today proposing sophisticated theories on the nature and functioning of consciousness, most agree that consciousness currently remains a little understood phenomenon. This being the case, the search within academic literature for relevant theoretical and methodological constructs that culminated in the selection of the triguna and Abhidharma, was extensive.

The challenge was primarily to identify research methodology that could accommodate investigation into quality of consciousness in relation to human behaviour in general, whether or not such research had previously been applied specifically to environmental conservation behaviour. The approach taken was that if a suitable methodology was identified within general behavioural research literature, it could be adjusted if necessary to accommodate research into environmentally focused behaviour.

The Vedic triguna and the Buddhist Theravada Abhidharma both offered psychological frameworks that could be applied to evaluate quality of consciousness. Although the ontological foundations of the two methodologies vary significantly, their epistemological approaches and ethical tenets of compassion towards all species of life, including their acknowledgement of the significance of the consciousness of all life, are compatible (Bhaktivedanta 1987-8, 7:14:9; Kabilsingh 1996). Whilst such compatibility was not the precursor in identifying two systems through which data could be collected and processed, that both systems stress the relevance of compassion towards all conscious beings suggest that such qualities are axiomatic for human beings desiring to achieve higher qualitative levels of consciousness.

Detailed descriptions of the search for relevant literature that preceded this choice are given in Chapter Two.

CHAPTER TWO

LITERATURE REVIEW

To understand consciousness is to understand something deeply important about us. This may sound truistic to some, but even so, it is not a truism apparently much honored in the past century's leading views of mind, meaning, and behavior.

Charles P. Siewert in *The Significance of Consciousness* (1998, 3)

Chapter Outline
As the literature review chapter, Chapter Two discusses the search for research literature on the topic of quality of consciousness in relation to environmental conservation behaviour. A description is given of the research process that leads to an investigation into texts of Eastern philosophies. Vedic and Buddhist texts are examined for the purpose of identifying theoretical constructs that are suitable for designing data collection items, as well as for identifying relevant methodologies that can be applied to processing data. Elementary constructs of the two different methodologies are discussed, including their solidarity in purpose and design. An overview of how the two methodologies serve the thesis objective closes the chapter.

2.1 In Search of Suitable Theoretical and Methodological Approaches

2.1.1 The Topic of Quality of Consciousness within Current Literature

Consciousness studies have well and truly found their place within peer-reviewed literature over the past few decades. In spite of efforts on behalf of reductive materialists and epiphenomenologists to mitigate the significance of consciousness, its enigmatic nature and enduring relevance cause it to remain a constitutional phenomenon. Within an academic world that is today steeped in empirical research methods, the topic of consciousness remains a bit of a misfit: as a mystery to be solved by quantum physicists, as a topic to be debated by philosophers and as an obstacle to be somehow accommodated by psychologists. As Thomas Metzinger comments in "The Problem of Consciousness" (1996) the phenomenon of consciousness coupled with the origin of the universe "marks the very limit of human striving for understanding" (1996, 3). Whilst it may be argued that without the presence of consciousness all behavioural analysis would have no meaning (as an unconscious person can not behave) the precise meaning of consciousness remains a contested issue within both academic and non-academic sectors of contemporary society.

Initially a broad search was conducted into both peer-reviewed and non-peer-reviewed literature addressing the role of consciousness in relation to human behaviour. Several articles from the *Journal of Consciousness Studies* addressed issues such as the function, makeup, situatedness and the source of consciousness. Most articles were fundamentally philosophical in nature and content, with little if any research media being proposed. A vast quantity of articles from the neurological and biological perspectives was also located within other peer-reviewed research

journals such as *Consciousness and Cognition* and *Journal of Humanistic Psychology*, yet no articles proposed research methods that facilitate evaluation of the quality of human consciousness. In other words, although theories on the nature and workings of consciousness have been published in surplus amounts within mainstream Western academic literature, no methodologies were located that can accommodate research into the relationship between quality of consciousness and the quality of mental, intellectual, emotional and behavioural peculiarities. A small number of peer-reviewed journal articles were located within the journal *Human Ecology Review* (2003) in which the topic of conservation psychology constituted a theme for one of its issues. Almut Beringer stated that:

> a psychology of the soul advises that human behaviour is not the result of thoughts and feelings, motives, the unconscious, and so forth. Rather, thoughts, feelings, and behaviour arise from consciousness, whereby consciousness includes both the mind and the unconscious (the shadow) (see also Irwin 2002; Keepin 1991; Scott 2003). Desired changes of behaviour, therefore, must be preceded or accompanied by changes in consciousness. (Beringer 2003, 152)

Whilst such notions of the role of consciousness certainly address concerns raised in Chapter One, regarding the role of consciousness within both general and environmental conservation behaviours, research directions discussed within Beringer's article and within other conservation psychology literature do not propose any methodologies that could potentially meet the demands of the thesis objective.

An attempt was thus made to find the topic of quality of consciousness within more alternative approaches to human behaviour. Popular philosophical approaches to environmental care such as Deep Ecology, Gaia Theory and Ecopsychology were investigated. Whilst these approaches address the topic of consciousness within the context of the need for human beings to expand our awareness of our natural environments, especially our awareness of our interconnectedness with our natural environments, quality of consciousness was not exclusively addressed by any of the three philosophies. Thereby, structured research methodology for measuring quality of consciousness was not found within relevant academic literature (Devall and Sessions 1985; Roszak, Gomes and Kanner 1995; Lovelock 1991).

Whilst several publications on empirical research into environmental consciousness were located within peer-reviewed literature (De Young 1986; Krause 1993; Petrakis and Xepapadeas 1996) research criteria predominantly consisted of recycling efforts, the use of environmentally friendly products, electricity-consumption and pollution. Potential causal agents underpinning relevant behaviours, such as intrinsic motivation (De Young 1986) and morality (Petrakis and Xepapadeas 1996) had been investigated, whilst quality of consciousness *per se* had not. Although intrinsic motivation and morality may be described as comprising certain qualities of consciousness, research conducted by the above-listed authors did not address these factors within the context of consciousness, instead focusing on select attitudes and behaviours.

Given the strong environmental focus of First Nations Peoples of North America, publications about and by such peoples were then researched. In "Ties That Bind: Native American Belief as a Foundation for Environmental Consciousness" (1990) Annie L. Booth and Harvey M. Jacobs claim that consciousness or awareness of the spiritual nature of humankind's relationship with Earth underpins all traditional Native American relationships, both human and non-human. The authors attribute Native Americans' ecological consciousness as the means by which their natural

ecosystems have not been exploited. According to Luther Standing Bear of the Lakota Sioux, white man does not understand his own environment and is overcome by primitive fears in his consciousness, due largely to his not having any deep spiritual roots in the land itself. Yet Booth and Jacobs claim that contemporary literature suggests that Western culture is turning to Native Americans to learn how to "live in harmony with the natural world" (1990, 34-5, 41). Booth and Jacobs proposed no viable means by which to measure or evaluate quality of consciousness of either individual people or groups of people such as communities or societies.

Several spiritually based philosophies such as those underpinning Taoism, Judaism and Christianity were also investigated. In *Taoism and the Environmental Crisis* (1990) Graham Wood argues that if human beings can reduce their "desire for material pleasure and the 'high life' that is the cause of the environmental problem," then the current crisis facing our natural environment could at least be tempered (1990, 21-2). He also claims that the Taoist answer to put an end to environmental destruction is to live simply, as opposed to the Western propensity for pouring "much effort and resources into the convenient lifestyle" (1990, 21). In "The Ecological Crisis: A Common Responsibility" Pope John Paul II (1920-2005) stated that "the ecological crisis is a moral issue …. respect for life and for the dignity of the human person extends also to the rest of creation" (Pope John Paul II). Calling on greater responsibility and solidarity between all peoples, the pope referred to the compassion of Saint Francis of Assisi in stressing the need for humanity to keep alive a "sense of "fraternity"" with the rest of creation (1990). Such perspectives of the modern human condition on behalf of religious orders may be argued as being underpinned by the acknowledgement of humankind's current lack of higher ethical and spiritual considerations. Yet a system for evaluating such a lacking does not appear to have yet been presented within relevant literature.

As several seemingly potential avenues for securing research methodologies that could accommodate investigation into quality of consciousness had thus been exhausted, traditional Eastern approaches were examined. It was discovered that voluminous scriptural and scientific writings, as well as centuries of applied practice, underpin ancient Vedic and Buddhist academic approaches to understanding quality of consciousness. Jonathan Shear comments that "methodologies for exploring the contents and dynamics of consciousness akin to those developed in Eastern cultures could play a significant role" (1996, 54) in the development of an appropriate science of consciousness within cognitive-developmental research. Reasons given include that ancient "Eastern cultures have taken the idea of systematic exploration of the internal phenomena of consciousness seriously for quite some time" (1996, 64). Section 2.1.2 gives an overview of major Vedic and Buddhist theoretical and methodological approaches to understanding quality of consciousness.

2.1.2 Eastern Approaches to the Topic of Quality of Consciousness: An Overview

Ancient Vedic and Buddhist literature contains elaborate cosmological and phenomenological explanations of life. Compiled thousands of years ago, texts forming the basis of both philosophies consist of voluminous descriptions of how and why humankind's quality of consciousness or quality of awareness is currently less-than-ideal, how such quality has manifested and what steps can be taken to enhance current qualitative levels. Primarily, both approaches maintain that adherents must adopt a serious attitude in terms of dedication to achieving relevant changes. This

premise is underpinned by the understanding that changes in quality of consciousness take time and in most instances require long-term behavioural adjustments.

Consciousness itself is to a certain extent viewed differently by the two philosophies. Differences are primarily linked to variations in appreciation of the constitution of the individual living being, commonly referred to as the spiritual self or spiritual soul. Whereas Vedic texts (also referred to as the *Vedas*) maintain that every living individual is an eternal indestructible personality (*jiva* or *atma* in Sanskrit) Buddhism concludes that the self is ultimately a "product of the functioning of a person's psycho-physical organism and a mere subject of knowing, thinking, desiring etc." (Prasad 2000, 61). In effect, Buddhism claims "the whole of reality to be of the nature of mere mentation" (Guenther and Kawamura 1975, 15-6) whilst the *Vedanta* (Vedic conclusion) claims that the individual always remains under the control of the Supreme Person's (Lord Krishna's) spiritual and material natures (Bhaktivedanta 1989, *intro* 9). In other words, Buddhism sees the self and the self's environment as being products of the individual's own mind, whilst Vedic teachings assert that the individual is an eternal part of the Supreme Person, who produces and maintains both spiritual and material realities:

> While *Vaishnava* [devotees of the Supreme Lord, Visnu, or Ksishna] theology posits structure within consciousness itself, Buddhism explicitly teaches that consciousness is divided by the influence of the mind, which is seen as an ever-changing network of actions and reactions. In Buddhism there is no soul (or jiva), but the individual mind is repeatedly reborn by-in effect-downloading itself into new bodies. Liberation is attained when the individual recognizes that consciousness is one and thereby ceases to identify with the phenomena continually arising within consciousness. (Thompson 2003, 248)

Resultant from these differences is a highly personalistic philosophy maintained by the Vedas and a highly impersonalistic philosophy maintained by Buddhism, with the Vedanta arguing for the eternal person and Buddhism arguing for the eternal non-person (Rosen 2003a, 91-102). Within this context, the two philosophies may be appreciated as maintaining a number of different ontological foundations, whilst constructs such as the triguna and the Abhidharma may be appreciated as being complementary, or even compatible in purpose and design.

Both Vedic and Buddhist teachings maintain that material embodiment is a temporary experience for the living being. Individuals are thereby encouraged by both philosophies to find a way in which to put a permanent end to repeated birth and death due to the suffering that material embodiment brings. Through the experiences of birth, death, old age and disease, every individual at some stage of material embodiment experiences pain, confusion, disappointment, stress and anxiety. Within this context, repeated material embodiment and its subsequent involvement with the material realm of existence is described as constituting "illusion" or "delusion" by both philosophies (Bhaktivedanta 1989, 10:4-5; Guenther and Kawamura 1975, 44-8). Material considerations and experiences are thereby seen by both philosophies as inferior to non-material or spiritual considerations and experiences.

Both Vedic and Buddhist teachings assert that according to personal qualities or characteristics maintained by the individual him/herself, his/her conscious awareness will produce parallel behaviours, as well as parallel outcomes of relevant behaviours. For example, both doctrines maintain that if an individual cultivates the quality of compassion within his/her own consciousness, then the individuals' thoughts, opinions, actions and results of actions will be characterised by compassion.

Similarly, if an individual fosters the quality of violence within his/her consciousness, then his/her thoughts, opinions, actions and results of actions will be characterised by violence (Rosen 2003b, 43-62).

Vedic and Buddhist teachings thus conclude that the quality of an individual's conscious awareness directly determines his/her activities and results of activities on all levels of existence, including mental, intellectual, emotional, social, spiritual and physical levels. Both doctrines also maintain that the qualities of an individual's environment directly and indirectly influence the individual's consciousness, according to the individual's degree of involvement with and exposure to such external qualities. It is for these reasons that many peoples of India, the place of origin of both philosophies, have for thousands of years maintained cultural practices that encourage piety, compassion, cleanliness, humbleness, spirituality and sincerity. Without such influences, human behaviour is understood to become morally, intellectually, spiritually and materially degraded.

In addition to maintaining environments that encourage high quality of consciousness, practitioners of both philosophies apply various methods of evaluating existing qualitative levels of consciousness. Within the Vedic tradition, texts such as *Bhakti-rasamrita-sindhu* (*Nectar of Devotion* by Bhaktivedanta 1982) and *Hari-bhakti-vilasa* (Bhaktivedanta 1996, *madhya*: 1:35) composed some 500 years ago by *acaryas* (those who teach by example) Srila Rupa Goswami, Srila Sanatana Gosvami and Srila Gopala Bhatta Goswami, outline regulations and behavioural guidelines for the purpose of helping serious practitioners achieve a higher qualitative level of consciousness. Instructions given on the cultivation of ethics include etiquette for associating with individuals who are cultivating similar goals, how to dovetail one's activities and thoughts towards higher spiritually focused goals and how to enhance one's own knowledge (and the knowledge of others) as to the meaning of material embodiment.

Evaluation of quality of consciousness thereby takes the form of assessment of an individual's advancement towards achieving better moral standards and advancement towards spiritually orientated goals such as the attainment of spiritual knowledge. Material prosperity, social status, career-orientation and one's ancestry hold no value within such goals. Within such teachings, the triguna as a tripartite explanation of both cosmological and psychological material influences presented in the classics *Bhagavad-gita* and the *Srimad Bhagavatam*, is broadly accepted by Vedic practitioners as providing a detailed guide as to which qualities elevate and which qualities degrade human consciousness.

Buddhist teachings assert that consciousness is one of a number of five psychophysical experiences available to the individual by choice, but is also accepted as the all-encompassing awakened state of every living being. Within Buddhism the concept of quality of consciousness is often defined as quality of awareness or mindfulness, or as the quality of an individual's all-encompassing experience. Mental attributes are described as "qualities of consciousness" with quality itself being determined by the function of specific attributes (Rabten 1992, 145). In other words, the Buddhist view of consciousness is as a "mental experience" and as "the experience that comes from the contact of each sense organ with its object" (Varela, Thompson and Rosch 1991, 67). The "relations" that tie together the experiencer and the object experienced are described as "mental events," "mental factors" or "emotions" that can either retain positive/wholesome or negative/unwholesome qualities, according to their functions (Guenther and Kawamura 1975, 9; Varela, Thompson and Rosch 1991, 256-8).

2.2 Vedic Literature

2.2.1 Vedic *Literature: An Introduction*

According to Vedic knowledge itself, Vedic texts of ancient India were compiled some 5,000 years ago (Bhaktivedanta 1969, 9; Rosen 2002, 14). They have since become the backbone of contemporary Hindu practices whilst also being influential on other Eastern philosophies such as Buddhism, Jainism and Sikhism. Original texts address countless topics such as cosmology, astronomy, physics, psychology, philosophy, religion, sociology, law, architecture, medicine and history discussed within both metaphysical and mundane contexts, creating voluminous writings. Although Vedic literature predominantly maintains a religious status, this thesis does not concern itself with its religious application.

The word Veda has its etymological roots in the Sanskrit word *vid,* meaning 'to know' or 'knowledge.' It is related to the English words *wisdom* and *wit* (German roots); *idea* (originally *widea*) (Greek roots); *video*, *view*, *witness* and *vision* ('to see') (Latin roots); and *vet/ved* ('know') (Scandinavian roots) as well as many others (Rosen 2002, 14). All Vedic texts are written in the Sanskrit language. Literally the word Sanskrit means 'polished,' 'refined' or 'perfected' and is today widely accepted to be one of, if not the oldest living language in the world. Although Sanskrit has gone through several stages of development from its oldest recorded form, it has remained the language of the learned and priestly classes throughout Indian history (Rosen 2002, 166-7).

Writings that are today accepted as comprising authentic Vedic literature are extensive, yet complementary in purpose and design. The main body of works includes the four Vedas (Rg, Sama, Yajur and Atharva), the Upanishads, the Puranas and the Vedanta-sutra. Sage *Vyasadeva*, a scholar and saint residing in the Badrinath district of Northern India, compiled these works. The following diagram shows the different divisions of Vedic literature, comprising four primary divisions according to their comprehension. Marked in red is the *Bhagavata Purana* (also known as the *Srimad Bhagavatam*) of the *smriti-sastras*, which is consulted throughout this thesis. Also marked in red is the epic *Mahabharata,* which contains the *Bhagavad-gita*, also consulted throughout this thesis:

DIAGRAM 2.2.1.1: Vedic Literature (Rosen 2002, 15; Satsvarupa das Goswami 1990, 40-8; Toropov and Buckles 2004, 168-9)

Sruti-sastra (that which is heard) Compared to modern law books in design and purpose	*Smriti-sastra* (that which is remembered). Compared to modern law journals in design and purpose	*Sutras* (aphorisms)	Other categories
* Vedic *Samhitas* (collections): *Rig, Sama, Yajur and Atharva* * *Brahmanas* * *Aranyakas* * *Upanisads* (comprising over 108 separate books)	* *Itihasas* (history/epics): *Ramayana,* ***Mahabharata*** *etc.* * *Puranas*: 1) *Sattvik Puranas:* *Visnu Purana*, *Naradiya Purana*, ***Bhagavat Purana***, *Garuda Purana*, *Padma Purana*, *Varaha Purana* 2) *Rajasik Puranas:* *Brahma Purana*, *Brahmanda Purana*, *Brahma-vaivarta Purana*, *Markandeya Purana*, *Bhavisya Purana*, *Vamana Purana* 3) *Tamasik Puranas:* *Matsya Purana*, *Kurma Purana*, *Linga Purana*, *Shiva Purana*, *Skanda Purana*, *Agni Purana* * *Upapuranas* (total of 18) and *Sthala* (regional) *Puranas* * Versified equivalents of the *Dharma-sutras*: *Manu-smriti*, *Visnu-smriti* etc.	* *Srauta-sutras*, *Grihya-sutras*, *Dharma-sutra*, *Sulba-sutras*, Vedanta-*sutras etc.*	* Veda*ngas* * *Upa*Vedas * Writings and commentaries of the *acaryas* throughout the ages

According to Vedic literature itself (Bhaktivedanta 1972a) Sage *Vyasadeva* received the knowledge of the Vedas from his teacher and spiritual master, Narada Muni, who in turn received it from his spiritual master, Lord Brahma. This process of receiving knowledge from one's spiritual master or *guru*, who in turn received it from his/her *guru*, is known as learning through the *parampara* system and constitutes the original method by which all Vedic knowledge was traditionally learnt. Lord Brahma had in turn received the knowledge of the Vedas from Lord Krishna, who appeared in the Yadu dynasty within the same era as Sage *Vyasadeva*, ca. 5,000 years ago. Here the lineage stops. There is no recorded source of Vedic knowledge beyond Lord Krishna, according to Vedic literatures themselves (Bhaktivedanta 1989, *intro* 15-6, 4:1).

Whilst modern scholars often portray Krishna as an ordinary historical figure who did little else except frolic with the cowherd girls of Vrndavan, Vaishnavas maintain that Krishna is the original Supreme Personality of Godhead, the fountainhead and source of all spiritual and material manifestations. Thereby, He is accepted as the original source of Vedic knowledge. According to Vedic texts, in His time Krishna was addressed as "Bhagavan," He who possesses "knowledge, sensory power" and "inconceivable power"; "Govinda," He "who knows everything in all respects by the words of the Vedas"; "Mahatma," He who is a "great soul"; and "Yogin," He who is the only source of knowledge (Purusottama Dasa 1996, 74-6, 80, 82).

Something also needs to be said of Sage Vyasa, or *Vyasadeva*, as the compiler of the Vedas. According to Indologists and Vedic scholars and practitioners, *Vyasadeva* was clearly a writer of non-fiction. His historical records and instructions for future generations within texts such as the *Puranas* were not imaginary. *Vyasadeva*'s writings were records of then-current events and of teachings that were disseminated by highly esteemed personalities of the time. In other words, the writings of Sage Vyasadeva are accepted as authentic spiritual teachings, presented to the masses of people in a manner suitable for understanding in this current age known as *Kali-yuga*, in which irreligion is increasingly prominent (Bhaktivedanta 1989, 10:37; Rosen 2002, 16-7).

As with most ancient literature that has survived many generations, original Sanskrit texts have been preserved whilst they have also been translated and interpreted by countless authors. The *Bhagavad-gita* or *Gītopanishad* is said to be "the most commented upon book in the religious history of man" (Rosen 2002, 24) and is considered by many to be the most important of all Vedic literatures in terms of its contents. Popular commentaries include the impersonalistic interpretations by Bhaskara and Shankara from the 7th and 8th centuries, today considered classic interpretations. Other authors such as Yamanujacharya, Madhvacharya and Keshava Bhatta from the Nimbarka school, have produced theistic versions.

Charles Wilkins first translated the Bhagavad-gita into English in 1785, from whence it began to gain popularity in the Western world. From this time, intellectuals such as August Wilhelm von Schlegel and Arthur Schopenhauer (Germany); Ralph Waldo Emerson and Henry David Thoreau (America); Max Mueller and Aldous Huxley (England); and Leo Tolstoy (Russia) have all commented on the subject matter of the *Bhagavad-gita* (Rosen 2002, 25). It was not until the coming of His Divine Grace Abhay Caranaravinda Bhaktivedanta Swami Prabhupada (1896-1977) to America in 1965, however, that the *Bhagavad-gita* and other Vedic classics began to fill the shelves of academic and popular libraries in the English-speaking world, as well as in non-English speaking Western countries.

2.2.2 Translations by A. C. Bhaktivedanta

Upon leaving the Earth in 1977, Bhaktivedanta left behind a vast legacy of teachings on ancient Vedic culture and knowledge. According to the *1976 Britannica Book of the Year* (in Rosen 2002) he "astonished academic and literary communities worldwide by writing and publishing fifty-two books on the ancient Vedic culture…in the period from October 1968 to November 1975" (Rosen 2002, 143). His publishing trust, the Bhaktivedanta Book Trust, today publishes his works in over 80 different languages.

Throughout his publications, Bhaktivedanta presents each individual verse in its original Sanskrit form, followed by its English equivalent. He also provides accompanying purports for most texts. This format of presentation has accredited Bhaktivedanta with a high degree of accuracy in delivering the original meaning of Vedic knowledge. In addition to the Bhaktivedanta Book Trust today being one of the world's biggest exponents of Vedic literature, it is for the above reasons that Bhaktivedanta's translations of Vedic texts have been chosen over others as the prime source of Vedic literature for this thesis. The following sample demonstrates the layout in which most of Bhaktivedanta's texts are presented:

TEXT 23

कीटः पेशस्कृतं ध्यायन् कुड्यां तेन प्रवेशितः ।
याति तत्सात्मतां राजन् पूर्वरूपमसन्त्यजन् ॥२३॥

kīṭaḥ peśaskṛtaṁ dhyāyan
kuḍyāṁ tena praveśitaḥ
yāti tat-sātmatāṁ rājan
pūrva-rūpam asantyajan

kīṭaḥ—an insect; *peśaskṛtam*—a wasp; *dhyāyan*—meditating on; *kuḍyām*—in his hive; *tena*—by the wasp; *praveśitaḥ*—forced to enter; *yāti*—he goes; *tat*—of the wasp; *sa-ātmatām*—the same state of existence; *rājan*—O King; *pūrva-rūpam*—the previous body; *asantyajan*—not giving up.

TRANSLATION

O King, once a wasp forced a weaker insect to enter his hive and kept him trapped there. In great fear the weak insect constantly meditated upon his captor, and without giving up his body, he gradually achieved the same state of existence as the wasp. Thus one achieves a state of existence according to one's constant concentration.

PURPORT

The following question may be raised: Since the weaker insect in this story did not physically change his body, how can it be said that he achieved the same state of existence as the wasp? Actually, by constant meditation upon a particular object one's consciousness becomes filled with its qualities. Due to extreme fear the smaller insect was absorbed in the characteristics and activities of the large wasp and thus entered into the existence of the wasp. Due to such meditation, he actually took the body of a wasp in his next life.

FIGURE 2.2.2.1: Sample of Layout of Bhaktivedanta's Texts (Bhaktivedanta 1987-8, 11:9:23)

Nowhere in his publications does Bhaktivedanta assert that the aim of the Vedas is to accommodate the religion of Hinduism. Rather, he draws the attention of his readers to the speaker of the *Bhagavad-gita*, namely Lord Krishna, being the central figure in the epic *Mahabharata*. For this reason, this thesis does not recognise Vedic texts as Hindu texts, but rather as literature compiled by associates of Krishna at the time of His appearance on Earth.

Throughout his many commentaries on original Sanskrit texts, Bhaktivedanta identifies modern societies' psychological, economic, welfare, political, ethical and

religious problems as stemming from excessive materialism. Stating that "disparity in human society is due to lack of principles in a godless civilization" (Bhaktivedanta 1987-8, 1:*xxi*) he stresses that the desire of human society to "lord it over material nature" (1987-8, 2:2:37) will intensify instead of diminish the distress experienced by the world. The more that humankind exploits and develops the Earth's natural resources for different varieties of sense enjoyment, the more humankind will succumb to, and be illusioned by, material energy. According to Bhaktivedanta, this propensity to "lord it over material nature" (1987-8, 1:15:25-6, 3:5:44) for purposes of sense enjoyment, is the root cause of the suffering that all materially embodied individuals endure, regardless of species and regardless of their specific mundane circumstances:

> This material body continues as long as one is not detached from the false conception of lording it over material nature. The impetus for lording it over material nature is the sense of "mine" and "I." "I am the lord of all that I survey. So many things I possess, and I shall possess more and more. Who can be richer than I in wealth and education? I am the master, and I am God. Who else is there but me?" All these ideas reflect the philosophy of *aham mama*, the conception that "I am everything." Persons conducted by such a conception of life can never get liberation from material bondage. (Bhaktivedanta 1987-8, 3:5:44)

In the words of Satsvarupa Dasa Goswami, amidst his many lessons Bhaktivedanta "taught that people could resolve their conflicts and live together in peace and prosperity only through an essential change of consciousness" (1987, *back-cover*). This change of consciousness, according to Bhaktivedanta, must necessarily be founded on accurate knowledge on the constitution of the non-material or spiritual self and his/her situatedness within his/her material body. Without sound knowledge on these essential factors, humankind will remain ignorant about the real nature and therefore real needs, of not only human beings but also of all materially embodied living beings.

Consequently, instead of investing global resources in developing plans to advance ethically and spiritually, societies will increasingly invest resources in advancing economically and materially. Grossly inappropriate lifestyle choices will be made by human beings, with the ramifications of those choices impacting on all species of life. A society submerged in ignorance about its members' constitutional nature, according to Vedic conclusions, will thereby undoubtedly increase the suffering of all its dependants (Bhaktivedanta 1989, *intro* 7-24).

As Vedic knowledge has its roots in the teachings of Lord Krishna (see section 2.2.1) Bhaktivedanta's teachings on the three modes of material nature, the non-material self, the self's subtle and gross material bodies and their interaction within this gross material world, draw philosophical conclusions directly in relation to Krishna Himself. Such highly personalistic conclusions of seemingly impersonalistic topics (such as material nature) are thereby theistic in nature. Describing Krishna as the Supreme Personality of Godhead (1987-8, 3:32:29) Bhaktivedanta often elaborates on the topic of the individual's consciousness in relation to supreme consciousness, namely Krishna's own consciousness.

Whilst this aspect of Bhaktivedanta's publications is prolific, neither the subject matter of Krishna's own consciousness, nor the subject matter of the individual's own consciousness of Krishna, are discussed in this thesis. Instead, Bhaktivedanta's explanations of the workings of the three material modes and supporting topics are extracted from his discussions on Krishna the person, as well as from his discussions

on other historical personalities discussed in the Vedas. Readers who are accustomed to accessing information from mainstream contemporary academic publications, in which information is presented in a manner that directly meets specific research demands, may thereby find the accessing of quotations from Bhaktivedanta's publications, presented in this thesis, challenging.

2.2.3 Specific Texts and Their Contents

2.2.3 (1) Publications by Bhaktivedanta

The most important publications by Bhaktivedanta in terms of their popularity within both academic and non-academic arenas, include *Srimad Bhagavatam* (1987-8), *Bhagavad-gita As It Is* (1989) and *Sri Caitanya Caritamrita* (1996). Amongst these, the former two will be consulted regularly throughout this thesis. *Srimad Bhagavatam* is widely accepted as the foremost and purest of all the *Puranas* in terms of the knowledge it delivers. In essence it presents the teachings of the *acaryas* of the ancient Vedic culture. Such teachings address both impersonal and personal aspects of Vedic cosmology and psychology. The personalistic doctrine, which promulgates that the highest degree of spiritual self-realisation is attained through the individual learning the science of his/her personal relationship with God, is the overarching message of all *Srimad Bhagavatam* texts.

Unlike much other numinous literature, the *Srimad Bhagavatam* discusses the materially embodied individual's current situatedness as necessarily being analogous with his/her current quality of consciousness. In conjunction with the *Bhagavad-gita*, the *Srimad Bhagavatam* thereby delivers the science of the role of consciousness in determining behaviour as well as life circumstances in general, making these two publications excellent sources of methodological constructs for purposes of designing data-collection items.

Ancient Indian philosophical writings on the nature of the non-material self and its interaction with the material world through material embodiment are traditionally known as belonging to the *sankhya* school of philosophy. As the oldest of the six classical schools of Indian thought, *sankhya* is described as emphasising "principles of matter and soul" focusing its teachings on the "evolution of the cosmos and of "the person"" (Toropov and Buckles 2004, 171). Bhaktivedanta states that "according to the *Nirukti*, or the Vedic dictionary, *sankhya* means that which describes things in detail, and *sankhya* refers to that philosophy which describes the real nature of the soul" (1989, 2:39). He also states that "*sankhya* means that factual knowledge by which one can get out of the material entanglement" (1987-8, 3:24:38).

One of the most significant components of the *Sankhya* philosophy is its exegeses on the triguna, translated as the 'three modes of material nature.' The triguna, representing three distinct qualities, asserts its influence onto all material phenomena including all cosmological aspects of the material universes and on the consciousness of all materially embodied beings. Each *guna* (meaning 'rope' or the binding element that keeps the individual ensnared in material life) has distinct properties that determine its rank within the triguna hierarchy (Bhaktivedanta 1997, chap.15).

Often described as the idealistic or the topmost of the three gunas*, sattva guna* is portrayed as representing "goodness" (Bhaktivedanta 1989, 14:6, 18:20, 23). This guna is comprised of qualities such as *truthfulness*; *self-control*; *simplicity*; *showing compassion towards others*; *being interested in and concerned about spiritual matters*; and *greater and real knowledge*. The intermediate guna, *rajas guna*, represents "passion" and in addition to passion itself is comprised of qualities such as

material complexity; *sense gratification*; *self-adulation*; *greed*; and *anxiety* (Bhaktivedanta 1989, 14:7, 18:21, 24). The third guna, often referred to as the mode of darkness, *tamas guna,* represents "ignorance" and is comprised of qualities such as *nescience*; *laziness*; *delusion*; *being uninterested in and unconcerned about spiritual matters*; *violence*; *helplessness*; and *fearfulness* (Bhaktivedanta 1989, 14:8, 18:22, 25).

The Vedanta regarding humankind's potential to attain global environmental sustainability thus rests in the understanding that a change in humankind's quality of consciousness, from the qualitatively lower modes of rajas and tamas gunas to the qualitatively higher mode of sattva guna, is essential. This conclusion is upheld by the premise that sattva guna represents the function of maintenance and sustainability of the material environment, through its presiding deity Lord Vishnu who is the maintainer of the material cosmos (Bhaktivedanta 1987-8, 4:11:16, 5:17:22-23, 10:85:31). By its very nature, sattva guna enables the individual to preserve material resources rather than utilise them incorrectly (rajas guna) or to deplete and destroy them altogether (tamas guna) (Bhaktivedanta 1987-8, 10:27:4, 11:25:17; 1989, 18:25). This is further supported by the Vedic premise that sattvic knowledge, described as *greater and real knowledge*, is able to satisfy not only higher ethical goals, but also mundane material goals, as it is, by its very nature, accurate in all spheres of application. This premise is depicted in the model Stratified Hierarchical Presentation of Scores (SHPS) (see section 3.3.1).

Publications by Bhaktivedanta such as *Life Comes From Life* (1981); *The Laws of Nature: An Infallible Justice* (1991); *Renunciation Through Wisdom* (1992); *The Science of Self Realisation* (2003); and *Bhakti: The Art of Eternal Love* (2004) have contributed to the researchers' broader reading of the Vedic perspective on the topic of consciousness and the triguna, but are not all cited within the thesis. *Life Comes from Life* (1981) is a compilation of conversations between Bhaktivedanta and his disciples on the modern scientific process. In this text, Bhaktivedanta presents the Vedic perspective of the modern approach to scientific knowledge, compared to the contemporary perspective maintained by scientists themselves.

The remaining above-listed publications are both religious and philosophical in nature, drawing the attention of the reader to the spiritual nature of all materially embodied living beings and to the spiritual nature of Krishna and His different energies. They address the means by which an individual can understand and thereby engage in behaviour that is conducive for elevating his/her own quality of consciousness, as well as that of others. The contents of all of Bhaktivedanta's publications deliver the essential message of original Vedic writings, namely that material embodiment is unnatural for the eternally existing non-material living being. Material embodiment, which manifests from the material concept of life, should therefore be abandoned so that the living being can return to his/her original condition of spiritual happiness, bliss, knowledge and eternity.

2.2.3 (2) Other Publications through the Bhaktivedanta Book Trust

A number of other texts published through the Bhaktivedanta Book Trust by other authors have also contributed significantly to this thesis, either as background reading or as sources of specific referencing. *The Hidden Glory of India* (2002) by Steven J. Rosen, presented in the format of a pocket-book encyclopedia, is an overview of traditional Vedic culture with a specific focus on *bhakti-yoga*, the science of devotion to Lord Krishna. Subject matters include Vedic literature, the roots of *bhakti-yoga*,

Vedic cosmology and time, descriptions of demigods and different *avatars* (incarnations of Krishna), places of pilgrimage and Vedic arts. Of specific importance for this thesis is Rosen's discussion on Vedic literature and the triguna, which will comprise the primary component of the Vedic methodology for data collection and processing (Rosen 2002, 14-23, 176-7).

Readings in Vedic *Literature: The Tradition Speaks for Itself* (1990) by Satsvarupa dasa Goswami describes the contents and purpose of Vedic literature from the ontological and epistemological perspective of the Vedas themselves. Essential elements of Vedic thought such as *samsara* (the wheel of repeated birth and death), *prakrti* (material nature) and the three gunas, all relevant subject matters to the workings of consciousness, are discussed. *Your Ever Well-Wisher* (1987) also by Satsvarupa dasa Goswami, is perhaps the most widely accepted authentic biography of Bhaktivedanta's life, including descriptions of his teachings and his life events through which he taught by example.

Mechanistic and Non-mechanistic Science: An Investigation Into the Nature of Consciousness and Form (1981) by Richard L. Thompson, examines consciousness from both traditional Vedic and contemporary academic perspectives, such as those of quantum mechanics and Darwinian evolution. Fundamental Vedic ontological and epistemological constructs relevant to human behaviour such as *karma* (reaction to action), the *paramatma* (Krishna's expansion as the supersoul within the heart of every individual living being), the consciousness of the materially embodied individual and the laws of material nature are discussed (1981, 13-6, 78, 134-5, 180-1). This text attempts to establish the non-mechanistic nature of consciousness by arguing from the Vedic perspective. As such, this text offers a valuable literary source for discussing Vedic conceptual approaches to the topic of consciousness, as well as for designing data collection items.

Divine Nature: A Spiritual Perspective on the Environmental Crisis (1995) by Michael A. Cremo and Mukunda Goswami gives a succinct overview of the many multifaceted issues that currently surround global environmental destruction. In the attempt to present "spiritual solutions" to global environmental management dilemmas, the authors argue that the many problems faced by environmental management regimes are underpinned by a general lacking of ethical, spiritual and religious principles in human society (1995, 45-61). Consciousness is discussed as the emanation of the eternally existing self, whose exposure to either material or non-material environments will determine his/her quality of existence. Exposure to material environments is explained as resulting in the individual seeking material goals, including the goal of exploiting natural resources, whereas exposure to non-material/spiritual environments will result in the individual seeking spiritual goals, which by their own nature promote material simplicity, meaning a lower rate of the use and abuse of material resources. Thus exposure to material and to materialistic environments is identified as the root cause of the environmental crisis.

2.2.3 (3) Other Supporting Literature

In *Esoteric Anatomy: The Body as Consciousness* (1998) Bruce Burger approaches the topic of human anatomy and health from the Vedic perspective, as well as other perspectives alternative to those of allopathic Western medicine. Amongst many physiological and metaphysical topics in relation to the human body, Burger discusses the eternally existing individual and his/her interaction with the three modes of material nature. Describing the three gunas as "levels of consciousness" Burger

investigates the many archetypal patterns and forces within material nature that influence human consciousness, behaviour and general wellbeing (1998, 135).

In *Vedic Ecology: Practical Wisdom for Surviving the 21st Century* (2002) Ranchor Prime takes a theological approach to consciousness, presenting Vedic religious doctrines within the context of environmental care. Discussing topics such as the sanctity of all life, traditional Vedic agriculture and cow protection, the purpose of the manifestation of the material universes and humankind's duty and role within those universes, Prime addresses environmental care from the ultimate personalistic perspective i.e. from the perspective of the individual person's relationship with the person of God and with God's creation. Addressing the individual soul as "the basis of life" Prime describes the individual's interaction with the material world through his/her consciousness which extends to his/her immediate environment (2002, 44). Prime asserts that without his/her internal spiritual connection with the supreme consciousness of God, the individual will never be capable of knowing Earthly phenomena in their totality.

2.2.3 (4) Peer-reviewed Literature on Contemporary Triguna Research

Academic research into the gunas as a tripartite system of psychological evaluation has escalated over the past few decades, although it remains in the background of research into other systems of psychological evaluation. Most peer-reviewed publications report on researchers' efforts to seek standardisation for Vedic Personality Inventories (VPI) based on triguna methodology, as well as validity and overall reliability of such inventories. According to M. Sitamma, K. Sridevi and P.V. Krishna Rao (1995, 15) a small number of VPIs have already been developed from the three gunas, presented in the *Bhagavad-gita* and *Srimad Bhagavatam*. E.G. Parameswaran (1969) and K. Uma, Y.S. Lakshmi and E.G. Parameswaran (1971) developed one of the earliest available within contemporary literature. This VPI presented the gunas as three distinctly independent dimensions, with no analysis carried out into correlation or interaction between the different gunas (Sitamma, Sridevi and Rao 1995, 14). In 1971, R. Singh used a VPI to develop schedules for interviewing patients with psychic disorders.

In his efforts to seek construct and factorial validity of the three gunas as a viable categorisation scheme, David B. Wolf in "A Psychometric Analysis of the Three Gunas" (1999) concluded that overall, the hypotheses of Vedic literature concerning the three modes were supported by his research. He stated that "multiple-groups factor analyses (Nunnally and Bernstein 1994) support the categorization scheme of the three gunas, and they also support the assertion of Vedic theory that sattva and tamas are inversely correlated, with rajas as an intermediary mode" (Wolf 1999, 1389). This is supported by Bhaktivedanta (1989, 14:8). Wolf commented that from earlier research involving 247 subjects, Wolf concluded that VPI methodology is effective, as all three guna-scales had alpha reliability coefficients above .86 (0 = zero internal consistency; 1 = perfect internal consistency) (Colman 2003, 177).

In "A Further Exploration of the Vedic Personality Inventory: Validity, Reliability and Generalizability" Harvey S. Stempel et al. (2006, 272) state that from their research they found that the VPI has "adequate psychometric properties" and supports generalisability. In other research by R.C. Das designed to validate the existence of the three distinct levels or qualities that comprise the triguna, results revealed that the three gunas were "exclusive of each other; that they are negatively correlated at significant levels, and that rajas is closer to sattva than tamas in the

hierarchy-which is in perfect harmony with the *Gita* (*Bhagavad-gita*) concept of the gunas" (Das 1987, 11).

P. Marutham, J.P. Balodhi and H. Mishra report on the results from the distribution of their VPI to 322 post-graduate students, in which their research found that each item (guna characteristic) in each of the three modes measured a different aspect of personality. These findings were supported as "the total correlation was not significant, indicating that each item was assessing a specific aspect" (Marutham, Balodhi and Mishra 1998, 17-8). Inventories developed by Vidhu Mohan and Sadhna Sandhu (1986, 49; 1988, 23-4), R.C. Das (1987, 7; 1991, 50) and N.S. Pathak, I.D. Bhatt and R. Sharma (1992, 1) confirm that one (or two) gunas will usually predominate over the other two (or one) within an individual's personality, although all three are always present to some degree. Sitamma, Sridevi and Rao state that:

> it is maintained that the gunas act together and that they are found in every object in the universe. They never exist in isolation. They interact and compete with one another resulting in the domination of one over the others. No personality is exclusively sattvic, rajasic or tamasic (Singh, 1972). The predominance of one guna and the degree of predominance are the determinants of the individual's behaviour. (Sitamma, Sridevi and Rao 1995, 14)

This is supported by Bhaktivedanta (1987-8, 3:12:27; 1989, 14:10).

Das (1987) and Mohan and Sandhu (1988) investigated the triguna as a viable means by which to ascertain personality types. Mohan and Sandhu (1988) compared Eysenck's model of personality and the triguna model from the *Bhagavad-gita*. Results revealed that there was a "significant relationship" between the two models, in that the hypothesis that extraversion and sattva guna are negatively correlated, was upheld (1988, 35). Other findings such as a high degree of correlation between sattva guna and neuroticism weakened the relationship between the two models.

It appears that the triguna has not yet been applied to research into environmental conservation organisations, nor into any other professional settings, with the exception of research conducted by Parvinder Kaur and Arvind K. Sinha (1992). They confirm that "almost no systematic account of any empirical work in the work organisational setting is available (although some empirical works have appeared recently-Mohan and Sandhu, 1986, 1988)" (1992, 28). In "Dimensions of Guna in Organisational Settings" (1992) Kaur and Sinha attempt to further guna research in this direction. They comment that:

> going by sheer face validity of the constituents of these gunas, one may not be too much off the track in arguing that the sattva guna consists of characteristics (i.e. patience, poise, self-control, and serenity) that may be treated as almost prerequisites for handling complex situational structures and processes that mark most modern organisations. (Kaur and Sinha 1992, 30)

Claiming that a correlation can be seen between the qualities of contemporary human societies and the qualities of rajas guna (1992, 28) the authors sought to test the reliability of the triguna system of evaluation within professional settings. They concluded, "the construct of the gunas holds some promise for being used in organisational behaviour research and practice" (Kaur and Sinha 1992, 32). They also concluded that:

> of course, there seems to be no denying the fact that sattva guna would be "the guna" to be acquired, enhanced and retained. There also seems to be some supportive indication to Chakraborty's (1987, p.76) contention that sattva is superior to rajas, and rajas to tamas in terms of their aid to the mind for a true understanding of facts and events; at least insofar as such understanding may get reflected in the organisationally relevant constructs like leadership, work ethic, personal effectiveness, self-actualising behaviour, and organisational effectiveness. (Kaur and Sinha 1992, 31)

Whilst the authors Michael A. Campion and David K. Palmer (1996) didn't investigate quality of consciousness according to the triguna, they developed a research portfolio on how to study corporate consciousness. In their attempts to define and contextualise corporate consciousness within the boundaries of corporate culture, and to answer questions such as "should we study corporate consciousness" (1996, 397) the authors list issues such as the topic's *importance to organisations*, its *researchability* and researchers' *intrinsic interest* in the topic (Campion and Palmer 1996, 397-8). Although the authors pay such attention to the potential requirements of research into corporate consciousness, they do not present any viable methodologies for research.

2.2.4 Vedic Cognitive Science

In presenting the *sankhya* philosophy, Bhaktivedanta stresses that if translated without adulteration, Vedic texts are unanimous in the conclusion that consciousness is the symptom and the indicator of the presence of a non-material atomic particle (the jiva) residing within an organic material body. According to Bhaktivedanta, the concept of the jiva refers to *all* species of life: humans, animals and plants, including microscopic creatures such as unicellular organisms (Bhaktivedanta 1970, chap.87; 1989, 8:3; 1996, *madhya* 24:307).

Thompson (1981, 23) describes the jiva as an "elementary unit of consciousness" possessing self-reflective conscious awareness. He also defines this unit as "the self" describing it as being unanswerable to physical laws in that it can be neither created nor destroyed by any material force (1981, 23). Being fully independent of matter it is capable of functioning without any material connections. Burger (1998) supports this assertion in stating that the physical body, including its form, condition and functioning, is an emanation of the consciousness of the jiva. According to Burger, the center of every material atom resonates with a field of non-material or spiritual potency, which provides the etheric pattern that determines and sustains the material form (1998, 269).

In *Bhagavad-gita As It Is* (1989, 2:17, 13:6-7) Bhaktivedanta states that surrounding the non-material self or jiva is a subtle material body that is constituted of an individual's mind, intelligence and false ego. The outer gross material body, commonly known as an individual's physical body, is comprised of the five gross elements of ether, air, fire, water and earth, generated through a series of transformations in the above-mentioned order. A model we may call the Vedic Model of the Materially Embodied Self (VMMES) can thus be presented as follows:

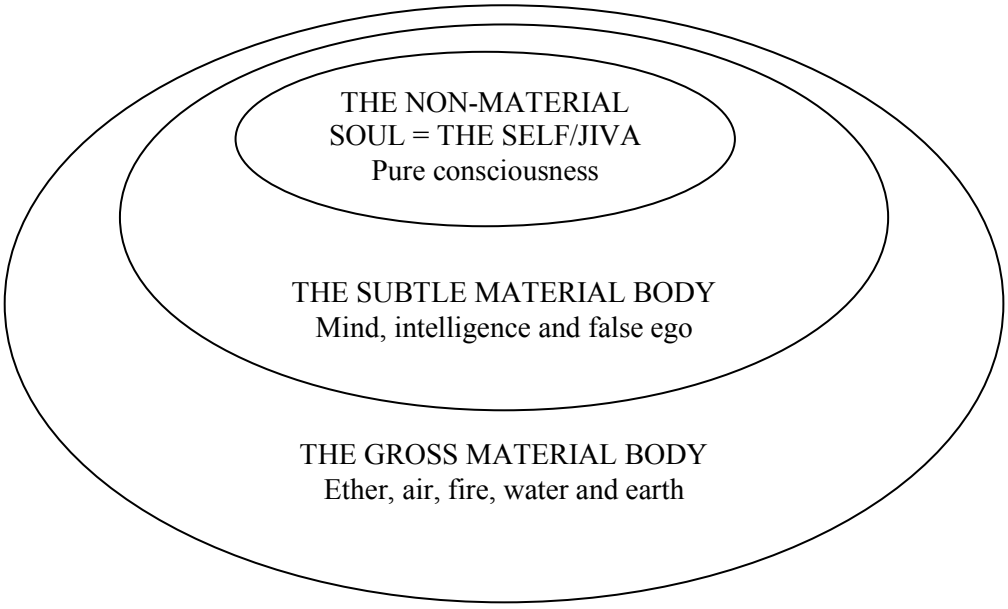


FIGURE 2.2.4.1: Vedic Model of the Materially Embodied Self (VMMES) (Bhaktivedanta 1989, 2:17, 3:42, 13:6-7; Thompson 2003, 246-7)

Bhaktivedanta (1981, 51) further asserts that being materially embodied is an unnatural situation for the eternally existing non-material jiva. As the jiva does not need a material body for his/her existence, being forced to accept such a body by the laws of *karma* is cumbersome and distressful for the jiva. The allotment of material bodies by material nature is explained as being dependent upon the jiva's own consciousness at the time of death, as well as the individual's personal *karma*. Such arrangements, described as comprising the workings of reincarnation or *samsara*, constitute the laws of material nature and are described in *Bhagavad-gita As It Is* (1989, 8:3, 16:19) as being applicable to all materially embodied jivas within all material universes. In conjunction with the workings of the three modes of material nature (gunas) these laws constitute the means by which the materially embodied jiva encounters the material realm and thereby qualifies his/her consciousness (and consequently his/her existence) according to his/her choices in life. A summary of the primary components of Vedic Cognitive Science can thus be presented as follows:

1. The constitution of the non-material eternally existing conscious jiva;
2. The jiva's situatedness within his/her material body (comprised of both subtle and gross material elements);
3. The jiva's interaction with the material world, including interaction with other materially embodied jivas;
4. Material contamination of the jiva's non-material consciousness according to the influences of the three gunas (perpetuated by the jiva's own choices in life) determining his/her quality of consciousness; and
5. Material embodiment and its perpetuity according to the quality of consciousness of the jiva.

Illustrated above in the VMMES, as constituting the nucleus of the human psyche as well as the individual as a whole, consciousness determines the innermost qualities

of the individual. It is from this inner nucleus, according to Vedic texts, that all outer personal attributes are derived. Vedic teachings therefore argue that a *consciousnesscentric* approach to psychological research is essential to thoroughly understand an individual's full psychological profile.

This approach promulgates that consciousness and its quality should be the center of all serious psychological research. As Bhaktivedanta states in *Srimad Bhagavatam* (1987-8, 2:10:23) "knowledge of Self can expand to the knowledge of phenomena, but physical knowledge cannot lead to knowledge of the Self." Thus according to Vedic literature, psychological research needs to begin with knowledge on the intrinsic, non-material self and his/her consciousness, before researchers can interpret subtle-material factors such as intellectual dexterity and mental aptitude, or external factors such as physical behaviour. Bhaktivedanta describes knowledge as a key constituent of the jiva's consciousness. In *Bhagavad-gita As It Is* (1989) he likens *knowledge* with *consciousness* itself, stating that "the soul is full of knowledge, or full always with consciousness. Therefore, consciousness is the symptom of the soul" (1989, 2:20). He also states that "knowledge, the object of knowledge, and the knower are the three factors that motivate action" (1989, 18:18). In other words, the Vedic concept of knowledge is that knowledge acts as the determinant of the jiva's quality of consciousness through his/her daily decisions to invest him/herself in different attributes.

In order to present the philosophy of *Sankhya* and related teachings of Bhaktivedanta in a contemporary psychological framework, approaches taken by contemporary cognitive sciences to explaining the human psyche, were consulted. Although the words *cognition* and *cognitive science* are today receiving much attention from psychologists, their precise meaning remains a contested issue. In "Where Did the Word "Cognitive" Come From Anyway?" (1996, 31-2) Christopher D. Green argues that the word *cognitive* has its original roots in the meaning "truth-evaluable" derived from early 20th century philosophical theories on ethics. Green claims that *cognition* was never intended to be synonymous with *mental* as it has been broadly interpreted today, but rather with aspects of the mental that can be subjected to "truth conditional analysis" (1996, 31). The *Oxford English Dictionary* defines the word *cognition* as being derived from the Latin *cognition-em* meaning "a getting to know, acquaintance, notion, knowledge, etc." and as "the action or faculty of knowing; knowledge, consciousness" (Simpson and Weiner 1989, 445). Colman's *Dictionary of Psychology* (2003, 140) traces the word *cognition* to the Latin *cognoscere* meaning "to get to know" stemming from *com* "together" and *noscere* "to know."

Given the above discussed derivatives and definitions of the word *consciousness* as 'inwardly aware; internal knowledge or conviction; knowledge as to which one has the testimony within oneself' (see section 1.1.1), cognition may be understood as a process by which the jiva's self-awareness, self-knowledge and his/her moral qualities are determined. Thus *sankhya* philosophy describing the jiva, the jiva's situatedness within the material realm and the process by which the jiva's quality of consciousness determines that situatedness, can be defined in contemporary terms as comprising a cognitive science, namely Vedic Cognitive Science (VCS). This science explains the process of material conditioning of non-material consciousness and the ramifications of such conditioning, making the contributions of the *sankhya* philosophy to Vedic knowledge important, in terms of the objective of this thesis.

2.2.5 Psychological Conditioning According to the Three Modes of Material Nature (Triguna)

Although the topic of materialism has today been widely researched within the sociological contexts of cultural, historical and consumer studies, Western psychologists have traditionally not affiliated materialism or matter itself with psychological conditioning theory. Perhaps the best known academic writings addressing such concerns are those of German sociologist Karl Marx (1818-1883). Marx drew correlation between materialism, consciousness and psychological conditioning, asserting that an individual's material circumstances will condition him/her to adopt corresponding values and beliefs, and therefore behavioural norms (Haralambos et al. 1996, 38-40; Kreis). The following paragraph by Steven Kreis (2004) delineates Marx's proposition on the role of consciousness within social settings:

> Because men are conditioned by the material world into which they are born, their ideas assume objective proportions. Under this influence, men misinterpret the nature of the world in which they breathe, work, love, suffer and die. They misunderstand their position and the meaning of their position. Later Marxists would eventually label this misinterpretation "false consciousness," a predicament intensified by the appearance of industrial capitalism. (Kreis)

In *Bhagavad-gita As It Is,* Bhaktivedanta (1989) refers to the same process of material conditioning as resulting in 'false consciousness':

> When we are materially contaminated, we are called conditioned. False consciousness is exhibited under the impression that I am a product of material nature. This is called false ego. One who is absorbed in the thought of bodily conceptions cannot understand his situation. (Bhaktivedanta 1989, *intro* 12)

In the second canto of *Srimad Bhagavatam* (1987-8, 1:13:46, 2:5:22-4) Bhaktivedanta further explains that such conditioning of consciousness occurs according to three eternally existing qualitative modes, which comprise the fundamental qualities of all material universes. These three modes, introduced above in section 1.2.3, activate the total material energies known as the *mahat-tattva* or *pradhana* in order to produce variegatedness within the material cosmos. When this interaction of the three modes, or gunas, occurs with the *mahat-tattva*, the manifestation is called *prakrti,* which is commonly referred to as 'nature' within the Western world (Bhaktivedanta 1987-8, 3:26:10).

Whilst the tripartite system of the gunas imposes its influence on all gross aspects of the material cosmos, it also manifests within subtle material elements such as the mind and intellect of the materially embodied living being. In addition to the five gross material senses that facilitate the individual's interaction with the material realm through seeing, touching, hearing, smelling and tasting, the subtle material mind, as the sixth sense, allows the individual to perceive (Bhaktivedanta 1992, 3:2). The three gunas can thereby be described as representing three different qualitative levels of psychological qualities or tendencies, or different qualitative levels of consciousness (Bhaktivedanta 1987-8, 3:5:11; 1989, 17:2; Rao and Harigopal 1979, 63-4). In the words of P.V. Krishna Rao and K. Harigopal:

> the three gunas- sattva, rajas and tamas, which are aspects of both matter and mind, are defined in terms of illumination, activity and inertia, respectively (Dasgupta, 1957; Kulkarni, 1972). From a psychological standpoint the three gunas might be considered as the three fundamental components of the human mind (Kulkarni, 1972) as the "tendencies exhibiting themselves at different levels of consciousness" (Pathak, 1932, p.11), or as the three aspects of human temperament and personality (Boss, 1966; Parameswaran, 1969; Smart, 1964). (Rao and Harigopal 1979, 63)

Mohan and Sandhu (1988) further explain that:

> *"Prakrtii*" [material nature] manifests itself at the individual level as the characteristic organisation of everything that constitutes the personality of an individual and which accounts for his distinctiveness. Since "*Prakrtii*" is constituted of the *Tri*-Guna, it follows, that the personality of an individual is accounted for by the "Guna" which is dominant in his constitution and which overshadows the other two. (Mohan and Sandhu 1988, 23)

Following is a comprehensive description of the three gunas. Most characteristics have been identified within Bhaktivedanta's *Bhagavad-gita As It Is* (1989, chaps.14-8) and *Srimad Bhagavatam* (1987-8, 11:chap.13, chap.25) with several characteristics also being identified in other texts such as Burger's *Esoteric Anatomy: The Body As Consciousness* (1998, 169-72). Lists of guna characteristics appearing in journal articles discussed in section 2.2.3 [4] are to a large extent the same as those contained within Bhaktivedanta's and Burger's texts.

The following lists do not contain all characteristics within all gunas. Whilst behaviours listed are followed by descriptions of relevant symptoms, all aspects of materially contaminated consciousness such as attitude, behaviour, activities and their results, as well as the symptoms of all of the above, are discussed in parallel terms within Vedic texts. In other words, descriptions of guna characteristics and descriptions of the symptoms of one who is predominated by such characteristics are for the most part not distinguished. A complete list of all guna characteristics adhered to in data processing within this thesis appears in the Complete Guna Characteristics Guide (CGCG) in Appendix A:

> sattva guna: self-realisation/self-knowledge; greater and real knowledge; the beginning of spiritual knowledge; control of the mind and the senses; humbleness/humility; tolerance; truthfulness; clear-sightedness; cleanliness; action that maintains; being interested in and concerned about spiritual matters; detachment/being aloof from the material body and from material/mundane circumstances; awareness of and interest in higher ethical and spiritual purposes of work; and material simplicity (living simply). The symptoms of one situated in sattva guna are happiness based on self-realisation, peacefulness and advancement in real and greater knowledge;
>
> rajas guna: knowledge producing many theories and doctrines by dint of mundane logic and mental speculation; knowledge gathered through the material senses (empirical knowledge); intense endeavour; unrestricted sense enjoyment/sense gratification; ambition for material pursuits/career-mindedness; false pride; nationalism; hankering and lamenting; stress and anxiety; selfishness; action that creates/recreates; an insatiable desire for results; material complexity/material affluence and luxury; and seeking honour, recognition and

status within society. The symptoms of one situated in rajas guna are greed, lust and the increasing desire to enjoy the fruits of one's activities. Also, distortion of the intellect due to too much activity; and

tamas guna: ignorance/nescience; illusion; laziness; inertia; dishonesty; acting whimsically, for no purpose; helplessness; stinginess; hypocrisy; action that destroys; violence towards others/causing others harm; slander, criticism and vilification of others; procrastination; living as a parasite/exploitation; being uninterested in and unconcerned about spiritual matters; intolerant anger; and quarrel. The symptoms of one situated in tamas guna are foolishness, arrogance, fearfulness, depression and madness.

Sitamma, Sridevi and Rao (1995) claim that all three modes are present within every situation within the material realm of existence:

> It is maintained that the gunas act together and that they are found in every object in the universe. They never exist in isolation. They interact and compete with one another resulting in the domination of one over the others. No personality is exclusively sattvic, rajasic or tamasic (Singh, 1972). The predominance of one guna and the degree of predominance are the determinants of the individual's behaviour. (Sitamma, Sridevi and Rao 1995, 14)

In discussing the many plights encumbering contemporary human societies, specifically Western societies, Bhaktivedanta (1989) claims, as did Kaur and Sinha (1992) above (see section 2.2.3 [4]) that humankind is today particularly influenced by rajas guna:

> And when the mode of passion is increased, one develops the hankering for material enjoyment. He wants to enjoy sense gratification. For sense gratification, a man in the mode of passion wants some honor in society, or in the nation, and he wants to have a happy family, with nice children, wife and house. These are the products of the mode of passion. As long as one is hankering after these things, he has to work very hard. Therefore it is clearly stated here that he becomes associated with the fruits of his activities and thus becomes bound by such activities. In order to please his wife, children and society and to keep up his prestige, one has to work. Therefore, the whole material world is more or less in the mode of passion. Modern civilization is considered to be advanced in the standard of the mode of passion. (Bhaktivedanta 1989, 14:7)

This claim may be said to be substantiated by authors such as James E. Burroughs and Aric Rindfleisch (2002), Judy F. Graham (1999) and Richard B. Norgaard (1995) who all claim that materialism and consumerism are increasingly being accepted by global human society as the means by which happiness can be attained. These behavioural trends are argued as being on the increase in contemporary society due to being accepted as normal trends in human behaviour. Norgaard (1995, 476) claims that "clearly, environmental problems are due to excessive material consumption by the rich." In discussing Al Gore' book *Earth in the Balance* (1992) Norgaard states that "Gore then argues that with sufficient collective moral resolve, driven by our spiritual reawakening, we can overcome our collective material madness which is embedded in the politics and institutionalisation of individual and corporate greed" (Norgaard 1995, 476).

It is important here to mention that in view of the above claims made by Kaur and Sinha (1992) and Bhaktivedanta (1989) regarding the predominance of the material mode of passion within contemporary society, it is predicted that results from research conducted in this thesis will show that the Australian Antarctic scientific community also predominates within the mode of passion. Whilst it is not unusual to find sectors of contemporary society who predominate within the modes of goodness (religious organisations, certain welfare groups etc.) and ignorance (gambling organisations, abattoirs, brothels etc.) these are generally less prevalent. Empirical research methods and methodology employed by scientists, endemic to rajas guna, also points towards a very prominent representation of rajas guna within the idiosyncrasies of contemporary science in general.

As argued by Norgaard, the environmental crisis is a product of humankind's greed, which can be overcome by spiritual awakening. Such a resolve directly correlates with Bhaktivedanta's argument that contemporary human society, afflicted by *materialism* (rajas guna) and *ignorance* (tamas guna) needs to raise its qualitative level of consciousness to sattva guna in order to see clearly not only its own priorities, but also those of other species of life. Such a vision necessarily incorporates the beginning of spiritual understanding, or at the very least, genuine concern about ethical and spiritual matters. It could be argued that the triguna sets a very high mark in terms of its critical evaluation of contemporary global human society's quality of consciousness. An overview of the general behavioural characteristics of most environmental management regimes in the West certainly suggests that contemporary societies do not consider the behavioural characteristics of the triguna's ideal mark (sattva guna) as being necessary to benefit environmental conservation outcomes. As this is the case, the triguna may be best appreciated as a means by which *actual* qualitative levels of consciousness can be measured against *ideal* qualitative levels of consciousness. Although this may be the case, Kaur and Sinha (1992) claim that:

> the Indian viewpoint posits that the attainment of sattva guna is a desirable goal. Hiriyanna (cited in Chakraborty, 1987, 78) suggested that it is possible to alter the existing proportions of the three gunas, so that the proportion of the sattva guna undergoes substantial increment. (Kaur and Sinha 1992, 28)

Vedic teachings further maintain that beyond the three material modes is the transcendental platform of goodness, known as *suddha-sattva* (pure goodness) (Bhaktivedanta 1987-8, 3:24:10). This platform of pure goodness differs from sattva guna, the material mode of goodness, in that it represents non-material or spiritual qualities of consciousness, completely uncontaminated by matter. Quality of consciousness on the suddha-sattva platform is therefore considered superior to the quality of consciousness experienced by a living being conditioned by any of the three material modes, as the individual's consciousness is free from all distorting maladies.

Characteristics of one who has attained the suddha-sattva platform of consciousness include (amongst several others) one "who looks upon a lump of earth, a stone and a piece of gold with an equal eye; who is equal toward the desirable and the undesirable; who is steady, situated equally well in praise and blame, honor and dishonor; who treats alike both friend and enemy; and who has renounced all material activities" (Bhaktivedanta 1989, 14:22-5). These descriptions are confirmed by Das (1987, 8). The Vedanta maintains that materially embodied individuals can not achieve the suddha-sattva platform of consciousness whilst they are attached to material concerns. This is due to the inherent quality of the suddha-sattva platform, which demands that the individual renounce all material desires and strictly adhere to

regulative principles such as celibacy, no taking of intoxication, no gambling, dedication to spiritual knowledge etc. i.e. principles that run contrary to the pursuit of material life.

The actual conditioning process is discussed extensively by Bhaktivedanta in both *Srimad Bhagavatam* (1987-8) and *Bhagavad-gita As It Is* (1989). Material energy or *prakrti* is described as being alluring for the materially embodied individual. In other words, *prakrti* attracts individuals who are prone to admiration of material quality. *Prakrti* is explained as covering up the intrinsic pure knowledge of the non-material individual in such a constant way that it is unnoticeable to the individual. In quoting the *Padma Purana* (one of the Sattvic *Puranas* of the *smriti-sastras*) Bhaktivedanta states that:

> material contamination is very subtle. Its beginning, its fruition and results, and how one suffers such results in the form of distress, are part of a great chain. When one catches some disease, it is often very difficult to ascertain the cause of the disease, where it originated, and how it is maturing. The suffering of a disease, however, does not appear all of a sudden. It actually takes time. (Bhaktivedanta 2004, 16)

Bhaktivedanta states that "a living entity is always pure, but he is prone to be attracted by material enjoyment and as soon as he agrees to place himself in material enjoyment, he becomes conditioned, but that is not permanent" (1968a). The analogy of "material dust on the mirror of the mind" is given to describe the process by which the individual's pure consciousness is covered by matter (Bhaktivedanta 1989, 3:38, 7:13). By the covering power of *prakrti*, those under its influence can not see beyond material causes of occurrences. The further absorbed an individual becomes in material quality, the more his/her consciousness becomes contaminated or covered up by matter. Vedic literature asserts that *all* psychological impairments originally stem from material conditioning of non-material consciousness i.e. different degrees of psychological impairment are *always* underpinned by corresponding degrees of the material conditioning of consciousness.

Bhaktivedanta further discusses the jiva's interaction with the material world through his/her material senses. By prioritising the satisfaction of the material senses over his/her non-material needs, such as the need to maintain unclouded consciousness, the jiva increasingly prioritises external or material concerns over inner or non-material concerns. Bhaktivedanta gives the analogy of the prioritisation of the needs of the birdcage over the bird him/herself residing inside the cage (1987-8, 1:2:8). By caring for the birdcage (the jiva's material body and material commodities) one does not satisfy the bird within (the jiva him/herself). In view of the above premises of Vedic knowledge and the structure of the Vedic Model of the Materially Embodied Self, the prioritisation of the materially embodied jiva's needs may be presented as follows:

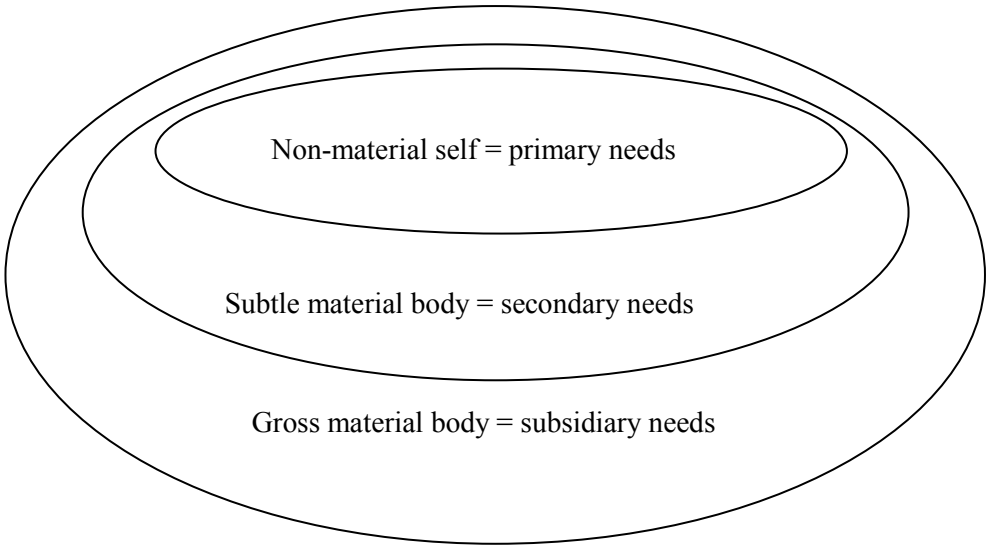


FIGURE 2.2.5.1: Model of the Prioritisation of the Needs of the Jiva (PNJ) (Bhaktivedanta 1987-8, 1:2:8; 1989, 2:18, 3:42; 6:34-6)

The needs of the jiva's subtle material body, such as clear-mindedness, a focussed and unperturbed intellect and restraint of the false ego (which can, when unrestrained, lead the individual to identify with matter instead of spirit) are accepted as being more pertinent than the needs of his/her gross material body. This is due to the role that the subtle material body plays in transporting the jiva to his/her next body at the time of death. The gross material body plays no such role (Bhaktivedanta 2003, chap.1).

2.3 Buddhist Literature

2.3.1 Buddhist Literature: An Introduction

(Siddhartha) Gautama Buddha, also known as Śakyamuni, is universally accepted as the Buddha manifestation for the current age, having appeared on Earth ca. 500 BCE. Born into royalty, he adopted the title of 'Buddha' when he ventured outside his palace and witnessed suffering, achieving enlightenment through a fundamental change of awareness. According to Vedic texts, Gautama Buddha is an incarnation of Lord Krishna who appeared specifically to teach non-violence and to distract atheists from their practices of killing animals for food. This may be further supported by the claim of Toropov and Buckles (2004, 223) that Buddhism has its original roots in Hinduism.

Originally, Buddha's teachings and life events were passed down by oral tradition, with the first written accounts manifesting approximately 400 years after his passing away. Today, there exist two primary schools of Buddhism. Theravada *Buddhism* or "the way of the Elders" (also known as the 'small vehicle scriptures') is perhaps the oldest and therefore comprises original Buddhist teachings according to devotees, although opinions exist that the Theravada school developed much later (Snelling 2000, 74-9). It teaches the spiritual benefits of living austerely and that deep and careful analysis of ourselves and our lives (psychological and philosophical) will eventually lead to enlightenment (Guenther and Kawamura 1975, *iii-iv*; Toropov and Buckles 2004, 208-10). *Mahayana Buddhism* or the 'great vehicle scriptures,' teaches that everyone will eventually become a Buddha with the aid of Boddhisattvas, those

who have already attained Buddha-hood. Philosophical concepts such as "emptiness" and the lack of a truly existing self were developed by the *Mahayana* school (Snelling 2000, 17-20, 38-45). As the teachings of the Abhidharma belong to the Theravada, only Theravada Buddhist texts will be discussed in this thesis.

In essence, both Buddhist doctrines assert that the Four Noble Truths, taught by the Buddha himself, must be realised before an individual can attain enlightenment. These include:

1. Life means suffering;
2. The origin of suffering is attachment;
3. The cessation of suffering is attainable; and
4. The way leading to the cessation of suffering is the Noble Eightfold Path.

(Toropov and Buckles 2004, 202-3)

The Noble Eightfold Path consists of right understanding, right purpose, right speech, right conduct, right livelihood, right effort, right alertness and right concentration (Toropov and Buckles 2004, 203).

The *Pali Canon* (a canon spoken in the Pali language, a dialect of middle Indo-Aryan) is comprised of what is broadly accepted as the original teachings of Gautama Buddha and is said to contain approximately four million words. The *Pali Canon* is divided into three categories including 1. *Vinaya Pitaka*: discipline/regulative principles and instructions for monastic life. At the heart of the *Vinaya Pitaka* is the *Pali Patimokkha* containing some 253 rules for men (monks) and 311 rules for women (nuns). Rules are presented in conjunction with philosophical treatises that encourage training in virtue; 2. *Sutra Pitaka*: instructional discourses and philosophical teachings of the Buddha; and 3. *Abhidharma Pitaka*: special/higher philosophical and metaphysical teachings on mind, matter and other phenomena with a focus on explanations of human experience within the material world (Bodhi 2005, 8-14).

John Snelling (2000, 17) claims that "the compilers of Abhidharma extracted and systematised the basic philosophical ideas implicit in the Buddha's teachings." Together these categories make up the *Tripitaka* or "three baskets" in which relevant texts were originally kept (Snelling 2000, 16-7; Toropov and Buckles 2004, 209-10).

Of specific relevance to this thesis are the phenomenological principles of human experience, which state that an individual's interaction with the material world is based on five *skandhas* or aggregates: namely forms, feelings, perceptions, dispositional formations and consciousness. From the fourth aggregate of dispositional formations (including also the second and third aggregates of feelings and perceptions) comes mental factor, as well as emotions. From the fifth aggregate of consciousness comes visual, auditory, olfactory, gustatory, tactile and mental consciousness (Varela, Thompson and Rosch 1991, 256-8; Snelling 2000, 26-8). Commentaries on relationships shared by the aggregates and their derivatives exist in several languages including Pali, Chinese, Tibetan and other East Asian languages.

2.3.2 Specific Texts and Their Contents

The Embodied Mind: Cognitive Science and Human Experience (1991) by Francisco J. Varela, Evan Thompson and Eleanor Rosch is one of three primary texts consulted in this thesis, in determining suitable Buddhist conceptual methodology for collecting and analysing data. In essence this text attempts to deliver a theory, namely *Enactive Cognitive Science* (ECS) (Varela, Thompson and Rosch 1991, 207-13) (also

sometimes referred to as *Enactive Cognitive Theory* [ECT]) on how the human individual interacts with his/her material environment. The theory proposes that consciousness and cognition are best understood through understanding the workings of the physical structures in which they are manifest i.e. the physical body (especially the senses and the brain) and the body's physical environment. The mind is seen as inseparable from human experience including the world it experiences, whilst the manifest physical world itself is seen as being produced or 'brought forth' from the individual's own conscious experiences. The five aggregates and different types of mental events and emotions presented in Abhidharma teachings are introduced into the theory by means of cognitive phenomena in the form of personality traits.

The second primary text consulted in designing the Buddhist components of data collecting and processing is *Mind in Buddhist Psychology* (1975) translated from Tibetan texts by Herbert V. Guenther and Leslie S. Kawamura. This publication discusses in detail the workings of the mind according to Abhidharma teachings which "concentrates on the training of one's critical cognition by methods of proper inspection" (Guenther and Kawamura 1975, *xii*). With a specific focus on the nature of different mental events, their differentiation and the detrimental impact that emotions have on the attainment of awareness or enlightenment, the authors aim to increase readers' awareness of the interconnectedness of the mind's activities and the individual's sense of reality. Basic unwholesome emotions, mental events (either positive/wholesome or negative/ unwholesome), omnipresent mental events, object-determining mental events and variables of the mind are all listed and discussed in detail, including a summary of what knowledge and awareness of such factors mean for the serious practitioner.

The third primary text consulted in investigating the Abhidharma is *The Mind and its Functions* (1992) by Geshe Rabten. Rabten discusses differences between ideal and non-ideal minds including their implications for experiences of perception, mental conception and cognition. In the same style as Guenther and Kawamura (1975), Rabten takes original Tibetan texts and discusses both epistemological and psychological models of the mind, elucidating their meaning within everyday behavioural parameters.

Whilst the purpose of this text is stated as being "to present an overall picture of the concept of the mind in Mahayana Buddhism" (1992, 8) Rabten's descriptions of mental and emotional factors do not appear to differ significantly from descriptions given by Varela, Thompson and Rosch (1991) or by Guenther and Kawamura (1975), neither of whom claim to present the Abhidharma specifically according to the *Mahayana* school of Buddhism. As there is some disagreement as to when the Theravada school first manifested (Snelling 2000, 74) perspectives on the Abhidharma's original affiliations may differ. There seems little if any contradiction between descriptions of Abhidharma factors between the three above-discussed texts. Whilst all texts vary slightly in their terminology used for descriptions, meanings of descriptions appear to be strongly congruous.

In the Buddha's Words: An Anthology of Discourses from the Pali Canon (2005) edited by Bhikkhu Bodhi, provides commentaries on stanzas of original *Pali Canon* script. Mental and emotional factors such as greed, hatred, violence and delusion are discussed within the context of the need for ethical self-discipline and mental self-cultivation, in which the qualities of loving-kindness, compassion, harmlessness in action and gentle speech are encouraged (Bodhi 2005, 23). This text is primarily accessed for its capacity to contextualise the meaning and purpose of the cultivation

of Positive Mental Events over Negative Mental Events and unwholesome emotions, as well as the purpose of cultivating awareness of the need for ethical action.

In addition to the above discussed texts, a selection of journal articles discussing the application of qualities of consciousness akin to Abhidharma factors to environmental conservation activities, will also be discussed in Chapter Seven. These articles address anticipated consequences of environmental conservation behaviours within the context of qualities such as morality, greed and compassion. *Buddhism: An Introductory Guide to the Buddhist Tradition* (2000) by John Snelling and *The Complete Idiot's Guide to World Religions* (2004) by Brandon Toropov and Father Luke Buckles provide general information on the Buddhist philosophy and religion.

2.3.3 Enactive Cognitive Science

The following discussion on ECS is included for the purpose of providing a contrast to Vedic Cognitive Science (VCS) in terms of the upcoming processing of data. As ECS draws from both general Buddhist epistemological conclusions as well as from specific conclusions made by the Abhidharma (as well as from theories on cognitivism and Maurice Merleau-Ponty's phenomenalism) it represents an attempt by contemporary academics to present Buddhist phenomenological explanations of mind, consciousness and behaviour. In view of the thesis objective, namely to ascertain whether or not a need exists for environmental scientists to raise the qualitative level of their own consciousness, the following aspects of ECS are considered relevant.

The authors state that "by embodied, we mean reflection in which body and mind have been brought together" (Varela, Thompson and Rosch 1991, 27). They also claim that "cognition is embodied action" (Varela, Thompson and Rosch 1991, 213). They describe embodiment as being constituted of an individual's personal Earthly history, by his/her physical body, language, social interaction etc. yet when the authors try to explain exactly what it is that is embodied they can not identify the self:

> It might appear that in our search for a self in the aggregates (forms, feelings, perceptions, dispositional formations and consciousness) we have come out empty handed. Everything that we tried to grasp seemed to slip through our fingers…. We did not fail to find the physical body…. Nor did we fail to locate our feelings and sensations, and we also found our various perceptions. We found dispositions, volitions, motivations- in short, all those things that make up our personality and emotional sense of self. We also found all the various forms in which we can be aware- awareness of seeing and hearing, smelling, tasting, touching, even awareness of our own thought processes. So the only thing that we didn't find was a truly existing self or ego. (Varela, Thompson and Rosch 1991, 79)

This culmination from the authors' research typifies the Buddhist perspective, as well as the perspectives of many other impersonal and transpersonal philosophies, namely that that the self is an illusion and exists only in relation to experience within the material realm of illusory existence. In this sense, ECS varies significantly from VCS, with the latter arguing that both subjective and objective realities exist, (including tangible and definable interactions between the two) with objective realities remaining largely beyond the influence or immediate control of the individual self. In contrast, ECS maintains a highly subjective reality akin to the outlook of the solipsist, who argues that all realities other than one's own awareness are automatons (Thompson 1981, 16). As the central concept of VCS is the existence of the eternal

non-material self or jiva, overarching spiritual goals of the two approaches differ considerably.

To further explain their theoretical position, Varela, Thompson and Rosch (1991) introduce the concept of *enaction*. An approximate definition given by the authors may be summarised as: perceptually guided action in which cognition, defined as "information processing as symbolic computation" emerges from the individual's sensorimotor patterns (from the brain and nervous system) (Varela, Thompson and Rosch 1991, 42, 173). In other words, ECS sees cognition as embodied action and is asserted as having its roots in the physical body, which along with its particular physical/material circumstances is in turn enacted or brought into reality by the individual him/herself.

ECS is thus a theory or science derived from autopoiesis theory i.e. the theory that the individual enacts or brings forth (auto self-creates) his/her own materially relevant existence (Maturana and Varela 1980, 88-95). Within the context of everyday behaviour such philosophical conclusions point towards the individual's complete autonomy in terms of determining the quality and circumstances of his/her own life. How the individual's invests him/herself in mental events/factors and/or emotions, outlined by the Abhidharma, are seen as determining the quality of the individual's overall experiences.

ECS and VCS, whilst differing in fundamental principles on the existence of the eternally existing self, agree on the relevance of the role of different qualitative mental and behavioural characteristics in determining the quality of an individual's life. Whilst ECS can not define the experiencer who thinks, acts, behaves etc. it agrees with VCS that quality of thinking, acting and behaving (experiencing) is the direct cause of an individual's quality of existence, including the quality of existence of relevant others. Applying methodological constructs from ECS and VCS in this research thesis thus serves the same goals: 1. To respond to the demands of the thesis objective and proposition; and 2. To provide data from which a profile of the quality of consciousness of Australian Antarctic scientists can be created.

2.3.4 Theravada Abhidharma Factors

According to Abhidharma teachings presented by Guenther and Kawamura (1975) "in Buddhist psychology 'mind' and 'mental events' are concepts by intuition whose complete meaning is given by something immediately apprehendable, and as such they are denotatively given particulars" (1975, *xxv*). In other words, the Abhidharma views the mind as being relevant or tangible only within its own application to different objects. Rejecting the concept of a central point within the mind (which would mean the existence of a self) Buddhism argues that the mind is itself an "event" (Guenther and Kawamura 1975, *xxvi*). For example, the function of the mental event of *non-attachment/detachment* is to provide the basis for "not being caught up in evil action" (Appendix B, 3).

It is thus considered a Positive Mental Event that leads the individual towards wholesome activities. It does not, however, serve the purpose of assisting the individual in developing a sense of wholesome or unwholesome identity, as such a purpose would implicate the individual to subscribe to a tangible self (Guenther and Kawamurra 1975, 43).

However, Buddhism does acknowledge that by choosing "appreciative discrimination" over "ego-centered demands" the individual can "discover the potential for growth and health that is in us and to develop it so that we might, and could, grow more and more into a human being" (Guenther and Kawamura 1975,

xxvii-xxviii). "Ego-centered demands," on the other hand, are seen as an "attempt to impose on and to interfere with all and everything," cutting ourselves off "from the possibility of seeing ourselves as unique and whole human beings" … "making everything no more than a means to our selfish, if not paranoid, ends" (Guenther and Kawamura 1975, *xxvii-xxviii*). The authors state that "it is for this reason that the 'Positive Mental Events,' as aids to growth, play such a prominent role in the analysis of 'mind'" (Guenther and Kawamura 1975, *xxviii*). The turmoil that human beings perpetually experience within their own minds whilst caught on the wheel of *samsara* is considered incentive enough for the individual to seek out a solution. Abhidharma teachings on mental events and emotions are considered valuable tools in working towards a permanent solution.

The following lists constitute the Abhidharma categories of experiential events (Varela, Thompson and Rosch 1991, 256-8). Similar lists also appear in *Mind in Buddhist Psychology* (Guenther and Kawamura 1975, 18-99) and in *The Mind and Its Functions* (Rabten 1992, 124-62). Whilst minor differences exist between the presentation of factors, lists are for the most part similar:

1. *Aggregates*

i) Forms;
ii) Feelings/sensations;
iii) Perceptions (discernments)/impulses;
iv) Dispositional formations; and
v) Consciousness.

2. *The Processes of Mind*

i) Consciousness as the fifth aggregate: visual, auditory, olfactory, gustatory, tactile and mental consciousness; and
ii) Mental events (the fourth aggregate, inherently including the second and third aggregates):

1. Positive/wholesome mental events: confidence/trust/faith; self-respect; decorum/consideration for others; non-attachment/detachment; non-hatred; non-deludedness/non-bewilderment; diligence/enthusiasm; alertness/suppleness; concern/conscientiousness; equanimity and non-violence;
2. Basic negative/unwholesome emotions: attachment; anger; arrogance/self-importance; lack of intrinsic awareness/ignorance; indecision; opinionatedness/afflicted views; and
3. Derivative/proximate negative/unwholesome mental events: indignation/wrath; resentment; slyness-concealment; spite; jealousy/envy; avarice; deceit/pretension; dishonesty; mental inflation; malice/cruelty; shamelessness; lack of sense of propriety/inconsideration for others; gloominess/dullness; ebullience/restlessness/distraction; lack of trust/faithlessness; laziness; unconcern/unconscientiousness; forgetfulness; inattentiveness and desultoriness/non-discernment.

Mental events and emotions of the Abhidharma and the characteristics of the Vedic triguna offer the individual a guide for achieving liberation from material involvement, although the individual's destination after achieving such liberation is

treated very differently by the two approaches. Both approaches maintain that the quality of life on Earth experienced by all living beings can be improved whilst they are still materially embodied, by choosing to invest in purer and more virtuous psychological and behavioural qualities. The Abhidharma's Positive Mental Events and the triguna's sattva guna characteristics (see sections 2.2.3 and 2.2.5) thereby encourage the individual to enhance his/her awareness, sense of morality, sensitivity towards oneself and towards others, knowledge and conscientiousness in general, with the understanding that such improvements will ultimately result in more favourable circumstances for all concerned.

The triguna's sattva guna characteristics and the Abhidharma's positive/wholesome mental events can thus be appreciated as representing *ideal* qualities of consciousness, whilst rajas and tamas guna characteristics and negative/unwholesome Abhidharma factors can be appreciated as representing less-than-ideal or even vulgar qualities of consciousness. Although this is theoretically correct, it must be stated that the Vedic conception of what constitutes *ultimate* ideal qualities of consciousness are those pertaining to the suddha-sattva platform (the spiritual mode of goodness) which is above the mundane sattva guna. For the purposes of this thesis, however, as the suddha-sattva platform of consciousness will not be included in data-collection or processing, the material mode of goodness (sattva guna) is accepted as representing ideal or the best qualities of consciousness which scientists may aspire towards. This premise is congruent with triguna methodology itself, which stipulates that attainment of suddha-sattva qualities of consciousness is cumbersome to achieve without first predominating within the mundane sattva guna.

Furthermore, the mundane sattva guna does, in itself, contain certain characteristics that portray the individual's inherent interests in spiritual matters, which one may ordinarily expect to find within an ordinary population of different personalities. Such sattvic characteristics include *having faith in spiritual life in general*; *being pious and religious and being aware of a higher spiritual nature*; and *maintaining a rudimentary interest in spiritual matters* (Bhaktivedanta 1987-8, 11:25:24-7; 1989, 18:20-2). In other words, whilst suddha-sattva characteristics can not be included in data collection and processing, sattvic characteristics addressing scientists' rudimentary interest in spiritual matters can be. A similar situation appears within the context of Abhidharma factors, as is discussed below.

In addition to the attainment of the above listed virtues of the Noble Eightfold Path and the cultivation of Positive Mental Events of the Abhidharma, Buddhist elevation of consciousness is also necessarily accompanied by the accomplishment of certain *paramitas* (perfections), or *paramis* in the Pali language. The following list appears in *A Treatise on the Paramis* (Dhammapala 1996, 10-3), in *Buddhist Dictionary: Manual of Buddhist Terms and Doctrines* (Nyanatiloka Maha Thera 2004, 25-6) and in *The Path of Purification* (Buddhaghosa 2004, IX: 124):

1. Giving;
2. Morality/virtue;
3. Renunciation;
4. Transcendental wisdom/understanding;
5. Energy;
6. Patience/forbearance;
7. Truthfulness/does not deceive;
8. Determination/resolution;

9. Loving-kindness; and
10. Equanimity.

Whilst it would be unreasonable to expect Australian Antarctic scientists to achieve perfections that are considered goals for individuals whose lives are fashioned specifically to achieve higher spiritual goals, *most* Theravada perfections show correlation with characteristics of the triguna, which pertains to mundane characteristics only. This correlation is substantiated by the argument of the Vedanta, that liberation from material bondage according to Buddhist principles (impersonal liberation) does not properly or permanently deliver the jiva above the material realm. In other words, what Buddhism calls liberation from *samsara*, the wheel of repeated birth and death, does not, in the eyes of the Vedas, afford the individual permanent liberation. As this is so, the Vedas do not recognise many of the Buddhist *paramitas* (perfections) as necessarily leading to ultimate spiritual realisation or enlightenment, but rather to the materially elevated platform of partial spiritual realisation (mundane sattva guna) of the Supreme Absolute Truth, which is the person Lord Krishna.

The Complete Abhidharma Factors Guide and Guide for Assessing Correlation between the Triguna and the Abhidharma (CAFG-GACTA) created specifically for the purposes of this thesis, outlines correlation between Abhidharma factors and triguna characteristics in detail. Most perfections share some affiliation with sattva guna characteristics. The perfection of *energy* is affiliated with certain rajasic characteristics. The perfection of *transcendental wisdom/understanding* corresponds with the suddha-sattva characteristic *remaining neutral and transcendental, knowing that the modes* (triguna) *alone are active* within this material world (Bhaktivedanta 1989, 14:22-5).

In other words, the Theravada perfection of *transcendental wisdom/understanding* is likened to the suddha-sattvic quality of understanding the real nature of natural phenomena and their manifestation according to higher spiritual causal factors. The tenth perfection of *equanimity* and the Positive Mental Event of *equanimity* both correspond with the suddha-sattva characteristics of *remaining undisturbed regardless of favourable or unfavourable material circumstances* and *being equipoised in both happiness and distress*. As scientists are not being evaluated on transcendental qualities of consciousness, but rather on the qualities of their materially conditioned consciousness, the Positive Perfections of *transcendental wisdom/understanding* and *equanimity* and the Positive Mental Event of *equanimity* will thus not be included in data-collecting and processing. Although scientists will not be evaluated as to their capacities for maintaining spiritual or transcendental insight into their work, certain data-collection items offer scientists the opportunity to give their opinions on the potential role of such factors, as well as the opportunity to disclose their general interest in such matters.

It is important here to also note that just as the mundane sattva guna accommodates the individual's initial or foundational interests in spiritual matters, likewise certain Abhidharma Positive Mental Events represent the individual's rudimentary interests in spiritual life. Relevant factors include the Positive Mental Events of *non-attachment/detachment* and *non-deludedness/non-bewilderment*. *Non-attachment/ detachment* is described by the CAFG-GACTA as that which "withdraws us from a compulsive involvement with the object through an understanding of its true nature… It is to not be attached to any specific material circumstance, object or to material life in general" (Appendix B, 3). *Non-deludedness/non-bewilderment* is described as "awareness to counteract the deludedness that has its cause in either what

one has been born into or what one has acquired (one's material circumstances)" (Appendix B, 4).

It should be noted here that whilst the above listed ten perfections are not traditionally discussed as belonging to the teachings of Abhidharma, they nevertheless belong to the Buddhist Theravada school of which the Abhidharma forms one part. For this reason and for the reason of being economical with words, Theravada Abhidharma mental events, emotions and Theravada perfections are collectively referred to as 'Abhidharma factors' throughout this thesis. As perfections represent ideal qualities attainable by the individual, they are considered wholesome or positive. A complete list of Abhidharma factors, including descriptions of factors, appears in the CAFG-GACTA in Appendix B.

Throughout this thesis, categories of Abhidharma factors are referred to as Factor Groups. These constitute:

1. Positive Mental Factors;
2. Negative Mental Factors;
3. Negative Emotions; and
4. Positive Perfections.

The categories of Positive Mental Events and Positive Perfections are further combined as Factor Contrast Group 1 (representing positive or wholesome Abhidharma factors), whilst the categories of Negative Mental Events and Negative Emotions are together referred to as Factor Contrast Group 2 (representing negative or unwholesome Abhidharma factors). A comprehensive list of Abhidharma factors, as well as descriptions of their implications for human behaviour, appears in the CAFG-GACTA. Whilst not systematised in the same fashion as the triguna, Abhidharma mental events, emotions and perfections may be organised as follows:

TABLE 2.3.4.1: Systematisation of Abhidharma Factors

	POSITIVE/WHOLESOME QUALITY	NEGATIVE/UNWHOLESOME QUALITY
MENTAL EVENTS	Confidence/trust/faith; self-respect; decorum/consideration for others; non-attachment/detachment; non-hatred; non-deludedness/non-bewilderment; diligence/enthusiasm; alertness/suppleness; concern/conscientiousness; equanimity and non-violence.	Indignation/wrath; resentment; slyness-concealment; spite; jealousy/envy; avarice; deceit/pretension; dishonesty; mental inflation; malice/cruelty; shamelessness; lack of sense of propriety/inconsideration for others; gloominess/dullness; ebullience/distraction/restlessness; lack of trust/faithlessness; laziness; unconcern/unconscientiousness; forgetfulness; inattentiveness and desultoriness/non-discernment.
EMOTIONS	-	Attachment; anger; arrogance/self-importance; lack of intrinsic awareness/ignorance; indecision; opinionatedness/afflicted views.

PERFECTIONS	Giving; morality/virtue; renunciation; transcendental wisdom/understanding; energy; patience/forbearance; truthfulness/ does not deceive; determination/ resolution; loving-kindness; and equanimity.	-

In this way Abhidharma mental events, emotions and perfections can be systematised according to either positive/conducive or negative/detrimental qualities for purposes of aiding the individual to act responsibly and to dedicate him/herself to the "seriousness of living" (Guenther and Kawamura 1975, *xvi*). Abhidharma mental events have thereby been described as "most comprehensive in being a growth and health psychology" (Guenther and Kawamura 1975, *xvii*). The lack of 'positive' emotions in the above table is indicative of the general Buddhist perspective that emotions are hindrances for the individual who aims to advance on the path towards enlightenment. Visa versa, the lack of negative perfections reflects the idealistic nature of perfections i.e. perfections represent ideal goals to be strived for and are therefore not relevant in the negative contrast.

In the words of Bodhi (2005) "the Buddha asks us to stop drifting thoughtlessly through our lives and instead to pay careful attention to simple truths that are everywhere available to us, clamoring for the sustained consideration they deserve" (Bodhi 2005, 19). One of these truths is stated as being that inevitably all living beings will grow old, fall ill and die as unavoidable consequences of material embodiment. In *Bhagavad-gita As It Is* (1989, 13:8-12) Bhaktivedanta lists the same problems of material embodiment, stating that "unless we have a pessimistic view of this material life, considering the distresses of birth, death, old age and disease, there is no impetus for our making advancement in spiritual life." Both Buddhism and Vedic teachings thus view material embodiment as a malady that the individual is encouraged to put an end to. Both schools of thought also agree that it is due to humankind's attachment to sensual pleasures/sense gratification (Bhaktivedanta 1987-8, 1:18:45, 5:5:16; 1989, 4:26; Bodhi 2005, 35, 194-205) that the quality of life on Earth (experienced by all species) including the condition of the natural global environment, is currently poor.

2.4 Conclusion

Is it a futile idea to even suggest that scientists should pay attention to the quality of their own consciousness and to take steps to changing current qualitative levels if they were identified as being less-than-ideal, ineffective, unfavourable or detrimental to environmental care? Whilst the investigation carried out in this thesis can not answer such questions, it can determine scientists' current qualitative levels of consciousness according to Buddhist and Vedic perspectives. Whilst scientists may or may not choose to act according to relevant findings, awareness of findings by scientists and/or other academics, as well as by society at large, may be pivotal in instigating change.

The ontological and epistemological foundations of Vedic and Buddhist approaches to quality of consciousness are considered compatible. However, Vedic theoretical constructs have been chosen over Buddhist constructs to represent the main methodology applied in designing data collection items and data processing

techniques in order to satisfy the thesis objective. This choice has been made for the reason that the Vedic triguna is considered as offering a more consistent and profound categorisation scheme for analysing qualitative levels of consciousness, than what the Buddhist Abhidharma factors offer. Specific reasons include:

1. As a psychological categorisation scheme, the Vedic triguna is supported by detailed cosmological explanations of the manifestation of the triguna (Bhaktivedanta 1987-8, 11:chap. 24, chap 25; Burger 169-72; Kaur and Sinha 1992, 27; Wolf 1999, 1379) enhancing its theoretical strength, as well as its credibility. Similar explanations of the manifestation of consciousness in relation to inert matter have not been located within translations of original Buddhist texts;
2. The hierarchical presentation of the triguna is consistent with theoretical concepts of the qualitative nature of material phenomena in general, such as the lower modes being represented by more dense, coarse or grievous qualities whilst the higher mode is represented by more uncomplicated, tranquil and blissful qualities. The triguna is therefore considered superior in its theoretical structure, meaning it can more easily be applied to data analysis and interpretation; and
3. Vedic general and specific conclusions about the effect of different guna characteristics on the individual's consciousness maintain greater consolidation i.e. the conceptual organisation of the role that the gunas play in determining mental, intellectual and behavioural peculiarities is considered more coherent and fastidious than the organisation of Abhidharma factors.

In preparation for data collection and processing, Chapter Three will bring together into a single framework Vedic and Buddhist methodology and methods selected to meet the thesis objective.

CHAPTER THREE

CONSTRUCTING A FRAMEWORK FOR DATA COLLECTING AND PROCESSING

Materialist ontology is simply too impoverished to accommodate consciousness.

David H. Lund in "Materialism and the Subject of Consciousness" (2000, 7)

Chapter Outline
Chapter Three describes the thesis data collection and processing. A theoretical framework is built consisting of all theoretical and methodological components that will serve to satisfy the thesis objective. Chapter Three aims to provide the reader with a broad overview, as well as detailed explanation of how overarching goals of the thesis, its theoretical foundations and the data-collection and processing methodology all fit together. Explanations are given as to why different data will be collected and processed in the way that is planned.

3.1 Data Collection and Processing Framework: An Overview

3.1.1 Framework Purpose and Suitability for the Thesis Objective

The framework constructed in this chapter serves the purpose of systematising the designing of data collection items, as well as the collecting and processing of data. It also facilitates evaluation of data results in terms of easy identification of the meaning and potential ramifications of results. Constructed specifically for the purpose of satisfying the thesis objective, the framework is relevant to this thesis only. The components of Vedic Cognitive Science including the VMMES (with its consciousnesscentric approach) coupled with the triguna, are presented as a reference system for psychological evaluation. Combined with the Buddhist Theravada Abhidharma mental events, emotions and perfections, the framework provides a means by which the qualitative level of consciousness of Australian Antarctic scientists can be estimated.

Introduced in section 1.1.3, the thesis proposition suggests that the quality of consciousness of environmental scientists is currently poor, which is impacting adversely on the outcomes of environmental conservation activities. The thesis objective that followed was:

TO INVESTIGATE IF THERE EXISTS A NEED FOR ENVIRONMENTAL SCIENTISTS TO RAISE THE QUALITATIVE LEVEL OF THEIR CONSCIOUSNESS, FOR THE PURPOSE OF ENHANCING OUTCOMES OF ENVIRONMENTAL CONSERVATION ACTIVITIES

The framework was designed specifically to respond to this objective. As delineated in Chapter Two, Vedic and Buddhist conceptual theory and methodologies were chosen to assess the quality of consciousness of scientists because they were considered the best methodology available. They were also chosen due to the

determination that having two evaluative systems instead of one would enhance data results and add meaning to their implications. By selecting two systems that are fundamentally congruous in purpose and epistemological approach, the thesis objective can be met with little if any contention. Additionally, by choosing two systems that are similar, but not the same in their composition and structure, a broader appreciation of data results can be gained whilst the overall aim of the evaluation remains compatible.

The hierarchical presentation of the triguna allows for a logical interpretation of data results, as well as a rational explanation of potential ramifications of results. By assessing results against the qualitative nature of characteristics of the different gunas, an overall appraisal can be made as to the general situatedness of scientists within the hierarchy of three gunas. The thesis Data Collection and Processing Framework (DCPF) is presented as follows:

TABLE 3.1.1.1: Data Collection and Processing Framework (DCPF)

FRAMEWORK COMPONENTS	COMPONENT EXPLANATION
↓ THEORETICAL COMPONENTS ↓	
VEDIC COGNITIVE SCIENCE (VCS) **CONSCIOUSNESSCENTRIC PARADIGM** **VEDIC MODEL OF THE MATERIALLY EMBODIED SELF (VMMES)** ***guna psychological characteristics***	THE VMMES IS THE CORE COMPONENT OF VCS AND THEREFORE ALSO OF THE DCPF. DEPICTING THE COMPOSITION OF 'THE PERSON,' THE VMMES IN CONJUNCTION WITH THE CONSCIOUSNESSCENTRIC PARADIGM GIVES INSIGHT INTO THE ROLE THAT CONSCIOUSNESS PLAYS WITHIN AN INDIVIDUAL'S ENTIRE CONSTITUTION. THE TRIGUNA COMPONENT OF VCS PROVIDES THE METHODOLOGY NEEDED TO UNDERSTAND MATERIAL CONDITIONING OF NON-MATERIAL CONSCIOUSNESS.
ENACTIVE COGNITIVE SCIENCE ABHIDHARMA (mental events ***and emotions)*** ***Abhidharma psychological factors*** **THERAVADA** ***(perfections)***	WHILST ALL ASPECTS OF ECS WILL NOT BE INCLUDED IN DATA ANALYSIS, ECS IS PRESENTED HERE TO CONTRAST VCS. WHILST ABHIDHARMA TEACHINGS ARE ESSENTIALLY PSYCHOLOGICAL TEACHINGS, MENTAL EVENTS, EMOTIONS AND PERFECTIONS CONSTITUTE GUIDELINES FOR THE ENHANCEMENT OF WHAT MAY BE DESCRIBED AS QUALITIES OF CONSCIOUSNESS.
↓ DATA COLLECTION COMPONENTS ↓	
AUSTRALIAN ANTARCTIC SCIENTIST INVENTORY (AASI)	THESE THREE DATA COLLECTION ITEMS ARE AIMED AT COLLECTING INFORMATION ON SCIENTISTS' QUALITATIVE LEVELS OF

INTERVIEW SERIES WITH AUSTRALIAN ANTARCTIC SCIENTISTS	
AUSTRALIAN ANTARCTIC SCIENCE LITERATURE	
IDEAL GUNA SITUATEDNESS QUESTIONNAIRE (IGSQ)	THE IGSQ AIMS TO ASSESS HOW THREE DIFFERENT PROFESSIONAL GROUPS ESTIMATE ENVIRONMENTAL SCIENTISTS' IDEAL SITUATEDNESS WITHIN THE TRIGUNA, IN RELATION TO SPECIFIC ENVIRONMENTAL SCIENCE GOALS. RESULTS FROM THIS DATA ITEM CAN BE MEASURED AGAINST RESULTS FROM THE ABOVE THREE DATA-ITEMS.
↓ DATA PRESENTATION AND EVALUATION COMPONENTS ↓	
COMPLETE GUNA CHARACTERISTICS GUIDE (CGCG)	GUNA CHARACTERISTICS ARE LISTED ACCORDING TO PARALLEL TOPICS. THIS GUIDE PROVIDES AN EXTENSIVE LIST OF CHARACTERISTICS TO ASSIST DATA PROCESSING AND EVALUATION.
THE GUNA DATUM EVALUATION GUIDE (GDEG)	THE GDEG FACILITATES EVALUATION OF INDIVIDUAL DATA IN RELATION TO, AND WITHIN THE CONTEXT OF, THE TRIGUNA.
THE STRATIFIED HIERARCHICAL PRESENTATION OF SCORES (SHPS)	THIS PRESENTATION, ADAPTED FROM MODEL 3.3.1.1, DEPICTS THE TRIGUNA ACCORDING TO VCS. IN ADDITION TO ARRANGING SCORES ACCORDING TO VCS METHODOLOGY, THE MODEL GIVES THEORETICAL MEANING TO THE TRIGUNA COMPONENT OF THE DCPF.
THE GUNA PROFILE CONSTRUCTION GUIDE (GPCG)	THE GPCG BRINGS ALL THE DATA TOGETHER FOR EVALUATION. IT FACILITATES THE COMPOSING OF AN OVERALL PICTURE OF THE SITUATEDNESS OF THE AUSTRALIAN ANTARCTIC SCIENTIFIC COMMUNITY AGAINST THE TRIGUNA.
SIGNIFICANCE AND IMPLICATIONS OF GUNA SITUATEDNESS (SIGS)	THIS GUIDE FACILITATES UNDERSTANDING OF THE RESULTS OF BOTH INDIVIDUAL DATA AND ALL DATA COLLECTIVELY. IT EXPLAINS THE MEANING OF RESULTS IN TERMS OF THEIR POTENTIAL CURRENT AND FUTURE IMPACT.
COMPLETE ABHIDHARMA FACTOR GUIDE and GUIDE FOR ASSESSING CORRELATION BETWEEN THE TRIGUNA AND THE ABHIDHARMA (CAFG-GACTA)	THIS TABLE GIVES EXPLANATIONS OF MENTAL EVENTS, EMOTIONS AND PERFECTIONS. ITS PURPOSE IS TO ASSIST IN DATA PROCESSING AS WELL AS TO SHED LIGHT ON DATA RESULTS. IT IDENTIFIES CORRELATION BETWEEN INDIVIDUAL

	MENTAL EVENTS, EMOTIONS AND PERFECTIONS AND TRIGUNA CHARACTERISTICS.
ABHIDHARMA PROFILE CONSTRUCTION GUIDE (APCG)	DESIGNED TO SERVE THE SAME PURPOSE AS THE GPCG, THE APCG AIDS THE ASSESSMENT OF SCIENTISTS' OVERALL QUALITY OF CONSCIOUSNESS, ACCORDING TO DATA COLLECTION AND PROCESSING USING ABHIDHARMA FACTORS.
SIGNIFICANCE AND IMPLICATIONS OF REPRESENTATION OF ABHIDHARMA FACTORS (SIAF)	IN ORDER TO GIVE MEANING AND VALUE TO OVERALL RESULTS ACCORDING TO THE ABHIDHARMA, THIS GUIDE CONTEXTUALISES RESULTS WITHIN THE BROADER SETTING OF GLOBAL ENVIRONMENTAL PROBLEMS. PROJECTED ESTIMATIONS ARE GIVEN OF WHAT DIFFERENT DATA RESULTS MAY MEAN FOR ENVIRONMENTAL CARE.

The DCPF provides a research framework in which the thesis objective can be addressed. Comprised of theoretical components, data collection items, data processing techniques, data evaluation guides, data presentation models and guides as to the significance and implications of results, the DCPF has the potential to satisfy the thesis objective.

Prior to data collection, all research procedures designed for each of the data collection items were submitted to the Southern Tasmanian Human Research Ethics Committee for approval. Details of all data collection items, including their underpinning research methodology, objectives and goals, as well as planned methods of collection were provided. Approval was given on 16 October 2003 (approval number H7605) with no alterations required for any items.

3.1.2 Framework Parameters

Methodological parameters imposed by the selected data collection and processing approaches, namely the triguna and the Abhidharma, are as follows:

1. An estimate *only* can be given of scientists' qualities of consciousness. Whilst both triguna characteristics and Abhidharma factors offer extensive descriptions of quality of consciousness, collecting and analysing data on such phenomena is prone to obscurity, meaning that determining results is, particularly in some cases, highly interpretative. As the many aspects and features of the human mind, intellect and consciousness are highly abstract in nature, extracting specific qualitative tendencies opens the door to potential error. As such, data results from research in this thesis will be accepted as estimates only of the actual quality of consciousness of Australian Antarctic scientists;
2. Although Vedic cosmology and psychology offer explanations as to how all individuals are perpetually being influenced by matter, an estimation only can be given of how individual scientists have come to be influenced by specific material characteristics of the triguna. For example, the Vedas explain that all materially

embodied individuals are materially contaminated due to their desire to enjoy material life (instead of spiritual life). However, unless an individual's personal history is thoroughly known in detail, then it will be impossible to ascertain exactly why he/she chooses to engage in specific material activities, such as killing animals for research (tamas guna influence) or dedicating his/her time to assuring ethical research practices (sattva guna influence). For this reason, specific origins of individual scientists' conditioning are not pursued in data collection.

Similarly, identifying exact causal factors responsible for scientists' mental events or emotions is considered extremely difficult. The Abhidharma itself does not claim to be able to facilitate such identification. Therefore, specific causal agents underpinning the manifestation of scientists' mental events, emotions and perfections are not pursued in this thesis; and

3. As VCS forms the primary theoretical data-collection and processing component of the DCPF, interpretations of research results will primarily be restricted to the theoretical premises of VCS. By processing data (excluding the AASI and the IGSQ) against Abhidharma factors, results will be appreciated from another similar, but not identical point of evaluation. These restrictions will produce results that have been analysed according to two highly congruous systems of analysis that also offer significant diversity. The meaning of results will also be produced from such coupling of congruity and diversity.

3.2 Data Collection Items

3.2.1 The Australian Antarctic Scientist Inventory

A VPI based on the psychological component of the three modes of material nature comprises the first data collection item. The Australian Antarctic Scientist Inventory (AASI) has been constructed to follow a format of data collection and processing known as *item response theory* (IRT), one of the two basic approaches to psychometric analysis. IRT, also known as *latent trait theory*, determines the relationship between hidden or covered personality traits and responses to pre-determined test items, such as those constructed for the AASI.

This approach can provide a reliable estimation of actual traits being tested, without needing to compare scores with those of other groups such as a norm group (Colman 2003, 384). Although this is the case, AASI results will be compared to and discussed against the results from other data items in this thesis in order to construct the general profile of the quality of consciousness of the Australian Antarctic scientific community. They will also be compared to results from other Vedic Personality Inventories carried out by other researchers.

Designed especially for this research thesis, the AASI is aimed at providing information on scientists' own perceptions of their own quality of consciousness. However, it must be stressed that most inventory statements do not directly address quality of consciousness in their wording, although differences in quality of consciousness underpins all statements according to which specific guna represents which specific statements. For example, the following AASI statement represents the quality of consciousness that rajas guna, the material mode of passion, imposes on the individual. Yet neither the topic of quality of consciousness, nor rajas guna, are addressed within the statement:

> 17. For most of my professional life I have strived towards attaining an enjoyable and comfortable lifestyle for my family and myself.

The statement is affiliated with rajas guna through the characteristics of *sense enjoyment/sense gratification*; *concentrated selfishness* (centred on the non-physical self's physical body) *and extended selfishness* (centred on the self's mundane family, country, work organisation etc.); and *the accumulation and/or spending of money for material purposes*.

Whilst a number of VPIs based on the triguna have been developed over the past two decades (Das 1987, 1991; Kaur and Sinha 1992; Marutham, Balodhi and Mishra 1998; Mohan and Sandhu 1986; Pathak, Bhatt and Sharma 1992; Singh 1971; Stempel et al. 2006; Wolf 1999) it appears that no researchers have yet contextualised inventory statements to suit a particular study-sample. In other words, constructing statements so that they apply specifically to a selected group of subjects, such as the Australian Antarctic scientific community, is a new approach to research using VPIs. Of the sixty statements comprising the AASI (twenty representing each guna) most statements were constructed to address issues specific to either Australian Antarctic science, or environmental science in general. A small number of statements were not specific to any type of science behaviour.

In constructing the AASI, all research publications on the triguna discussed in Chapter Two were consulted. Specific challenges included contextualising scientists' professional circumstances within statements, whilst at the same time accurately representing relevant gunas. Instruction on such construction was derived from inventories designed by Das (1991), Pathak, Bhatt and Sharma (1992), Marutham, Balodhi and Mishra (1998) and Wolf (1999). The structure of the overall inventories developed by these authors, as well as individual inventory statements, were found to be particularly suitable in formulating AASI statements. Specifically, Wolf's (1999) inventory has been consulted for structural factors such as the number of statements suitable for the sample and statement formulation for accuracy in grammatical aspects, to ensure accuracy in the meaning of statements.

In Marutham, Balodhi and Mishra's (1998) article, a 10-point list describes the steps the authors took in developing their VPI. These steps have been recognised as being generally representative of the approach taken by most researchers who have constructed VPIs. Eight of the ten steps listed by the authors were adhered to in the construction of the AASI. Descriptions of similar procedures followed in constructing the AASI are given below:

Marutham, Balodhi and Mishra's (1998, 16) 10 points are highlighted in **bold**, with relevant descriptions of constructing the AASI following each point.

1. **Items were pooled from the *slokas* describing the triguna in *Sankhya Karika* and *Bhagavad-gita***

All statements created for the AASI were derived from *slokas* (Sanskrit verses) in the *Bhagavad-gita,* specifically from *slokas* and accompanying purports from Bhaktivedanta's *Bhagavad-gita As It Is* (1989). *Slokas* and purports from Bhaktivedanta's *Srimad Bhagavatam* (1987-8) were also consulted. Where statements or parts of statements were derived from other literature, it was confirmed that the original source of those statements was also either the *Bhagavad-gita* or *Srimad Bhagavatam*, though not necessarily from Bhaktivedanta's publications of these Vedic texts. A complete list of sources consulted in constructing AASI statements appear in Appendix A (the Complete Guna Characteristics Guide [CGCG]).

As the primary goal of each statement was to secure participants' position in relation to the guna itself, rather than a specific characteristic (although this served a subsidiary goal) some statements represented two or three characteristics inherent to the relevant guna. This inclusion of representation of more than one guna characteristic within a single statement was done deliberately in some statements, in order to better contextualise the meaning of the statement. Where statements did contain more than one characteristic, those characteristics were often similar to each other or associated in some way, either through their grammatical meaning or through their application to scientists' behavioural norms within real-life experiential contexts.

It must also be noted that some guna characteristics were represented within more than one statement. This was also done deliberately, for the reason that certain characteristics have been considered as being particularly relevant to the study-sample. As all guna characteristics were given equal value or weight as representatives of their respective gunas, multiple appearance of some characteristics did not affect scores for the overall guna.

2. The items were phrased in such a way that they are direct, simple and do not imply more than one meaning.

All efforts were made to design statements that did not contain double-meanings. It was discovered after completion of the AASI data collection, however, that the AASI did contain two statements that may have confused participants, due to the number of issues addressed within the statements. Upon examination, however, it was considered that overall meanings of statements were not blemished, even though statements contained a number of issues. The first of these statements, as a representative of sattva guna reads:

> 10. I believe spiritual insight and wisdom should play an active role in contemporary scientific research, such as physical science and biological science.

This statement represents the sattvic characteristics of *knowledge concerning the spirit soul beyond the* (material) *body*; *being interested in and concerned about spiritual matters*; and *clear awareness of the existence of a higher, spiritual nature within all entities* (Bhaktivedanta 1989, 18:20, 22; 1987-8, 11:25:24, 27). Some participants reported that they were unsure if the statement meant that both insight and wisdom were intended as 'spiritual.' In order to accommodate this imperfection in the grammar, the statement can be reworded to read:

> I believe spiritual insight and spiritual knowledge should play an active role in contemporary scientific research, such as physical science and biological science.

The second AASI statement that may have been interpreted as containing a double-meaning, was:

> 15. My research often forces me to indulge in false hopes, as such predicaments are a part of the empirical research process.

This statement was derived from tamas guna characteristics described in Bhaktivedanta's *Srimad Bhagavatam* (1987-8, 11:25:2-5, 15) as *indulgence in false hopes* and *false expectations*. Whilst no participants reported difficulty with this statement, upon review it was decided by the researcher that participants may have, for some reason, indulged in false hopes without being under the opinion that such predicaments are an inherent part of the empirical research process. This statement may have been better phrased as:

> My research often forces me to indulge in false hopes and false expectations of the work I carry out.

Steps **3** and **4** in Marutham, Balodhi and Mishra's (1998) 10-point list are irrelevant to this thesis, as they address the development of a 4-point scale of values ratings, which was not used in the construction of the AASI.

5. Instruction for the inventory was written giving the details about the way it has to be filled.

Instructions for all participants of the AASI were the same, regardless of which science organisation they were employed by, their professional positions or other factors such as gender:

Please respond to each statement by circling one of the six options in the Likert scale. You are asked to respond to statements as you see yourself in your role as a professional Antarctic scientist. As such, statements refer to your understanding of yourself within the context of your professional life, not your personal life.

Please try to respond to statements in a manner that is truly representative of your behaviour and/or attitudes, not in a manner that is representative of how you would prefer your behaviour and/or attitude to be. Responding in the latter manner would create distorted data, which would hamper research efforts aimed at producing mechanisms that will enhance conservation techniques.

6. This inventory was distributed to three judges who have knowledge about the Triguna theory, for validation.

During construction of the AASI an initial draft was distributed to four independent referees for analysis. Referees were chosen for their general academic credentials coupled with their knowledge on Vedic literature, specifically the *Bhagavad-gita* and *Srimad Bhagavatam*. Referees examined the 60 statements against their inherent gunas and offered relevant feedback. Comments advising adjustments were minimal and appear below under Step 7. As AASI statements were constructed in consultation with the following academic experts on Vedic knowledge, guna scales employed in the construction of the AASI can be said to have *content validity*.

7. Based on the suggestions given by them, additions and alterations were made to finalise the inventory.

After experts were consulted, the following alterations were made:

1. Adam L. Carroll (MBBS [University of Queensland, Australia]; B Teach. [University of New England, Australia]): Carroll suggested that the sattvic quality of *auspiciousness* is actually a quality belonging to individuals situated on the suddha-sattva platform of consciousness. Whilst Bhaktivedanta discusses at great length the auspicious nature of spiritually enhancing circumstances that are aimed at attaining the suddha-sattva platform of consciousness, he also lists the quality itself as belonging to the material sattva guna (Bhaktivedanta 1989, 6:40; 1987-8, 11:25:13). It was therefore decided that AASI Statement 35, designated as representing material sattva guna, would remain as it was.

Carroll also questioned the designation of the characteristic of *careful study of the past and future* (Bhaktivedanta 1987-8, 11:25:2-5) to sattva guna, as within the AASI it appears within the context of empirical research. Whilst it is true that most research conducted by environmental scientists is empirical, meaning that such research is affiliated with rajas guna through scientists' dependency on their material senses to acquire knowledge, the characteristic itself (*careful study of the past and future)* is not qualified by Bhaktivedanta as necessarily only pertaining to non-empirical investigation. As such, the statement could remain as it was;

Carroll also questioned whether or not a number of other statements that represented either rajas or tamas guna were in fact represented by both. Upon careful examination of the details of Bhaktivedanta's writings it was found that relevant statements (Statements 1, 2, 11, 24, 25, 44, 48, 52 and 59) did not represent a mixture of gunas, but rather represented either unmixed rajas or unmixed tamas. Statements could therefore remain as they were. It is considered noteworthy that Bhaktivedanta (1989, 14:14, 16) often discusses the overall influences of rajas and tamas gunas simultaneously, as both gunas are considered as representing a poor quality of consciousness. Other authors such as Kaur and Sinha (1992, 31) and Singh (1971, 150) also discuss the effects of rajas and tamas guna in opposition to the effects of sattva guna, as the former two are generally considered as representing undesirable qualities and the latter as representing desirable qualities;

2. William H. Deadwyler III (PhD [Rel. Stud.] [Temple University, Philadelphia, USA): Deadwyler suggested that a glossary be added at the beginning of the inventory, in order to assist participants in their interpretation of terms and concepts that may be unfamiliar to them. The following glossary was composed an inserted at the start of the AASI:

Consciousness –the awareness of an individual living being
Auspicious -favourable, promising, showing as a good omen
Spiritual –pertaining to the metaphysical quality of phenomena
Non-material –that which is manifest outside physical laws
Soul –the ultimate non-material atomic particle, the source of life
Material body –the physical body, comprised of material elements
Intrinsic nature –the inner nature of a living being, the essential nature
Human sense gratification –satisfaction of the material/physical senses
The Supreme –the ultimate controlling force of life itself, independent of any specific religious or non-religious designation
Higher purpose –reason for a cause that exceeds ordinary or mundane reasons;

3. David Hooper (B Sc [biochem.] [University of Queensland, Australia]; B Ed. [Queensland University of Technology, Australia): Hooper suggested that AASI Statements 46 and 56, both constructed as representing tamas guna, contained elements of rajas or sattva guna within them, and that they would need adjusting to refine their representation of tamas guna alone. Statement 46 is affiliated with the tamasic characteristics of *ignorance/nescience*; *acquiring knowledge for sense gratification, absorbing the mind in varieties of eating, sleeping, defending and sex, without any higher purpose*; and *foolish materialistic knowledge*. Statement 56 is affiliated with the tamasic characteristics of *acquiring knowledge for sense gratification, absorbing the mind in varieties of eating, sleeping, defending and sex, without any higher purpose* and *knowledge concerned only with keeping the body comfortable* (Bhaktivedanta 1987-8, 11:25:24; 1989, 18:22, 28):

> 46. I work with the understanding that advancement of sciences based in physics and mathematics will undoubtedly lead to advancements in the quality of life experienced by all species of life.
>
> 56. I strive towards acquiring knowledge for the purpose of creating a more comfortable and enjoyable life for all living beings, regardless of whether or not such acquisition involves a higher purpose.

The relevant aspects within these statements that were considered as being rajasic or sattvic, instead of tamasic, were the clauses of *striving* towards bettering *life for others*. Within tamas guna the individual does not care for the wellbeing of others, human or non-human, as the individual is encumbered by extensive selfishness. Neither does the individual strive in his/her work (as he/she does within rajas guna) as the tamasic individual is generally lazy. Within rajas guna, the individual is also afflicted by selfishness, but has some notion of caring for others, even though that caring is aimed at material wellbeing i.e. altruism within rajas guna aims to aid individual's material needs only, not their non-material or spiritual needs, and is always accompanied by selfish gain (Bhaktivedanta 1987-8, 1:2:10).

It was decided that both statements did contain elements of rajas guna within them, but not sattva guna. The clause *experienced by all species of life* was deleted from Statement 46 and the clause *for all living beings* was deleted from Statement 56. The word *strive* (Statement 56) was replaced with the word *work*.

Hooper also commented that although Statement 59 addresses scientists' consumption of alcohol during the lunch-hours of their working days, regular alcohol consumption outside working hours, keeps the individual predominating within tamas guna. Although this is correct, as a commitment had been made by the researcher of this thesis to the Human Research Ethics Committee to only address scientists' consciousness and subsequent behaviours during their professional working-hours, Hooper's concern had to be disregarded; and

4. David B. Wolf (PhD [Florida State University, USA]; MSW [Florida State University, USA]): Wolf viewed only a selection (20 statements) of the total AASI statements (60 statements). Wolf suggested no alterations.

8. All the items were written on cards separately for each item and the cards were shuffled, to randomise the items, so that the effect of set is controlled.

In order to randomise the order of the appearance of AASI statements, individual statements were jumbled according to their designated gunas. In other words, statements representing different gunas were entered in the AASI at random, with alterations to this randomness being made only where clusters of statements from the same guna appeared (more than three in a row) in order to ensure diversity of guna representation throughout the AASI. There was also minimal input into the dispersing of subject matters of statements, in order to create a balanced sequence of subjects. The full list of AASI statements, including their formulation according to their representative guna characteristics, appears in Appendix C.

9. These randomised items were typed along with instructions and examples.

The AASI was formatted into a questionnaire and prepared for distribution. A 6-point Likert-scale was inserted after each statement to give participants optimum choices in their response to each statement:

a) I strongly agree
b) I basically agree
c) I am neutral
d) I basically disagree
e) I strongly disagree
f) I choose to not respond to this statement

This Likert-scale is similar to those used by Pathak, Bhatt and Sharma (1992, 4) and Wolf (1999, 1382) although neither Wolf nor Pathak, Bhatt and Sharma included option f) *I choose to not respond to this statement*. This option was included in the AASI for the purpose of giving scientists the option to not respond to a statement, should they in some way feel challenged by a subject matter or should they not understand a particular statement.

10. This finalised inventory was administered to the college students in groups and the data was obtained.

The AASI was distributed to members of the Australian Antarctic scientific community who were present in Hobart, Tasmania at the time of distribution (July-August 2004). At this time, members numbered approximately 273. Copies of the AASI were distributed to all scientific organisations listed under section 1.1.2.

All members of the Australian Antarctic scientific community were eligible to participate in the AASI, with the exception of social scientists such as policy-makers, sociologists, legal workers and medical staff. They were omitted for the reason that although they support Australian Antarctic science in various ways, they do not carry out environmental science activities and as such are not part of the chosen study sample. AASI participation rates are discussed in Chapter Four.

As the AASI was constructed directly from the Vedic triguna, AASI data will not be processed against Abhidharma factors.

3.2.2 The Ideal Guna Situatedness Questionnaire

The Ideal Guna Situatedness Questionnaire (IGSQ) was designed to collect data on the opinion of different professional groups, as to scientists' ideal situatedness within the triguna, with regards to them achieving specific environmental science goals. The

IGSQ gave Australian Antarctic scientists the opportunity to offer their opinions on their own ideal situatedness within the triguna. Participants were asked to identify characteristics from different gunas in relation to achieving a selection of environmental science goals. The other two professional groups who participated in the IGSQ were conservation psychologists recruited from the international conservation psychology list-serve (maintained by the University of Michigan, USA) and academics who were all well versed in Vedic knowledge.

Four of the total six environmental science goals consisted of the Australian Government's goals for the Antarctic program, listed in section 1.1.2. One of the remaining two goals consisted of a key function and responsibility of the United Nations Environmental Program (UNEP):

> To ensure that emerging environmental problems of wide international significance receive appropriate and adequate consideration by Governments.

The last goal consisted of the mission statement of the World Wide Fund for Nature (WWF):

> To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

Each of the six conservation goals was presented alongside twelve guna characteristics, of which four were derived from each of the three gunas. Characteristics were chosen to represent a diversity of characteristics from each guna. After selection, characteristics were sequenced at random in their presentation within the questionnaire. The specific guna representing each characteristic was not disclosed to participants, nor was the triguna methodology itself. Participants were asked to assess the benefit of each characteristic by placing an X in the box that best represented their evaluation as being either 1. Definitely beneficial; 2. Possibly beneficial; or 3. Not at all beneficial. The same procedure was applied for each of the six goals, with all twelve characteristics being presented in the same order alongside each goal.

The three groups selected for participation in the IGSQ, namely Australian Antarctic scientists, conservation psychologists and Vedic scholars were chosen in order to produce the opinions of not only groups considered relevant to the thesis subject matter, but also to give contrasting professional opinions. Scientists were not expected to be familiar with Vedic teachings, nor the topic of consciousness in relation to behaviour. Conservation psychologists were estimated to have some prior knowledge on the topic of consciousness in relation to behaviour, but not necessarily on Vedic teachings in psychology. They were also expected to have rudimentary knowledge on, or at least interest in, environmental conservation topics. Vedic scholars were of course expected to be well-versed in Vedic teachings, including the triguna, but were not expected to be particularly knowledgeable about environmental conservation issues.

As the results of the IGSQ will communicate the opinions of different professional groups as to how scientists would best be situated within the triguna, in order to achieve specific environmental science goals, IGSQ results may challenge the authority of the Vedas as to ideal guna situatedness for scientists. Whilst Vedic

conclusions as to scientists' best situatedness within the triguna are based on knowledge handed down from ancient elite scholarly sources, opinions of at least two of the three professional groups, namely conservation psychologists and Australian Antarctic scientists, are likely to be based primarily on contemporary academic knowledge. As such, differences in opinions about the ideal situatedness of scientists will give further insight into discrepancies between current academic appreciation of ideal environmental conservation behaviour and that of ancient scholarly and spiritually based appreciation of the same.

As with the AASI, the IGSQ was designed directly from the methodology of the Vedic triguna. As such, IGSQ data will not be processed against Abhidharma factors.

3.2.3 Interview Series

A premise of this thesis is that although many Australian Antarctic scientists may not be directly involved in policy making or in the decision-making process for the direction of research-programs, their contributions to such activities are substantial. For this reason, scientists' own perspectives on the scientific process and on the role of the researcher/scientist are considered highly influential on the overall outcomes of science activities. To further secure scientists' own perceptions of their own consciousness, as confirmed through their attitudes, behaviour and opinions, scientists were invited to discuss their professional lives in an interview.

Data retrieved from interviews will give information on the motivational impetus of scientists, as well as information on their opinions on different aspects of the science they engage in, such as program structure, research methodology and organisational goals and values. Interview questions were not constructed using either triguna or Abhidharma methodology, but were designed in a way that was estimated to allow responses to be assessed against both systems of evaluation.

Another goal of the Interview Series was to produce qualitative data to contrast the quantitative data retrieved from the AASI and the IGSQ. As Daphne M. Keats states in discussing qualitative analysis of interviews conducted for research purposes:

> qualitative analysis of selected case studies may be a valuable adjunct to the statistical treatment. Such case studies provide in-depth reports from the respondent's personal viewpoint. They put flesh on the bones of the statistics, bringing together the discreet components of the analysis into an integrated whole. They are also able to deal with individual cases which do not fit easily into the broad picture derived from the statistical analysis. (Keats 2000, 79-80)

A number of different literary sources were consulted in the construction of the Interview Series. In order to establish an interview style that would assist scientists to openly discuss their positions on different issues, Ivey's Microskills Hierarchy (in Ivey, Bradford Ivey and Simek-Morgan 1997, 53) was consulted. This hierarchy outlines basic interview skills such as attending behaviour (including appropriate body language, vocal qualities and verbal tracking skills) paraphrasing, summarising, contextualising and reflection of meaning. By employing these skills, the interviewer aimed at creating an atmosphere in which interviewees could feel relaxed, yet focused on the interview questions.

Interview questions were identical for every interviewee. In general, questions were constructed in a manner that was considered best for retrieving responses that addressed issues related to quality of consciousness. For example, the first two questions asked interviewees to talk about themselves. This was done in the attempt to

assist them to become familiar with the interview climate and to obtain information on their professional roles as Australian Antarctic scientists. It was estimated that scientists' discussions about themselves would provide information on the qualities of consciousness underpinning their perspectives on themselves as scientists. Conceptual questions about scientists' work, working environment and opinions on scientific methods were asked later.

The only two closed-ended questions within each nine-question interview, addressing scientists' attachment to their professions and their interest in spiritual aspects of the natural environment, were asked at the end of each interview. This was done for the purpose of giving interviewees the opportunity to bring the interview to a close without further delay, if they felt they had 'had enough.'

Questions were formulated in consultation with the work of Kris Cole (1993, 163-73), Andrew M. Colman (2003, 511) and J. Vincent Peterson and Bernard Nisenholz (1995, 135). The following factors were considered important for compiling a profile of the overall quality of consciousness of scientists:

1. Scientists' own perspectives of themselves as scientists, including their perspectives of what motivates and inspires them as scientists;
2. Scientists' general awareness and understanding of the condition of their own consciousness, as well as awareness and understanding of the significance of that condition;
3. Scientists' inclination towards including spiritual considerations into their work activities and programs;
4. Scientists' understanding of qualitative science which encompasses theoretical approaches to non-material phenomena such as consciousness. This understanding was also considered important within the context of contrasting scientists' appreciation of quantitative science, which comprises almost all current Antarctic science research methodology;
5. Scientists' awareness of the social culture that constitutes their working environment, including the influence of that culture on the professional goals and values of their organisations. Included in this factor was scientists' understanding of the process of peer-review, as a means by which science operates within strict epistemological and theoretical boundaries defined by the contemporary science status quo; and
6. Scientists' attachment to their professional positions, primarily for the lifestyles that they provide through monetary income.

A list of the final versions of all interview questions appears below. Following each question is a discussion on special considerations made during the construction of each question:

1. What inspires/excites you the most about being an Antarctic scientist?

This question was designed to follow on from scientists' descriptions of their professional positions, which they were asked to clarify prior to the interview questions. It was aimed at encouraging scientists to talk openly about themselves and about what drives their pursuance of Antarctic science. The question was designed to be a general and broad question, from which scientists would choose the information they gave about their impetus for being Antarctic scientists;

2. Can you tell me about your original motivations for becoming an Antarctic scientist?

Similar to Question 1, this question aimed at retrieving information from scientists about the impetus or motivation underpinning their initial interests in becoming involved in Antarctic science. The question asked scientists about their professional (and personal if they chose to discuss such issues) circumstances that lead them to become involved in Antarctic science in the first place, as opposed to choosing to become involved in another science field or in another vocation altogether;

3. Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?

This question was designed for the purpose of attaining scientists' perspectives on their own consciousness. It was anticipated that scientists would differ in the amount of information they would provide, including the amount of detail according to different degrees of self-reflection and self-awareness on behalf of each individual. Whilst it was acknowledged that scientists may be unwilling to divulge information on everything that typically goes through their minds during their working day, answers were nevertheless accepted as giving a general indication of scientists' understanding as to the actual contents of their consciousness during their ordinary working day;

4. In your opinion, what role, if any, does qualitative science play in Antarctic science?

As most Antarctic science employs quantitative research methodology, it was anticipated that scientists would not be overly familiar with qualitative research methods. The question aimed at retrieving information about scientists' capacity to appreciate and accommodate research into non-material or non-quantifiable phenomena such as consciousness. As quantitative research aims at quantifying material data (i.e. organising data according to mathematical computations) research that falls outside such parameters such as research into consciousness, must be accommodated primarily by qualitative methods. The overarching aim with this question was to ascertain how inclined scientists were to acknowledge the importance of non-material phenomena in general;

5. Do you have any thoughts on the idea that spiritual insight and wisdom should play, or does already play, an active role in contemporary scientific research such as physics and biology?

This question aimed at allowing scientists to give their perspectives on both the actual and ideal presence of spirituality and wisdom within Australian Antarctic science. As both the triguna and the Abhidharma address the issue of *unconcern*, this question is of particular interest to the data results. Whilst the triguna and the Abhidharma define *unconcern* in slightly different ways, both maintain that unconcern about higher spiritual considerations leads to further indulgence and entanglement in material life, which is seen as the cause of chaos and suffering;

6. What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?

This question did not ask scientists to identify their organisations' official goals and values, but rather to discuss goals and values that are most prominent within their everyday working environments, whether or not such goals and values correspond with their organisations' official goals and values. Scientists were encouraged to talk about the ordinary working atmosphere shared by scientists and other work colleagues. By discussing such issues, an idea of the *corporate consciousness* underpinning work cultures can be estimated (see section 1.1.2);

7. Do you have any thoughts on the process of peer-review, as a means by which to ensure rigor in Antarctic scientific research?

It is a premise of this thesis that the consciousness of Australian Antarctic scientists is unavoidably influenced by the consciousness underpinning the broader international scientific community. Whereas Australian Antarctic science, that complies with mainstream empirical research paradigms, is generally accepted into peer-reviewed research publications, research that falls outside such parameters would unquestionably be rejected on the grounds of not being considered 'rigorous' by other mainstream scientists. As such, Australian Antarctic scientists' perspectives on peer-review are considered critically important for the overall process of Australian Antarctic science;

8. Have you ever considered giving up your professional position as a scientist for a simpler life (simpler life here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?

This question aimed at attaining information on scientists' attachments to their professional positions and to the material benefits that their monetary incomes bring. Hence the definition of *simpler life* is given as meaning a greater focus on spiritual (non-material) matters. A materially simpler lifestyle accompanied by spiritual realisation is inherent to sattva guna, whereas *material complexity* and *attachment to material affluence* are endemic to rajas guna. The total *lack of appreciation for material resources* is endemic to tamas guna. Thus if scientists choose to keep their materially-focused engagements for the purpose of satisfying their own senses, then they are firmly situated within rajas guna on this issue. If they choose to (or contemplate such choosing) to renounce their material activities for spiritual reasons, they are situated within sattva guna. If they choose to continue their scientific activities whilst being focused on higher spiritual and ethical considerations, offering the results of their activities to the Supreme, then they are situated in the mixture of sattva and rajas gunas.

The Abhidharma Positive Mental Event of *non-attachment/detachment* (to material considerations) and the Positive Perfection of *renunciation* also represent the idea of living simply materially. Opposition to these factors would imply that scientists are predominated by negative factors; and

9. As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?

A definite disinterest or un-interest in the spiritual dimensions of the Antarctic environment on behalf of scientists would place them firmly within tamas guna. Thus responses from this statement clearly direct interviewees either towards or away from higher qualitative levels of consciousness, according to definitions of Vedic triguna characteristics. As Buddhist philosophy does not incorporate the concept of the soul (see section 2.1.2) interviewees' responses to Question 9 will not be processed against Abhidharma factors.

In order to obtain data from Australian Antarctic scientists engaged in different science-fields, official research programs of different Australian Antarctic science organisations were consulted (see section 1.1.3). Program-leaders of the broader science-programs were invited to participate, as well as other scientists working within relevant science fields. Potential interviewees were employees of one of the science organisations listed in section 1.1.2.

It is important to note that it was estimated that some parts of interviewees' responses would not be able to be evaluated against either the triguna or the Abhidharma. It was also estimated, however, that at least some parts of most responses would be able to be processed against either of the two systems. In other words, whilst some response-segments will not correspond with either triguna characteristics nor Abhidharma factors, the contents of some segments will undoubtedly correspond more with triguna characteristics, whilst others will correspond more with Abhidharma factors.

3.2.4 Australian Antarctic Science Literature

The examination of features of science literature will provide information on the quality of consciousness underpinning scientific research outcomes, including the dissemination of research outcomes for academic and public communities. These data will give much-needed information on the quality of consciousness that underpins the 'final product' of Australian Antarctic science. The University of Tasmania, within which the Institute of Antarctic and Southern Ocean Studies (IASOS) is situated, provides researchers with extensive literature on Australian Antarctic science. Libraries within other organisations such as the AAD, ACE CRC, CSIRO and CCCAMLR are also situated within the Hobart district in Tasmania. The three categories of science literature that will be examined are as follows:

1. *The Antarctic Animals Ethics Committee's (AAEC's) Animal Experimentation Guidelines (2006)*

The AAEC's *Animal Experimentation Guidelines* (2006) can be accessed in Appendix Q. These guidelines address issues such as the capturing and killing of seals and birds, transportation and restraint of animals, anesthesia and euthanasia procedures, as well as definitions for what such practices constitute, according to Australian Antarctic science. Ethical parameters established within the guidelines' terminology and policies will be examined to determine the quality of consciousness underpinning current Australian Antarctic animal research practices;

2. Responses to Interview Series Question No. 7

In the opinion of Abelson (in Pall 2000, 256) peer-reviewed literature is "the major factor in keeping the scientific enterprise relatively honest." Pall himself states that without knowledge of peer-reviewed literature, students and the general public would "remain unaware of the most important deliberative structure of science" (2000, 256). This thesis argues that whilst researchers must be aware of contemporary peer-

reviewed literature in their academic fields in order to take advantage of contemporary theoretical developments, they must also guard against choosing peer expectations over rigor in research. Honesty in scientific research, as mentioned by Abelson, is not acknowledged in this thesis as necessarily being upheld by peer-evaluation, but rather by ethical research practices endemic to sattva guna and to positive Abhidharma factors. Peer-reviewed literature is therefore not accepted as necessarily providing 'the most important deliberative structure of science,' but rather as providing researchers with an understanding of current trends in research epistemology and technique.

As most Australian Antarctic science publications in research journals are reviewed by scientists' peers within both national and international scientific communities, the peer-review system is acknowledged as playing an important role in determining general science directions. In other words, Australian Antarctic science programs largely progress in accordance with the sanctions of the broader international scientific community. Perhaps the most important ramification of scientists using peer-review, according to Vedic and Buddhist philosophy, is that theoretical parameters of science are determined by the predominant quality of consciousness underpinning contemporary scientific communities (Bhaktivedanta 1987-8, 3:6:7; 1989, 9:30; Guenther and Kawamura 1975, *iii-iv*). Through scientists' association with each other in the form of scientific publications, conferences, educational curricula and academic pursuits in general, individual scientists imbibe, as well as influence, the collective consciousness of the scientific community as a whole; and

3. Peer-reviewed Science Literature

In selecting literature that can give a realistic picture of how contemporary Australian Antarctic science is situated against the three gunas, it was necessary to acknowledge the broadness of Antarctic science-fields. Science publications and their categories must be truly representative of all, or at least most such literature. Most, if not all, science conducted in Antarctica, whether Australian-based or not, can not be carried out elsewhere in the world and must, according to official research restrictions, somehow contributes towards solving a global environmental problem. As such, Australian Antarctic science publications are typically streamlined to meet very specific research goals and often, due to the exclusive nature of the Antarctic natural environment, include aspects of research methodology and methods that are not encountered in research conducted elsewhere.

It is important to note that Australian Antarctic scientific research, whilst exclusive in a number of its research goals and logistical challenges, does not vary greatly with Antarctic research carried out by other nations. For example, *all* scientific research conducted in the Antarctic region is faced with a variety of logistical challenges imposed by the Antarctic environment, including seasonal restrictions to access the region. The need for excessive monetary costs is also an obstacle faced by researchers from all nations, primarily due to the inaccessibility of the Antarctic continent and its extremely cold climate, creating diverse obstacles for human habitation in the region.

A small number of features, however, are exclusive to *Australian* Antarctic science only. The more obvious of these include the climatic conditions endemic to the East Antarctic plateau which constitutes all of the 42% of Australia's claim on the continent. Logistical challenges posed by access to research stations in this sector of the continent, as well as access to phenomena intended to be researched, are also

endemic only to Australian Antarctic science. Research methodology employed for relevant research projects must also be accommodated by relevant environmental peculiarities. The willingness of the Australian Government to allocate funds and other resources for Antarctic research is another feature that pertains only to Australian Antarctic science. Other features that are exclusive only to *Australian* Antarctic science, includes restrictions imposed upon the direction and content of research itself by the Australian government. Whilst scientists themselves are significantly influential in determining the direction of research programs through their professional opinions and interests, all research must adhere to the Australian Government's demands which extend to theoretical, logistical, ethical and methodological criteria.

In evaluating scientists' quality of consciousness within Australian Antarctic science literature, journal articles from the science fields of physical sciences, biological sciences and human impact studies will be examined. It is estimated that five articles from each of these science areas will accommodate a moderate variety in article peculiarities. In selecting articles, the following considerations were made:

Physical sciences: Articles selected for this category were published between 1997 and 2005. Research programs represented in the five articles, as samples of all physical science research fields covered by Australian Antarctic science, included mineral petrology, geoscience, meteorology, glaciology and atmospheric/space research. The following criteria applied in the selection of physical science articles:

1. All articles had to appear in peer-reviewed journals for reasons outlined in section 3.2.3;
2. All articles selected had to be listed in the AAD's publication database, to ensure that authors were actively engaged in Australian Antarctic science at the time of publication. It should be mentioned here that Australian Antarctic scientists employed by organisations other than the AAD (listed in section 3.2.1) maintain close working contacts with the AAD. As such, their publications are often affiliated with the AAD and hence, listed in the AAD's publication databases;
3. Articles published prior to 1996 were not considered (although they were much more numerous than articles published after 1996) in order to sample recent publications;
4. Attempts were made to include a selection of physical science research topics in order to try to access variety in overall research procedures and outcomes;
5. Attempts were also made to access a variety of journals that accommodated the different articles, in order to create a variety in article content, purpose, style and format; and
6. Care was taken to not select more than one article by each author/s, again, to create variety in publications.

Biological science: Articles selected for the biological science category span from 1997 to 2004. Research programs represented in the five articles included studies in mega-fauna, bacteriology, ecosystem studies, studies of vascular plants and marine ornithology. All of the above criteria for the selection of physical science articles were also applied in the selection of the five biological science articles, with relevant differences being accommodated.

In addition to the criteria in choosing physical science articles, selection of the biological science articles included an attempt to select articles that dealt with

different degrees of intervention in the lives of faunal and/or floral species by researchers. In other words, articles were sought that provided a variety in the degree to which scientists impacted on the lives of their study-samples. This was done to accommodate examination of different levels of disturbance caused for the living entities being studied, as well as examination of different approaches taken to such research by scientists. These considerations were made due to the strong emphasis that both the triguna and the Abhidharma place on ethical practices in relation to non-human species of life.

Human Impacts: Articles selected for human impact studies span from 1996 to 2005. There is only one research program represented in these five articles-human impacts studies, with different impacting factors investigated by scientists. Efforts were made to access articles that addressed different types of impact on the Antarctic environment. Research topics covered by the five selected articles included impacts on marine ornithology, waste-sites, chemical pollution of lakes, helicopter disturbance for penguins and human impacts on birds of flight. All of the above criteria for the selection of physical science articles were acknowledged in the selection of human impacts studies articles, with relevant differences again being accommodated.

3.3 Data Processing Using the Vedic Triguna

3.3.1 Triguna Evaluation and Presentation Guides

As depicted in Table 3.1.1.1, the DCPF contains five data evaluation and presentation items prepared for the processing of data according to the Vedic triguna. For the purpose of satisfying the thesis objective, the researcher of this thesis designed all five items introduced and discussed below. As such they have no sources in other literature:

1. The Complete Guna Characteristics Guide (CGCG)

Due to the size of this guide it appears in Appendix A. Primarily, it serves the purpose of providing an extensive list of most guna characteristics defined in literature. Containing direct quotes from texts that define characteristics, as well as additional approximate definitions of characteristics (formulated from general readings), the guide aims at creating a tool to aid in data evaluation. By defining how different gunas treat different topics, the guide allows for easy understanding of the different natures of the different gunas;

2. The Guna Datum Evaluation Guide (GDEG)

This guide aims at aiding data processing, by defining how individual datum can be analysed using the triguna. By describing the potential capacities of the triguna to assess psychological and behavioural peculiarities, the guide establishes the triguna's methodological parameters within the context of evaluation of individual datum. The complete guide is as follows:

The Guna Datum Evaluation Guide (GDEG):

i) Any individual datum can be affiliated with, and therefore evaluated in relation to, a specific guna characteristic. Each guna characteristic is responsible for the datum's designation to the guna;

ii) Any individual datum can be contextualised within its designated guna, taking into account all other characteristics inherent to that guna;

iii) An estimation can be given of how any individual datum would present within gunas other than its own designated guna;

iv) The position of any individual datum can be assessed against any one or all other data, in order to determine its position within the data results as a whole; and

v) The relationship between the position of any individual datum and its ideal position can be assessed according to triguna methodology and broader Vedic teachings;

3. The Stratified Hierarchical Presentation of Scores (SHPS)

This model is a conceptual depiction of the qualitative differences of the three modes of material nature. Its theoretical foundations are drawn from all publications on the triguna thus far discussed. Presenting the modes in a stratified fashion, including the suddha-sattva platform of consciousness, a visual reference to the meaning of differences in quality of consciousness can be easily ascertained. Its purpose is to act as a conceptual skeleton for the presentation of data-results, within the context of their meaning for scientists' quality of consciousness in relation to environmental conservation:

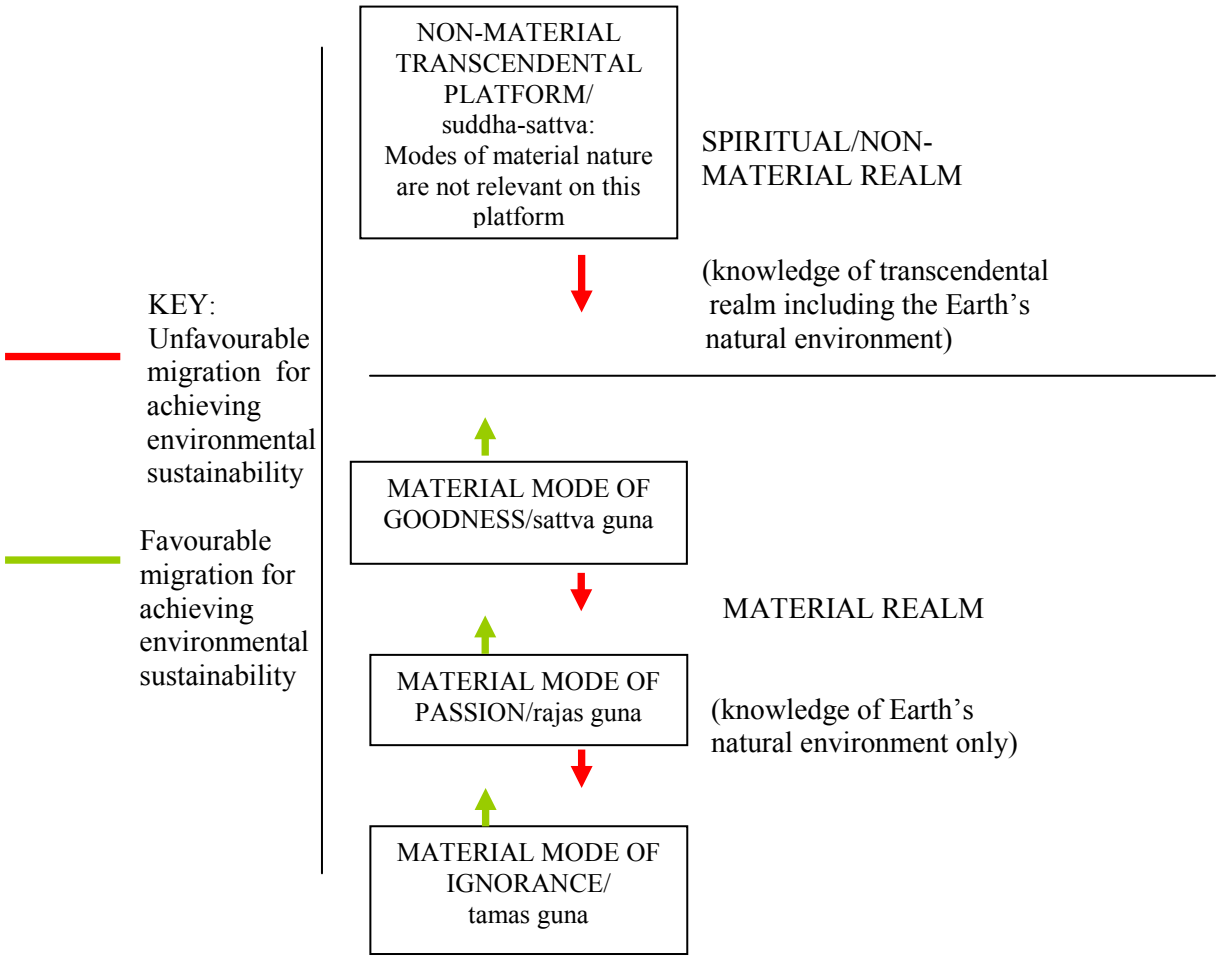


FIGURE 3.3.1.1: Stratified Hierarchical Presentation of Scores (SHPS)

4. The Guna Profile Construction Guide (GPCG)

This guide acts as a road map for creating the final profile or assessment of Australian Antarctic scientists' situatedness within the triguna. It aids evaluation of scientists' quality of consciousness according to the parameters of Vedic Cognitive Science. It identifies the boundaries of potential relationships between different data and lists different aspects of data. Such boundaries need to be acknowledged in determining whether or not a need exists for scientists to raise their qualitative level of consciousness. Of specific importance is Point v, which establishes the criteria for whether or not the thesis proposition is supported. The complete guide is as follows:

The Guna Profile Construction Guide (GPCG):

i) Identification of which guna is supported the most often within data results i.e. which guna contains characteristics that Australian Antarctic scientists affiliate with the most;
ii) Identification of scientists' degree of support for all three individual gunas e.g. is support for two gunas very similar?;

iii) Identification of which specific guna characteristics, amongst all characteristics within each of the three gunas, received the most support from scientists;

iv) Identification of any other specifically prominent aspects of data in terms of their significance for scientists' situatedness within the triguna; and

v) Whether or not scientists are currently experiencing a poor quality of consciousness, as asserted within the thesis proposition, will primarily be determined by which guna they predominate within. If scientists predominate within either rajas or tamas gunas, then they will be considered as currently experiencing a poor quality of consciousness, with predominance within tamas guna representing a poorer quality of consciousness than predominance within rajas guna.

This resolution is made for the following reasons: Consequences or symptoms of predominance within sattva guna are (amongst others) *clear-sightedness*; *acting purposefully according to higher spiritual and ethical principles*; *being interested in and concerned about spiritual matters*; and *peacefulness*. Within rajas guna, consequences include (amongst others) *being stressed, anxious and frustrated*; *distortion of the intellect due to too much activity*; *being dissatisfied, even in gain*; and *greed*. Consequences of predominance within tamas guna include (amongst others) *delusion*; *fearfulness*; *hypocrisy*; *acting whimsically, for no purpose*; *helplessness*; and *unhappiness*. As such, the quality of consciousness experienced within the two lower material modes is portrayed as being unsuitable for producing effective environmental conservation resolutions. Consciousness within the two lower modes is hence deemed as being of poor quality.

Whilst it may be easy to understand how sattva guna characteristics impact more favourably on the consciousness of environmental scientists than those of tamas guna, adverse impact of some rajas guna characteristics may be more difficult to fathom within the context of the behaviours of contemporary mainstream global society. Bhaktivedanta raises the following points with regards to this issue: Bhaktivedanta states that "when the mode of passion is increased, one develops the hankering for material enjoyment" (1989, 14:7). He also asserts that "one in the mode of passion is never satisfied with the position he has already acquired; he hankers to increase his position" (1989, 14:12). These tenets alone may not appear to represent poor quality of consciousness, yet as Bhaktivedanta further asserts, "activities in the mode of passion are simply miserable" (1989, 14:16). Characterised by much toil and strife, advancing the material paradigm unavoidably means *distress* and *anxiety*.

As *greed* develops from rajas guna (Bhaktivedanta 1989, 14:17) the individual can not experience peace and satisfaction with what he/she possesses or has achieved, nor with the possessions or accomplishments of others. As Lord Krishna says, "that happiness which is derived from contact of the senses with their objects and which appears like nectar at first but poison at the end is said to be of the nature of passion" (Bhaktivedanta 1989, 18:38). In other words, pleasure derived through the material senses is sure to come to an end

at some point or other, at which time the individual mourns his/her loss of his/her temporary material stimulation. In this way, comfort and stimulation gained through the material body, meaning through the material senses, regardless of which form such comfort and stimulation takes, inevitably leads the individual towards disappointment.

Furthermore, that the professional group of Vedic scholars gave considerably less support for rajas guna, than did the other two professional groups participating in the IGSQ, indicates that thorough knowledge of the different gunas (possessed only by the Vedic scholars group) leads to conclusions as to the unsuitability of rajas guna for achieving goals such as those espoused by environmental scientists;

5. Significance and Implications of Guna Situatedness (SIGS)

Whilst not conclusively determining the significance and implications of data results, the SIGS proposes a projected estimation of the significance and implications of scientists' predominance within different gunas. Significance and implications of both immediate and future estimated ramifications of predominance are presented. The purpose of SIGS is to give depth to discussion on final data results, including discussion on the outcomes of data evaluation using the GPCG:

TABLE 3.3.1.1: Significance and Implications of Guna Situatedness (SIGS) (Bhaktivedanta 1987-8, 11:chap.13, chap.25; 1989, chaps.14-18; Kaur and Sinha 1992, 27-31; Mohan and Sandhu 1986, 48; Wolf 1999, 1381)

Predominance According to Scores/Results	Immediate Implications of Predominance	Potential Future Implications of Predominance
A predominance of sattva guna qualities	A predominance of the material mode of goodness means that the current qualitative level of consciousness of scientists is in the most favourable position for learning about the natural environment. Knowledge obtained in sattva guna is described as *real knowledge*, characterised by *ethical practices* and *awareness of the existence of a higher, spiritual nature within all entities*. Whilst such knowledge is aimed at *furthering higher ethical and spiritual purposes*, it automatically also satisfies lower or physical needs of the natural environment. Empirical research methods are kept to a minimum, whilst scriptural guidelines are consulted.	The future implications of scientists' predominance within sattva guna are most likely to be proper *maintenance/sustainability* of the natural environment, due to the upkeep of more *efficient*, *purposeful* and *ethical* environmental management plans and policies. As *maintenance* and *sustainability* are inherent only to sattva guna, achieving environmental *sustainability* necessarily requires predominance within sattva guna.
A predominance	When rajasic qualities predominate, scientists are likely to adhere to	Long-term ramifications are most likely to be the ongoing and increasing

of rajas guna qualities	*mundane knowledge* i.e. *knowledge gathered through the material senses*. As *the intelligence becomes distorted* from situatedness within rajas guna, scientific research methods, and hence research results, will unavoidably be distorted. Potential ramifications include exaggerated, incomplete, incorrect, irrelevant, unimportant and/or morally inadequate research results. Relevant policies, lacking important details, will be characterised by *greed*; *economic prioritisation*; and *understanding which cannot distinguish between ethical and unethical behaviour.*	deterioration of the natural environment, as it is managed under sub-standard policies, with ethical standards being increasingly compromised in order to meet rajasic *economic* goals. Whilst conservation behaviours may not be witnessed as being directly *destructive* (a tamasic characteristic) the health of the natural environment will increasingly deteriorate, decreasing the quality of life of all living beings.
A predominance of tamas guna qualities	A predominance of tamasic characteristics means that scientists are causing havoc. Neither their research methods, nor research procedures, nor the outcomes of research are beneficial. Immediate implications are highly likely to be *violence towards others* (harming others through research and general science operations) and a complete *waste of material resources* on behalf of scientists, resulting in immediate deterioration and *destruction* of the natural environment. Management regimes will also suffer internal problems.	Future implications of policies made within tamas guna can be very serious, in terms of the ramifications for the global natural environment. If the needs of the environment go unnoticed and are *ignored*, the health of the environment could deteriorate rapidly and progressively, impacting severely not only on regional ecosystems, but also on the global ecosystem. As very little time is given to important policy-decisions, policies that are characterised by *amoral practices* and a *lack of pragmatism*, with *no higher purpose* will increase. Widespread and rapid species and habitat loss will eventuate, including widespread and rapid loss of human habitat.

3.3.2 The Australian Antarctic Scientist Inventory

In discussing the combining of qualitative and quantitative research, Margarete Sandelowski (2000, 246) states that "researchers have increasingly turned to mixed-method techniques to expand the scope and improve their analytic power … and deepen their insights from, their studies." Whilst all the data collection items prepared for this thesis include qualitative analysis, the psychometric analysis of AASI will play an important role. In particular, the AASI aims to measure the qualitative aspects of participants' consciousness by quantifying their responses to statements from each of the three gunas.

The first stage of processing AASI scores will involve entering raw scores into a table (Appendix E). In this table, calculations will be made of each separate Likert-scale option for each AASI statement, meaning scores for each Likert-scale option (see section 3.2.1) will be presented for each of the 60 statements. An overview of overall scores appears in Table 4.1.3.1. Total scores for each separate Likert-scale option for each statement are then added together. This value is divided by 20 (as the total number of statements within each guna) to arrive at the mean score for each

guna. This score is then divided by 115, representing the total number of AASI participants.

Percentages entered in Table 4.1.3.1 will then be entered into three pie charts (Pie Charts 4.1.3.1- 4.1.3.3) to further depict results. Pie charts will be included to give readers a visual depiction of the distribution of scores. Results will also be entered into a line-graph to further enhance readers' visual perception of overall results (Graph 4.1.3.1). Scores will also be entered into three histograms with each histogram depicting scores for one of the three gunas.

Scores will also be processed to determine their statistical significance, as well as their standard deviations. A repeated-measures analysis of variance (ANOVA) will be performed to assess differences between the means of the scores of each guna, as well as individual comparisons between means. A reliability analysis of AASI scores will also be carried out (using the standardised Cronbach's alpha coefficient) in order to determine "internal consistency and stability with which a (the) measuring instrument performs its function, corresponding roughly to the everyday concept of accuracy" (Colman 2003, 177, 629).

An examination of scores for individual statements within each guna will then be carried out in consultation with the CGCG, the GDEG and the SHPS. The percentages of scores will be entered in three tables: Table 4.2.1.1 (sattva guna statements), Table 4.2.2.1 (rajas guna statements) and Table 4.2.3.1 (tamas guna statements). Comments are made as to the significance of the scores for each statement, primarily by evaluating the overall support for each statement determined by adding the percentages of scores for the Likert-scale options Strongly Agree and Basically Agree. These percentages are then compared against the percentages of opposition to the same statement, determined by adding percentages of scores for the Likert-scale options Basically Disagree and Strongly Disagree. Contents of each statement (what the statement suggests according to specific guna characteristics) are then discussed. Specifically, comments will be made as to the implications of scores for purposes of environmental conservation of Antarctic and global environments.

In section 4.2.4, an additional investigation will be carried out into the consistency or cohesion of scores. In this investigation, consistency is determined by the similarity of distributions of scores for statements representing the same guna characteristic. In other words, if two AASI statements, whilst worded differently, both tested participants on the topic of *honesty* (a sattva guna characteristic) then theoretically, scores for the two statements should be the same, or very similar. The greater the degree of dissimilarity, the less consistency or cohesion scores represent. Once the degree of similarity of distributions has been assessed, the degree is discussed within broader estimated implications for Australian Antarctic science.

It should be noted that only a small number of guna characteristics are represented in more than one AASI statement, alongside other characteristics from the same guna. As this is the case, not all AASI statements will be processed according to this type of consistency analysis. This type of examination of consistency/cohesion was created specifically for this research thesis. As it has not yet been tested in other research, results will be accepted as tentative only. Restrictions on these results also include that scores do not reveal whether the same AASI participants were responsible for scoring the same on different questions, representing the same guna characteristics. In other words, what this type of consistency assessment fails to reveal, is whether individual participants were responsible for similarities in support for specific characteristics, or whether consistency in such support was coincidental within the entire AASI participant body.

3.3.3 The Ideal Guna Situatedness Questionnaire
As the IGSQ will not collect data on the qualitative level of consciousness of Australian Antarctic scientists, but rather on professional opinions *about* scientists' *ideal* qualitative level of consciousness, presentation and evaluation guides of the DCPF will not be consulted in the processing of IGSQ data. As the data retrieved from the IGSQ will not, like the other data-items, inform on the quality of consciousness of participants themselves, scores will not be designated within the triguna. Instead, results will be processed in such a way as to prepare them for further analysis against the overall results from the other data-collection items. The final correlation analyses of the results from the IGSQ and other data-collection items is presented in Chapter Seven.

Raw IGSQ scores by each of the three professional groups will first be entered into six tables, appearing in Appendix J. A repeated measures ANOVA test will then be carried out separately for each individual environmental science goal, followed by a standard ANOVA test for each goal. Line-graphs will be presented for each of the three professional groups. Due to their volume, tables containing results from the repeated-measures ANOVA and the standard ANOVA tests appear in Appendix K.

3.3.4 Interview Series
The processing of interview responses will take the general format of the *content analysis* approach, as discussed by Keats:

> Content analysis considers the nature of the verbal communication. The level of analysis can be directed to words, phrases or themes. Responses to the interview questions are transcribed into textual form and then categorised according to the unit of measurement selected. This method has been described by King (1994) as quasi-statistical, in that statistical analysis can be carried out comparing individuals or groups on their distribution across categories. (Keats 2000, 80)

Processing of interview responses will involve identification of guna representation within two different media: 1. Through scientists' statements about themselves (divulging their own qualities of consciousness); or 2. Through scientists' statements about their work colleagues (divulging the qualities of consciousness of other scientists). In view of the aims of Point 2 (scientists' divulging qualities of consciousness of other scientists) overall evaluations of individual scientists' interviews should not be accepted as representing interviewees' qualities of consciousness only, but rather as case-studies representing the entire scientific community. The analysis will be carried out in three stages:

i) Initial identification of quantifiable responses to interview questions. *Quantifiable* here means the capacity of responses to be clearly designated to a guna (or to a combination of gunas) for the purpose of being totaled with other designated responses to the same interview question;
ii) Identification of significant statements made by interviewees, analysed on a case by case basis. Significance will be determined according to the clarity of statements in representing one of the three gunas, as well as the overall prevalence of specific topics and their respective gunas, within an interview as a whole. Significance may also be determined

according to the professional positions of interviewees in relation to what they say; and

iii) An overall appraisal of each interview on a case by case basis. Each interview will be assessed as to each interviewee's general situatedness within the triguna.

These stages are discussed as follows:

Stage 1: Initial Identification of Quantifiable Responses to Interview Questions

As it is estimated that interviewees will respond to interview questions in different ways, meaning that not only answers, but also grammar, language and speaking styles will differ, responses will need to be examined to identify segments of responses that are directly relevant to questions being asked. As interviewees spoke about certain issues that were not directly relevant to actual issues being addressed within questions, parts of responses that were specifically representative of one of the three gunas will need to be identified. It should also be noted that scientists' initial introductions of themselves, including descriptions of their professional positions within the broader umbrella of Australian Antarctic science, will not be processed.

Parts of interviewee's responses that most clearly represent one of the three gunas, or a combination of gunas, will be chosen for quantification. The CGCG and the GDEG will be consulted in determining how to best identify guna representation within different dialogue contexts, as well as how to determine relationships between different guna representation within responses. In certain cases, responses may not provide enough information about scientists' situatedness within the triguna. In such cases there will be no quantification of the relevant scientists' response to that particular question.

Stage 2: Identification of Significant Statements by Interviewees

With the aid of the CGCG and the GDEG, the contents of each interview will be examined in order to identify statements considered significant. Only statements and parts of statements considered as clearly representing one or two of the three gunas will be identified and discussed. As an example, the following response clearly places the interviewee within rajas guna. This statement is considered significant due to the number of factors within the statement that are endemic to rajas guna. Working hard for long hours, attachment to family-life, feeling pressured by work commitments and struggling to keep control of one's work duties, are all symptomatic of the mode of passion:

> Well, keeping up the literature is a full-time job, doing the research is a full-time job, having a family is a full-time job. There are not enough hours in a lifetime to do everything that's required. There's always a feeling of struggling to keep up with workloads and whatever. (Wright Appendix L, 153)

Stage 3: Overall Appraisal of Each Interview

Once quantifiable responses have been identified and all interviews have been examined for significant statements, their overall situatedness within the triguna will be assessed. This appraisal will take the format of a general evaluation of each

interview as a whole, in consultation with already identified quantifiable responses as well as significant statements. It is important to note that this appraisal will include evaluation of statements made by the interviewees about themselves, about Australian Antarctic science and also about other scientists. An overall appraisal is arrived at in order to place, as accurately as possible, each interview within the triguna.

As discussed in section 3.2.3, responses to Interview Question No. 7 will not be processed in this chapter. Designed specifically to secure scientists' opinions on the process of peer-review, all responses to Question 7 will be processed in Chapter Six, the chapter analysing features of science literature.

3.3.5 Australian Antarctic Science Literature

The three science literature items will be processed as follows:

1. *The Antarctic Animals Ethics Committee's (AAEC) Animal Experimentation Guidelines*

AAEC guidelines for animal experimentation will be examined according to identifiable guna characteristics within the guideline clauses. Instructions for scientists imposing behavioural parameters for activities such as catching, transporting, tagging, anaesthetising and killing different types of animals, as well as what to do in the case of an overdose of anaesthetic, will all be assessed with the aid of the CGCG and the GDEG. It is anticipated that not all clauses within the text of the guidelines will easily correlate with guna characteristics. This aspect of collecting data on science literature is the same for analysing interview transcripts, in that only parts of the text that clearly represent a guna characteristic (or combination of characteristics) will be acknowledged and discussed.

Features such as descriptive language, grammar and the general approach taken by the AAEC towards the treatment of animals will be examined. Constituting guidelines for *ethics*, particular attention will be given to the general mood of instructions, in terms of different degrees of compassion and consideration for animals that are expected of scientists. How scientists' must treat the deaths of animals within different species, whether deaths are intentionally imposed or caused by accidental mishap in the course of research, will also be examined.

2. *Responses to Interview Series Question No. 7*

According to triguna methodology, if the predominant mode of consciousness of scientists is the mode of passion, then individual scientists who predominate within either the mode of goodness or ignorance would find it very difficult to have his/her theories and methodologies accepted by the greater body of scientists. In this way, scientific teachings largely remain the product of the most common quality or mode of consciousness within a scientific community at any given time. Regardless of Australian Antarctic scientists' current situatedness within the triguna, their situatedness will therefore be accepted as an approximate representation of the broader global scientific community.

Responses will be processed against the triguna in consultation with the CGCG and the GDEG. Attempts will not be made to quantify responses, as the data represents responses to one question only. Instead, general trends in scientists' responses will be discussed, including outstanding features. Such features may

include responses or parts of responses that clearly reflect a guna characteristic or a distinct combination of characteristics, or the prevalence of guna characteristics that are considered highly relevant to issues surrounding the topic of peer-review.

3. Examination of Peer-reviewed Science Literature

An initial overview will be made of features inclusive to all Australian Antarctic science peer-reviewed publications selected for the examination. This procedure will be carried out at the outset of the examination of articles within each different science area: physical science, biological science and human impacts studies. Features such as approaches to gathering knowledge, contents, presentation styles and overarching purposes of publications shared by all articles from the same research area will be acknowledged. This will be done in consultation with both the CGCG and the GDEG.

After this initial identification of shared representation of guna characteristics, articles will be examined individually to identify their exclusive features that represent different guna characteristics. The CGCG and the GDEG will be consulted in this analysis. Statements, phrases, clauses, sentences, paragraphs, individual words, photos, graphs, diagrams etc. that somehow represent one of the three gunas (or a combination of gunas) will be identified and discussed. An example of such processing is given below. The article excerpt is followed by the identification of relevant gunas (one paragraph only):

Giese, Melissa, and Riddle, Martin. 1999. "Disturbance of emperor penguin *Aptenodytes forsteri* chicks by helicopters." *Polar Biology*, 22:366-71.

The excerpt is taken from page 367:

> The study group we monitored comprised 1100 chicks and 300 adults, loosely assembled into 3 subgroups of approximately 400 birds each. The study group stood on fast ice, 10 km from open water and at least 500 m in any direction from the nearest rock outcrop, ice cliff or next group of penguins. A random sample of chicks were weighed from a group located over 500 m from the study group to provide an estimate of chick age based on mass.

Knowledge gathered through the material senses (empiricism); *acquiring scientific knowledge on the material body/material world* (in this case the material bodies of penguins); and *adherence to mundane knowledge* are rajasic characteristics. In scientific terms, mundane knowledge typically consists of measurements of different types (measuring, counting, weighing etc.) but may also consist of qualitative descriptions of material phenomena. Disturbing innocent creatures and disrupting their lives without any higher ethical and spiritual purpose is endemic to tamas guna. It is affiliated with *action performed in illusion, in disregard of scriptural injunctions, and without concern for future bondage or for violence or distress caused to others*.

An overall appraisal of each article is then given to identify overall predominating guna/s. This appraisal will be made according to the presence of different gunas inclusive to all articles within the same science-field, as well as each article's exclusive representation of different gunas. The prevalence of such representation within each article will determine its overall situatedness within the triguna.

3.4 Data Processing Using the Buddhist Theravada Abhidharma

3.4.1 Abhidharma Evaluation and Presentation Guides

There are three evaluation and presentation guides addressing qualitative differences in consciousness according to Abhidharma mental events, emotions and perfections. Following are descriptions of these guides, including discussion on how and why they will be used in processing data:

1. Complete Abhidharma Factor Guide and Guide for Assessing Correlation Between the Triguna and the Abhidharma (CAFG-GACTA)

Due to the size of this guide it appears in Appendix B. Primarily it serves two purposes: 1. It categorises and lists all Abhidharma mental events, emotions and perfections (factors), giving explanations as to the meaning of factors according to both Abhidharma psychological texts as well as to broader readings by the thesis researcher. Meanings of factors are elucidated according to their perceived relevance to the thesis objective, namely to aid evaluation of data by enhancing identification of different qualities of consciousness. 2. It provides a guide for identifying correlation between triguna characteristics and Abhidharma factors by listing specific guna characteristics against each Abhidharma factor.

Efforts were made to identify guna characteristics that correlate directly with Abhidharma factors. However, as the two systems do not share structural similarities, nor the same coverage of psychological peculiarities, consistent correlation was not possible to achieve. A relatively high correlation was achieved, however, in terms of overall representation of positive Abhidharma factors with sattva guna characteristics. Similarly, a strong correlation was found between Abhidharma negative factors with rajas and tamas gunas, specifically tamas guna. As such, the two systems maintain a high degree of overall theoretical similarity in terms of underlying meaning and purpose of design i.e. both systems promulgate the need for humankind to adopt positive, wholesome and higher qualities of consciousness and to abandon negative, unwholesome and lower qualities of consciousness;

2. Abhidharma Profile Construction Guide (APCG)

The APCG, like the GPCG, assists the researcher in producing an overall profile of all data results in response to the thesis objective. This profile will be constructed in Chapter Seven. Whereas the hierarchical structure of the triguna maintains the advantage of presenting gunas (including scores of gunas) in a manner that is conceptually logical (through its stratified ordering), Abhidharma mental events, emotions and perfections show a lesser degree of such structural logic. This becomes relevant within the context of processing data. Whereas data representing one (or two) of the three gunas can easily be situated within the triguna hierarchy, data on Abhidharma factors remain situated within their own categories only (Positive or Negative Mental Events, Negative Emotions or Positive Perfections), meaning that they can rarely be cross-referenced successfully. In order to overcome this bias, the following groups have been formed for processing data according to Abhidharma factors:

Factor Contrast Group 1: Positive factors (Positive Mental Events and Positive

Perfections); and
Factor Contrast Group 2: Negative factors (Negative Mental Events and Negative Emotions).

The APCG thus takes the following format:

i) Identification of which Factor Contrast Group is supported the most often within data results i.e. are Australian Antarctic scientists' influenced more by positive or negative Abhidharma factors?;
ii) Identification of scientists' degree of support for the two Factor Contrast Groups e.g. does support for the two groups vary significantly?;
iii) Identification of Abhidharma factors represented within each Factor Group and within each Factor Contrast Group that received the most support from scientists;
iv) Identification of any other specifically prominent aspects of data in terms of their significance for scientists' support for the two Factor Contrast Groups; and
v) Whether or not scientists are currently experiencing a poor quality of consciousness, as proposed by the thesis proposition, will primarily be determined by which Factor Contrast Group is represented the most within data. If Factor Contrast Group 1 (positive factors) is represented the most, then scientists will be considered as experiencing wholesome or a high quality of consciousness, whereas if Factor Contrast Group 2 (negative factors) is represented the most, then scientists will be considered as experiencing unwholesome or a poor quality of consciousness. Degrees of quality, according to differences in the ratio of representation within the different groups, will also be taken into consideration.

These resolutions are made for the following reasons: Consequences or symptoms of a greater representation of positive factors are described in the CAFG-GACTA as (amongst others) *clear-sightedness*; *seeing the intrinsic value in all things*; *avoiding acts that may have negative ramifications for oneself and others*; and *determination that is steady and aimed at producing tangible outcomes* (Appendix B, 1, 2, 4). Consequences or symptoms of a greater representation of negative factors include (amongst others) *material exploitation and passion-lust*; *withholding the truth due to fear or material desire*; *a lack of pity and compassion*; and *acting unethically* (Appendix B, 8, 9, 10). As such, the quality of consciousness experienced within negative Abhidharma factors is considered unsuitable for producing effective conservation solutions. Consciousness represented by negative factors is hence deemed as being of poor quality; and

3. The Significance and Implications of Representation of Abhidharma Factors (SIAF)

Designed to serve the same purpose as SIGS, SIAF aims to give insight into potential ramifications of scientists' representation of different Abhidharma factors. Significance and implications of representations are hypothetical projections only and

as such do not portray definitive conclusions derived from research. This is particularly so, as authors consulted about meanings of Abhidharma factors (Guenther and Kawamura 1975; Rabten 1992; Varela, Thompson and Rosch 1991) do not specifically discuss the ramifications of behaviours for environmental conservation, nor project future potential significance of relevant behaviours. The SIAF will be consulted primarily in Chapter Seven, in which overall meanings, significance and implications of all results will be discussed:

TABLE 3.4.1.1: Significance and Implications of Representation of Abhidharma Factors (SIAF) (Guenther and Kawamura 1975, 38-99; Rabten 1992, 125-62; Varela, Thompson and Rosch 1991, 256-8).

PREDOMINANCE OF ABHIDHARMA FACTOR GROUPS	IMMEDIATE IMPLICATIONS OF REPRESENTATION	POTENTIAL FUTURE IMPLICATIONS OF REPRESENTATION
POSITIVE MENTAL EVENTS AS HIGHEST SCORING REPRESENT-ATION	An ideal representation from which scientists may immediately be aware of what the most beneficial action is to take for the benefit of all living beings. *Concern/conscientiousness* and *decorum/consideration for others* are seen as particularly pivotal in scientists prioritising ethical conservation practices at the expense of other practices that may be more fascinating or economically viable, but less urgent in terms of the preservation of life. Compassion for all varieties of life is pronounced.	Long term benefits of scientists showing high representation of Positive Mental Events may include highly ethically based research programs. Relevant policy and legislation may in such ideal circumstances steadily develop management guidelines characterised by *non-violence* towards all recipients of environmental science. Steadiness in scientists' and managers' determination, plus *non-deludedness/ non-bewilderment* would enable scientists to prioritise research based on higher ethical and spiritual principles and to carry out research tasks based on long-term vision, clarity and focus.
NEGATIVE MENTAL EVENT AS HIGHEST SCORING REPRESENT-ATION	Recipients of relevant scientific research could be at risk of being exposed to outcomes of science produced by unwholesome consciousness. A *lack of a sense of propriety/inconsideration for others*, coupled with *mental inflation* and *shamelessness* may produce scientific activities aimed only at self-adulation on behalf of scientists and the Australian government. Outcomes may include immediate deterioration of the Antarctic and global environments.	Over a sustained period of time, Negative Mental Events may result in ignorant choices in research programs. Conservation programs would be earmarked by a general neglect of the needs of all species of life, as scientists increasingly succumb to ignorance and selfishness. Instead of aiming at attaining high standards of material and spiritual life for all sentient beings, scientists may become distracted to indulge in selfish practices. Motivated by *jealousy/envy* and encumbered by *deceit/pretension*, scientists may steadily deteriorate the integrity of the Australian Antarctic science program.
NEGATIVE EMOTIONS AS HIGHEST SCORING REPRESENT-	If scientists are too *attached* to their research results, leading to excessive *opinionatedness/afflicted views*, their professional status could suffer. If *arrogance/self-importance* also	Over an extended period of time, policies may develop so that they run contrary to public expectations and priorities. If scientists remain *ignorant* as to the real needs of Antarctic and

ATION	manifests in scientists' consciousness, then results of research activities may become distorted due to scientists' own desires for specific outcomes and personal benefits. If research becomes characterised by a *lack of intrinsic awareness/ignorance* instead of clear-sightedness, then immediate ramifications may be the immediate suffering on behalf of research recipients.	global environments, then their intervention may be more detrimental than helpful. Gross deterioration or even destruction of ecosystems may eventuate. If *indecision* manifests, appropriate response to urgent environmental situations may not occur.
POSITIVE PERFECTIONS AS HIGHEST SCORING REPRESENT-ATION	If *morality/virtue; determination/ resolution* and *loving-kindness* manifest in scientists' consciousness, then immediate effects of scientists' intervention into environmental affairs may be very favourable for recipients. This combination of qualities allows the individual to understand what is important in terms of environmental care. If the quality of *renunciation* also manifests, then scientists may give up their practices of serving their own senses and those of select others and instead adhere to virtuous purposes that will benefit all.	The long-term results from scientists scoring a high representation within the perfections may include global environmental sustainability. It may also include other positive effects such as increased health on behalf of all species of life, significant reductions in natural resource use, an increase in environmentally friendly energy-supply and the regeneration of exploited and devastated environments. If the qualities of *giving* and *renunciation* manifest as remedies for materialism, then other positive sociological changes may also occur within human societies.

3.4.2 Interview Series

Processing interview responses using Abhidharma factors will take the same approach as that of the Vedic triguna, namely the *content analysis* approach. Factors will be identified within the contexts of statements made by interviewees about themselves, statements made about Australian Antarctic science and statements made about other scientists.

The three stages of processing interview responses against the triguna, outlined in section 3.3.4, will also be followed in processing responses against Abhidharma factors (Stage 1. Initial identification of quantifiable responses; Stage 2. Identification of significant statements; and Stage 3. Overall interview appraisals) with relevant adjustments made. Primarily 'relevant adjustments' means identifying Abhidharma factors instead of guna characteristics within responses, as well as the following differences:

Stage 1: Interview Series Questions: Initial Identification of Quantifiable Responses

Responses or parts of responses that are specifically representative of Abhidharma factors will be identified from responses (again, excluding scientists' initial introductions of themselves and descriptions of their professional positions prior to answering schedules interview questions). Parts of responses that most clearly represent factors will be chosen for quantification. Identification of factors will be

done in consultation with the CAFG-GACTA. In certain cases, responses may not represent any factors at all.

Whether the contents of responses address scientists' own qualities of consciousness, or that of their work colleagues, all identified representation of Abhidharma factors will be processed. In other words, Abhidharma factors will be represented either through scientists' statements about themselves (divulging their own qualities of consciousness) about their work colleagues (divulging other scientists' qualities of consciousness) or Australian Antarctic science in general (divulged the quality of consciousness underpinning Australian Antarctic science in general).

Stage 2: Identification of Significant Statements by Interviewees

With the aid of the CAFG-GACTA, the contents of each interview will be examined in order to identify statements considered significant. Significance will be determined according to the clarity of statements in representing different Abhidharma factors, as well as the overall prevalence of specific topics and their respective factors within each interview in its entirety. In some cases significance will bet determined according to the professional positions of the interviewees, in relation to what the interviewee has said. Only parts of statements considered as clearly representing one or more Abhidharma factors will be identified and discussed. As an example, the following response segment is a clear representation of two different Positive Mental Events, namely *decorum/consideration for others* and *non-violence*, as well as two different Positive Perfections, namely *morality/virtue* and *loving-kindness*:

> I do not think that we should make judgements about our impacts based on the effects of our species alone. I think that all the other species on the planet deserve some moral obligation to give them some say, essentially, to keep their interest at mind. (Trull Appendix L, 140)

Stage 3: Overall Appraisal of Each Interview

Once quantifiable responses have been identified and all interviews have been examined for significant statements, their overall representation of either positive or negative factors will be determined. This appraisal will take the format of a general evaluation of each interview as a whole, in consultation with already identified quantifiable responses as well as significant statements. A special focus of this stage of processing will be the recognition of the commonality of interviewees' standpoints on particular issues i.e. recognition of interviewee's responses that may also represent other interviewees' standpoints on the same issue. As interviewees will not only be divulging their own qualities of consciousness, but also those of other scientists, overall evaluations of individual scientists' interviews should not be accepted as representing interviewees' qualities of consciousness only, but rather as case-studies representing the entire scientific community.

As with the processing of responses to Interview Question 7 using the Vedic triguna, processing of responses to this question using Abhidharma factors will be carried out in Chapter Six (Science Literature Features chapter) as the question addresses the issue of peer-review.

3.4.3 Australian Antarctic Science Literature

Processing science literature against Abhidharma factors will be done in a similar fashion to how literature will be processed against guna characteristics. Data will comprise the same three categories 1: the AAEC's *Animal Experimentation Guidelines*; 2: responses to Interview Series Question No. 7; and 3: peer-reviewed Australian Antarctic science literature:

1. *Examination of the Antarctic Animals Ethics Committee's (AAEC) Animal Experimentation Guidelines*

The CAFG-GACTA will be used in the examination of the AAEC's *Animal Experimentation Guidelines*. Just as it is expected that several clauses within the guidelines will not reflect any guna characteristics, so it is also expected that several clauses within the guidelines will not represent any Abhidharma factors. Only parts of the text that clearly represent factors will be acknowledged and discussed. As the Abhidharma stipulates that *non-violence* (including non-violence towards non-human beings) is a Positive Mental Event, that *malice/cruelty*; *shamelessness*; and *unconcern/unconscientiousness* are Negative Mental Events and that *morality/virtue* and *loving-kindness* are Positive Perfections, scientists' treatment of animals in research may prove a particularly good indicator of scientists' quality of consciousness, according to the Abhidharma.

2. *Responses to Interview Series Question No. 7*

Responses will be processed against Abhidharma mental events, emotions and perfections listed and defined within the CAFG-GACTA. General trends and outstanding features in terms of representation of Abhidharma factors within responses will be identified and discussed. It is acknowledged that whilst responses given by some scientists may represent several factors from the same, or from different Factor Contrast Groups (see section 3.4.1) others may contain very few or none at all, depending on interviewees' choices of topics, language, grammar etc in addressing relevant issues.

3. Examination of Peer-reviewed Science Literature

Examination of peer-reviewed journal articles using Abhidharma factors will differ slightly from that using the Vedic triguna. Essentially the examination will be the same, in that as the triguna will seek to identify guna characteristics within article texts, the Abhidharma will seek to identify Abhidharma factors within texts. As the Abhidharma does not contain as many factors as the triguna does characteristics, however, it is expected that the examination using the Abhidharma will produce less variety in findings compared to that of the triguna. Whereas the triguna encompasses distinguishing qualities of the individual's activities, thoughts, opinions, attitudes, behaviours etc. the Abhidharma primarily addresses the individual's mental and basic emotional qualities. For this reason, identification of Abhidharma factors within journal articles will consist of one examination only of all articles within each of the three different research groups, namely physical science, biological science and human impact studies.

Features identified as representing one, or more than one factor will be identified and discussed in relation to which Factor Contrast Group it/they represent. Statements

by authors considered very clear representations of a specific factor will be discussed in the following manner (the article excerpt is followed by the identification of relevant gunas [one paragraph only]):

Arata, Javier, Robertson, Graham, Valencia, Jose, Xavier, Jose C., and Moreno, Carlos A. 2004. "Diet of Grey-Headed Albatrosses at the Diego Ramirez Islands, Chile: ecological implications." *Antarctic Science*, 16 (3):263-75.

The excerpt is taken from page 266:

> Samples were obtained from chicks immediately after they had been fed by a parent, by inverting the chick over a plastic bag and gently squeezing its stomach and massaging its throat. This procedure induced the chick to vomit into the bag. Chicks were made to vomit only once during the season. Stomach emptiness of each sampled chick was verified by palpation of its abdominal wall.

The above excerpt indicates the presence of two different Abhidharma factors. The Negative Mental Event of *malice/cruelty* is described by the CAFG-GACTA as that which "lacks loving-kindness, pity, and affection, and has the function of treating others abusively" (Appendix B, 9). 'Others' includes non-human beings. The Negative Mental Event of *lack of sense of propriety/inconsideration for others* is also relevant. The CAFG-GACTA describes this factor as being manifest when individuals need respect for others in order to act appropriately and as "not restraining oneself by taking others as the norm" (Appendix B, 10). That chicks were made to vomit once only during the relevant season shows some degree of representation of *concern/ conscientiousness*, a Positive Mental Event.

An overall appraisal will then be made of Abhidharma factor predominance within each of the three research groups (physical science, biological science and human impact studies).

3.5 Chapter Conclusion

If results from the processing of data using both the Vedic triguna and the Theravada Abhidharma determine that the quality of consciousness of Australian Antarctic scientists is currently poor, then the thesis proposition will be supported. Regardless of the two systems' appreciation of the current qualitative level of consciousness of Australian Antarctic scientists, however, the thesis objective, namely to investigate if a need exists for scientists to raise their qualitative level of consciousness, will be satisfied by the data-collection and processing outlined in this chapter.

The presentation of results from data processing is itself anticipated to shed light on the meaning of overall results. In particular, data presented in accordance with the premises of the SHPS model is expected to contribute significantly towards the meaning of scientists' overall quality of consciousness. The Australian Antarctic scientist quality of consciousness profile will be constructed in consultation with both the GPCG and the APCG in Chapter Seven. As data significance guides, both the SIGS and the SIAF will enhance interpretation and understanding of overall results.

As the first of three data processing chapters, Chapter Four analyses results of scores from the AASI and the IGSQ.

CHAPTER FOUR

THE AUSTRALIAN ANTARCTIC SCIENTIST INVENTORY AND THE IDEAL GUNA SITUATEDNESS QUESTIONNAIRE

By reducing the psyche to matter, materialism displaces an ontology of consciousness…the human being is reduced to a thing-a reified biological machine engineered by evolution and stimulated by the environment.

Jon Mills in "Five Dangers of Materialism" (2002, 10)

Chapter Outline
Chapter Four, as the first of three data collection and processing chapters, discusses procedures for distributing the AASI and the IGSQ. It outlines the processing of scores for both the AASI and the IGSQ, showing results according to the DCPF presentation and evaluation components and additional models including pie charts, a line-graph and histograms. AASI scores are examined both collectively and individually with the aid of the CGCG and the GDEG. IGSQ scores are processed according to participant' opinions about the ideal qualities of consciousness for environmental scientists.

4.1 AASI: Distribution and Initial Results

4.1.1 AASI Distribution, Participation Rate and Procedure

Managers of science organisations (see section 1.1.2) were contacted and asked if the AASI could be distributed within their organisations. All organisations agreed to participate. An initial group email was then sent out to all scientists inviting them to participate in the AASI. An example of such an email appears in Appendix D with the AASI Information Sheet, distributed with each AASI. Primarily, the Information Sheet informed scientists who was conducting the relevant research and for what purposes, the overall benefits of the research and issues regarding confidentiality of participants. According to current human research guidelines, a consent form is not required for a questionnaire distributed for research purposes as participation itself is accepted as consent to participate. Therefore no consent form was drawn up for participants in the AASI.

All science organisations listed in section 3.2.1 were located in the Hobart district in Tasmania, Australia. Numbers of AASI distributed to different Antarctic organisations were based on numbers of scientists currently engaged in research within those organisations. Participation itself was influenced by factors such as whether or not scientists were present in Hobart at the time of distribution, on study-leave, sick-leave etc. The total number of AASI distributed was 273:

i) Australian Antarctic Division: 149
ii) Institute of Antarctic and Southern Ocean Studies, the Antarctic Climate and Ecosystem Cooperative Research Centre, and the

University of Tasmania (all situated within the University of Tasmania): 85

iii) Commonwealth Scientific and Industrial Research Organisation, Hobart: 36

iv) Commission on the Convention of Antarctic Marine Living Resources: 2

v) Bureau of Meteorology, Hobart: 1

Out of the 273 AASI distributed, 115 were returned completed (c.42%). Twelve were returned blank (no responses at all). The remaining 146 were not seen again. As participation in the AASI was anonymous (insofar as individual scientists go, although organisations were identified) it is not known how many scientists within each organisation participated. Completed AASIs were returned either via ordinary mail or via anonymous collection within organisations.

4.1.2 Raw AASI Results

Whilst it was acknowledged that scientists may not have been able to respond accurately to all AASI statements, meaning that it may have been difficult for scientists to be truly objective about themselves on all issues, responses were nevertheless accepted as being accurate representations of scientists' qualities of consciousness. Raw scores of the AASI, presented in Appendix E, first show actual numbers of participants who responded to each Likert-scale option. Percentages of values have also been added (calculated to two decimal places). In addition to the six columns representing the six Likert-scale options, a seventh column has been included in the processing of results. This seventh column marked as 'Blank/No response at all' shows numbers of participants who, although participating in the AASI, for unknown reasons did not respond to a particular statement at all (no mark was made on their papers).

The highest incidence of a 'Blank' response (no response at all) for a single statement was 4 (i.e. for one statement, four participants out of the total 115 left no mark on their papers). For two other statements, three participants left no mark, for six statements 2 left no mark and for 17 statements 1 participant left no mark. As these scores show a relatively low incidence of a 'Blank' response, no attempts were made to determine the causes of such a lack of scores. As 'Blank' responses were fairly evenly distributed over statements from all the three gunas, there was no sign that statements themselves or gunas representing statements played a role in causing 'Blank' responses.

Raw AASI scores were further processed in order to accommodate easy interpretation of results. In order to present data in graphs and in order to present a more coherent conception of scientists' support for each guna, numbers corresponding to Likert-scale options were reversed, so that Strongly Agree for a guna was represented by the value 5, and Strongly Disagree was represented by the value 1. A high average score thus corresponds to a high representation within each guna (high/great support for the guna) and a low score corresponds to a low representation. Original scores and reversed scores appear together in an Excel spreadsheet in Appendix F. Original scores begin at A1 and reversed scores begin at BK1.

4.1.3 Summary of AASI Results According to the Three Gunas as Separate Categories
The following table shows mean values of all scores for each guna:

TABLE 4.1.3.1: Percentages of AASI Responses Showing Scientist Support for Each Guna

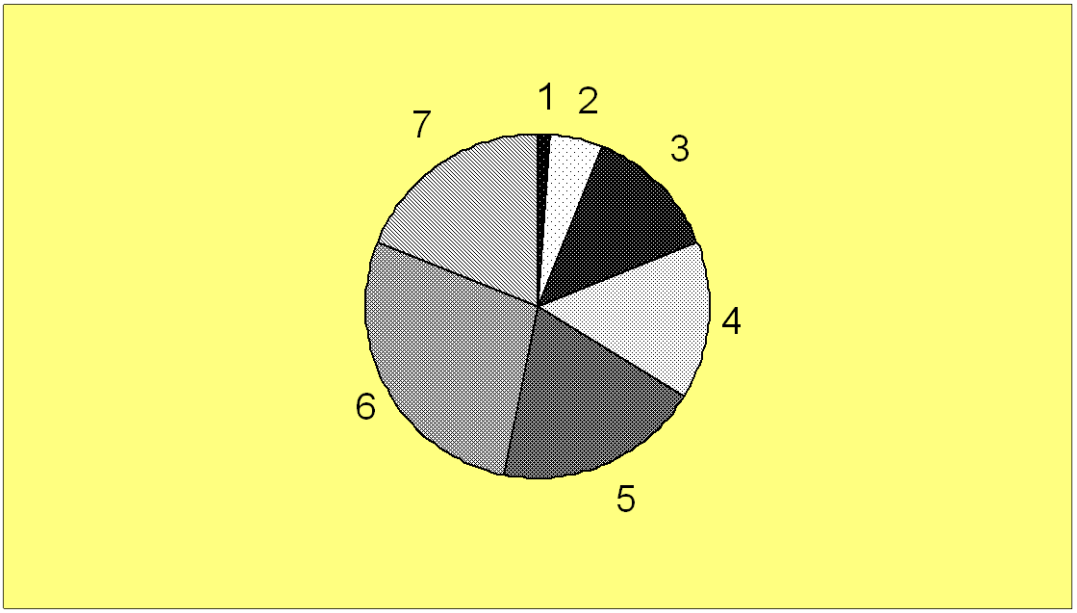
Scores have been rounded off to their nearest whole value.

GUNA	STRONGLY AGREE	BASICALLY AGREE	NEUTRAL	BASICALLY DISAGREE	STRONGLY DISAGREE	NO RESPONSE SELECTION	BLANK/NO MARK ON PAPER
SATTVA	19 %	28 %	19 %	15 %	13 %	5 %	1 %
RAJAS	24 %	38 %	17 %	13 %	4 %	4 %	Less than 1 %
TAMAS	10 %	19 %	15 %	27 %	26 %	2 %	Less than 1 %

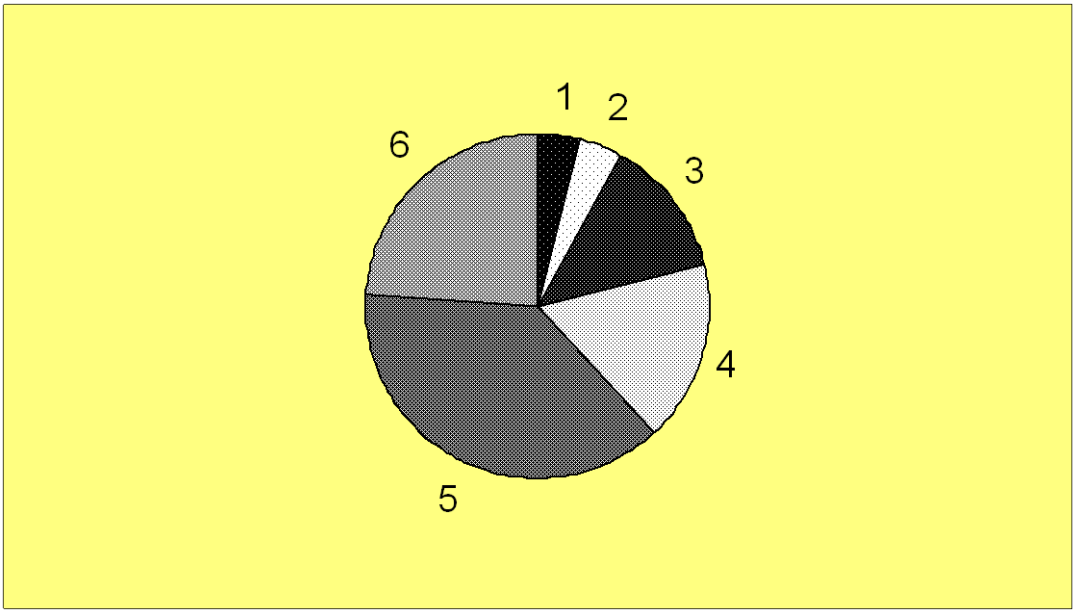
These results were further presented in the following pie charts:

PIE CHART 4.1.3.1: AASI Scores for Sattva Guna

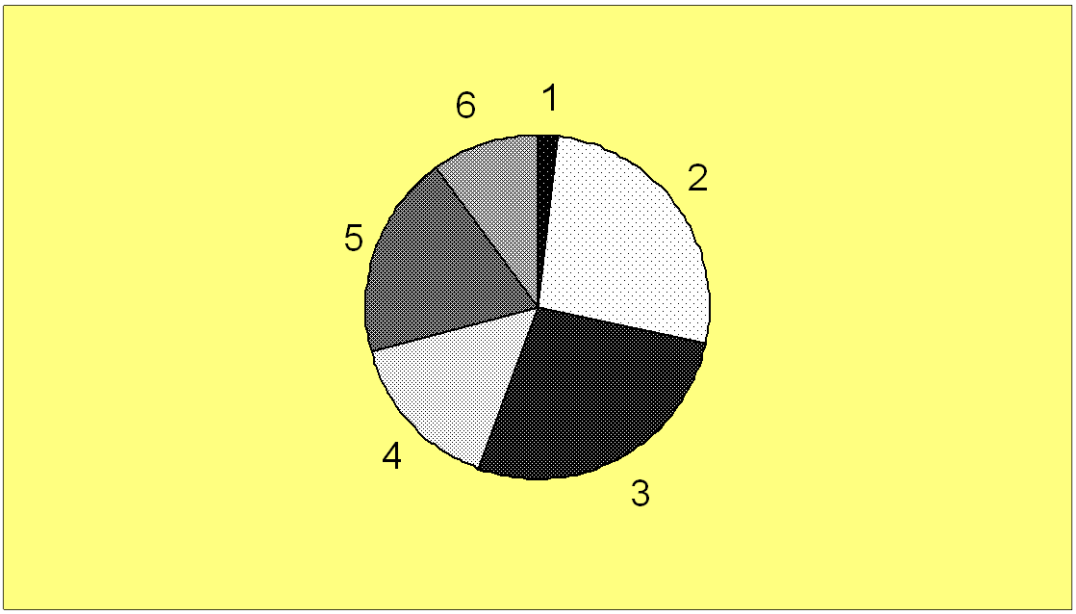
AASI SATTVA SCORE KEY: 1: Blank/no mark made on paper 1%; 2: No Response Selection 5%; 3: Strongly Disagree 13%; 4: Basically Disagree 15%; 5: Neutral 19%; 6: Basically Agree 28%; 7: Strongly Agree 19%.



PIE CHART 4.1.3.2: AASI Scores for Rajas Guna
AASI RAJAS SCORE KEY: 1: No Response Selection 4%; 2: Strongly Disagree 4%; 3: Basically Disagree 13%; 4: Neutral 17%; 5: Basically Agree 38%; 6: Strongly Agree 24%.

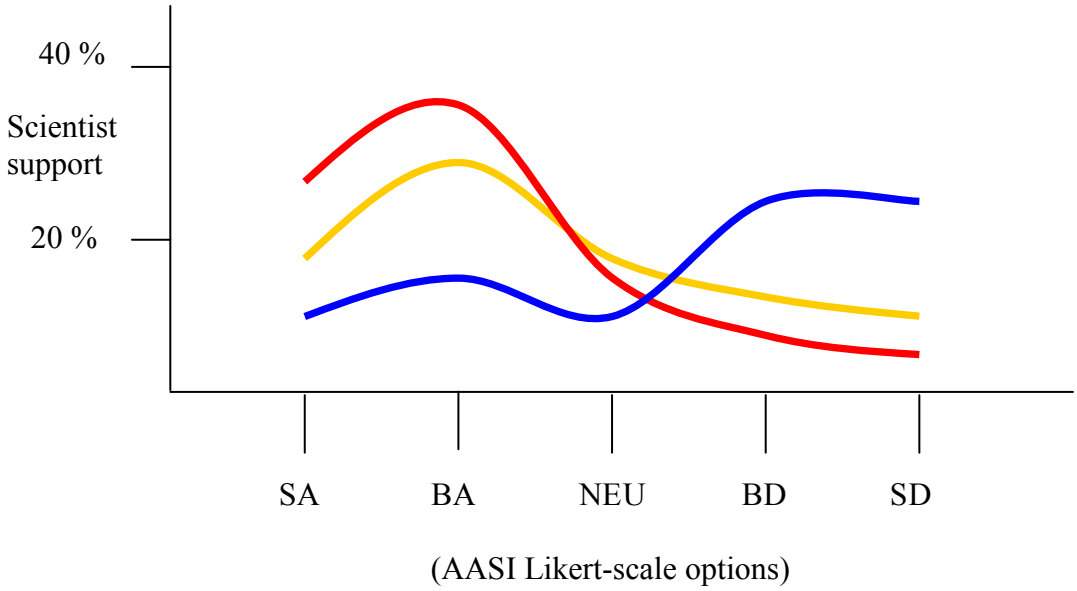


PIE CHART 4.1.3.3: AASI Scores for Tamas Guna
AASI TAMAS SCORE KEY: 1: No Response Selection 2%; 2: Strongly Disagree 26%; 3: Basically Disagree 27%; 4: Neutral 15%; 5: Basically Agree 19%; 6: Strongly Agree 10%.



Percentages are further presented in the following line graph in order to depict overall trends in scores. The highest scoring guna was rajas guna with 38 % of scientists supporting the Likert-scale option Basically Agree. Adversely, only 4 % of

participants strongly disagree with the premises of rajas guna, meaning that very few scientists are strongly opposed to the characteristics that comprise rajas guna behavioural norms. The trends of both sattva and rajas gunas are that scientists generally agree with and/or adhere to the behavioural norms that they represent. Adversely, tamas guna did not receive much support, but relatively high opposition. In the following line-graph colours represent gunas according to triguna theory: yellow (sattva guna) represents clarity and illumination, red (rajas guna) represents energy and passion and blue (tamas guna) represents ignorance and depression (Bhaktivedanta 1996, *adi-lila*: 5:66):

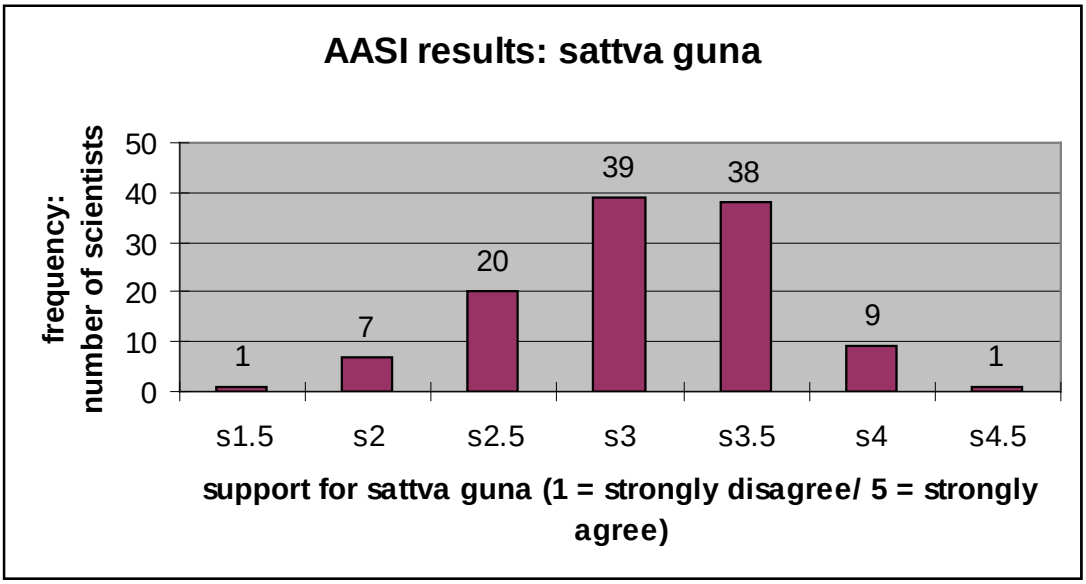


GRAPH 4.1.3.1: Line Graph Depiction of Results

In order to further present AASI results in histograms, to show the distribution of average scores of individual scientists for each guna, each individual scientist's score was rounded off to the nearest whole or half value. Numbers are presented in Appendix F, beginning at DZ1 of the Excel spreadsheet. The histogram for sattva guna shows that most scientists have scores of 3 (neutral) or 3.5 (agreeing only minimally). Within rajas guna most scientists had scores of 3.5 or 4, with only one score appearing below neutral. This indicates that most scientists are influenced by or somehow identify with, the qualities of this guna. Within tamas guna, most scientists had scores between 1.5 (quite strongly disagree) to 2.5 (disagreeing only minimally) suggesting that most scientists were opposed to tamasic consciousness:

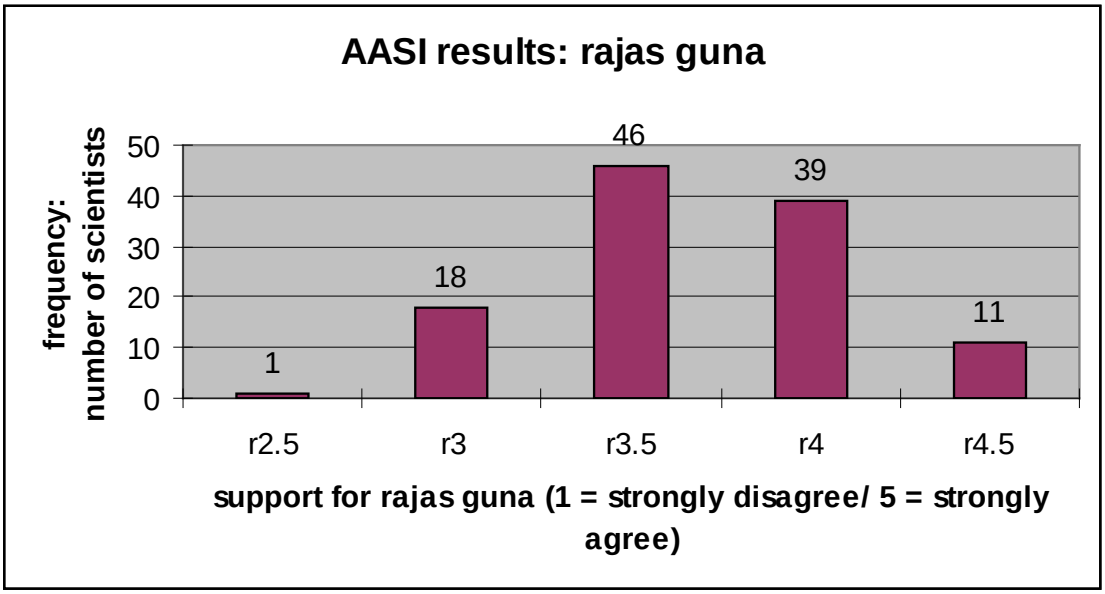
GRAPH 4.1.3.2: Histogram Presentation of Individual Scientists' AASI Results for Sattva Guna

Mean = 3.096
Std. Dev. = 0.5457
N = 115



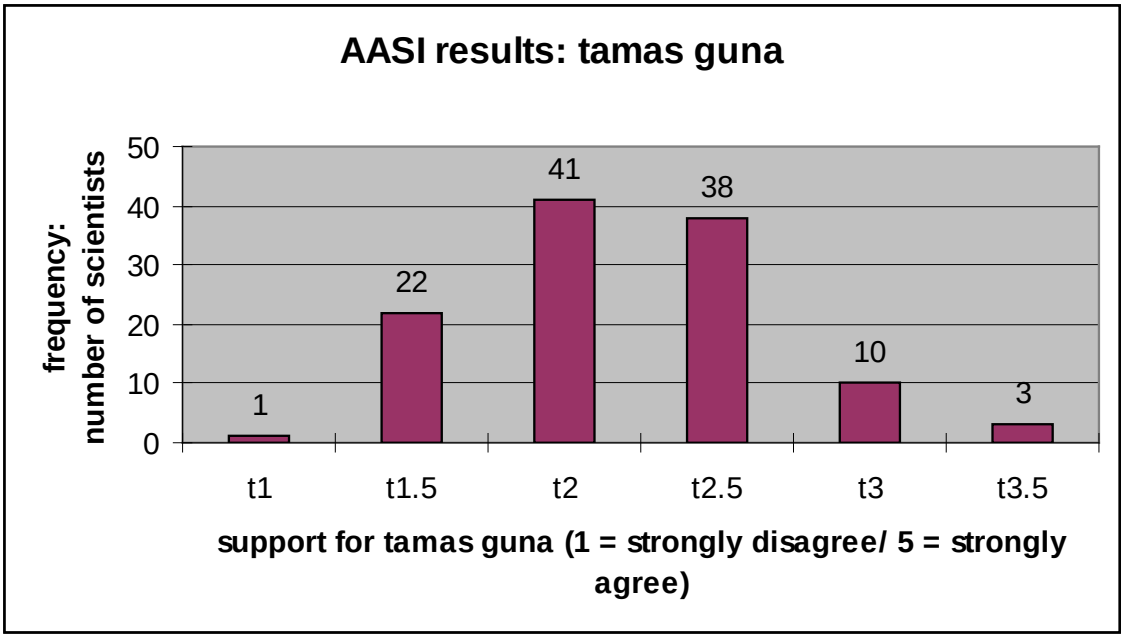
GRAPH 4.1.3.3: Histogram Presentation of Individual Scientists' AASI Results for Rajas Guna

Mean = 3.678
Std. Dev. = 0.4452
N = 115



GRAPH 4.1.3.4: Histogram Representation of Individual Scientists' AASI Results for Tamas Guna

Mean = 2.187
Std. Dev. = 0.502
N = 115



As is demonstrated in the above charts and graphs, differences in distributions of scores for the three gunas are quite large. In other words, results show definite trends in terms of scientists' qualities of consciousness, according to triguna methodology. A separate test was carried out to determine the statistical significance of differences in scientists' support for each guna, in order to verify that differences were not due to chance. AASI scores were copied into the computer program Statistical Product and Service Solutions (SPSS) with scores for both Likert-scale options "I choose not to respond" and scores that represented "blank" (no mark made on the paper) being designated as "missing values." A mean score was then calculated for each AASI participant across all 20 statements within each guna. The mean (standard deviation) for each guna scale was for:

sattva guna: 3.26 (0.37); rajas guna: 3.66 (0.38); and tamas guna: 2.56 (0.34).

Further analysis of scores was carried out, applying more stringent consistency criteria for retaining AASI statements as representative of their respective gunas. Statements were retained only if their scores were significantly positively correlated with the total score for the guna, and also if the correlation with the total score of their own guna was higher than its correlations with the total scores of the other gunas. In other words, statements had to relate significantly to their own guna and more closely to their own guna, than either of the other two gunas.

Appendix G shows the correlation between each AASI statement and each individual participant's mean score for each guna. The original means for all three gunas have been entered as sattva 1; rajas 1; and tamas 1. When guna statements that did not significantly relate to the total of their own gunas and that did not relate more strongly to their own guna than to the other gunas, they were deleted. Remaining statements included: 14 within sattva guna: 18 within rajas guna: and 12 within tamas guna. Means calculated according to revised scales (scales of AASI statements that remained after irrelevant statements were deleted) were then entered as sattva 2; rajas 2; and tamas 2. Correlations are presented in Appendix H:

Sattva 2 = mean (S5, S10, S12, S16, S19, S26, S27, S35, S38, S45, S49, S50, S54, S57).

Rajas 2 = mean (R1, R3, R7, R14, R17, R18, R20, R22, R23, R25, R29, R33, R36, R39, R42, R44, R52, R59).

Tamas 2 = mean (T2, T4, T6, T8, T15, T21, T28, T40, T47, T51, T53, T60).

Finally, a reliability analysis was carried out for both the original scales and the revised scales. Reliability was measured according to the standardised Cronbach's alpha coefficient, with .80 or better showing a fairly high level of internal consistency:

Original scales using all 20 statements were for:

sattva guna: .67; rajas guna: .72; and for tamas guna: .51.

Revised scales using selected statements were for:

sattva guna: .75; rajas guna: .70; and for tamas guna: .62.

Reliabilities of the revised scales, identified to determine internal consistency and stability of the triguna, suggest that they may be multifaceted i.e. the results suggest the presence of several sub-scales within each guna that are *positively* related, but not *perfectly* related. Individual guna characteristics within each guna represent different aspects of their respective gunas, but do not necessarily represent cohesiveness between all characteristics (Colman 2003, 629). Means and standard deviations of the revised scales were for:

sattva guna: 3.10 (0.52); rajas guna: 3.70 (0.42); and for tamas guna: 2.15 (0.50).

Despite the differences, original and revised scales were very highly correlated, as the following values show:

sattva guna: r = .94; rajas guna: r = .97; and tamas guna: r = .86.

Finally, a repeated measures ANOVA was performed to assess whether the differences between the means for the three gunas were statistically significant.

Colman (2003, 35) describes an ANOVA as "a statistical procedure for testing the significance of differences among several group means by partitioning the total variance in the dependent variable into effects due to the independent variable." The multivariate test for the equality of the three means was highly statistically significant, with Wilk's Lambda = 0.16, F (2,113) = 306.44, $p < .001$. Individual comparisons between the three pairs of means showed that all three differences were statistically significant, with $p < .001$, even after a Bonferroni adjustment to the p value to allow for the three tests. This clearly establishes the predominance of rajas guna, followed by sattva guna and then tamas guna as substantially lower again in AASI scores.

Tables containing results from correlation analyses of original and revised scales, as well as descriptive statistics, a linear model and calculations of estimated marginal means, all appear in Appendix H.

4.1.4 AASI Results According to the Stratified Hierarchical Presentation of Scores (SHPS)

AASI results were further entered into an adapted version of the SHPS model (see section 3.3.1). A popular philosophical environmental ethics concept, namely the dichotomy of the instrumental value of the natural environment versus its intrinsic value, was consulted in discussing overall results. This dichotomy states that the natural environment, specifically living beings within that environment, can be appreciated either for its own intrinsic self-value or for its value as instruments or commodities to be utilised, that it may hold for others (Callicott 1995a, 364; 1995b, 370; Fox 1995, 3-18). Humankind valuing living beings as commodities is broadly accepted as being rooted in anthropocentrism, whereas valuing them primarily for their own intrinsic selves is often associated with maintaining a spiritual outlook on the natural environment.

The following adapted version of the SHPS model presents AASI scores in relation to the philosophical premises maintained by the dichotomy of intrinsic value of the natural environment versus its instrumental value, as described in the above-cited publications:

TABLE 4.1.4.1: AASI Results According to Adapted SHPS Model/ Intrinsic versus Instrumental Value of the Natural Environment

- AASI SCORE KEY: SA = Strongly Agree; BA = Basically Agree; NEU = Neutral; BD = Basically Disagree; SD = Strongly Disagree; NRS = No Response Selection; BL = Blank/no mark made on paper; **hs** = highest score within guna.
- Scores have been rounded off to their nearest whole value.

AASI SCORES	GUNA CHARACTERISTICS RELEVANT TO AUSTRALIAN ANTARCTIC SCIENCE	INTRINSIC/ INSTRUMENTAL VALUE DICHOTOMY
↓ SPIRITUAL/NON-MATERIAL SUDDHA-SATTVA PLATFORM ↓		
NO AASI SCORES	• ABSOLUTE/SPIRITUAL KNOWLEDGE, INCLUDING SUPERIOR KNOWLEDGE ON THE MATERIAL REALM • TRANSCENDENTAL PLATFORM OF SELF-REALISATION • EXPERIENCE OF NON-DUAL VARIEGATEDNESS • FREEDOM FROM DELUSION CAUSED BY THE THREE MATERIAL MODES	• ALL SPECIES OF LIFE ARE VALUED ACCORDING TO THEIR ETERNAL NON-MATERIAL QUALITIES AND POSITION i.e. THEIR ULTIMATE INTRINSIC VALUE • THE REALISATION THAT THE SPIRITUAL OR INTRINSIC WELFARE OF ALL LIVING BEINGS IS INTERCONNECTED • THE UNDERSTANDING THAT VALUING OTHER LIVING BEINGS' INTRINSIC NATURE LEADS TO THE TERMINATION OF MATERIALISM (AS THE CAUSE OF VALUING OTHERS FOR THEIR INSTRUMENTAL WORTH)
↓ MATERIAL SATTVA GUNA ↓		
AASI SCORES: 1. SA 19 % **2. BA 28 % (hs)** 3. NEU 19 % 4. BD 15 % 5. SD 13 % 6. NRS 5 % 7. BL 1 %	• THE PURSUIT OF GREATER AND REAL KNOWLEDGE • THE BEGINNING OF SPIRITUAL KNOWLEDGE • NON-ATTACHMENT TO THE RESULTS OF WORK • MATERIAL SIMPLICITY/NON-COMPLEXITY • CAREFUL STUDY OF THE PAST AND FUTURE • CONTROL OF THE MIND AND THE SENSES • REGULATED WORK HABITS • SELF AWARENESS • ETHICAL/MORAL WORK	• THE INTRINSIC VALUE OF ALL SPECIFIC OF LIFE IS PRIORITISED OVER THEIR INSTRUMENTAL VALUE • THE INTRINSIC VALUE OF ALL SPECIFIC OF LIFE IS MADE THE RESEARCH PRIORITY • THE INTRINSIC OR INNER NON-MATERIAL NEEDS OF ALL SPECIFIC OF LIFE ARE PRIORITISED OVER THEIR EXTRINSIC OR MATERIAL NEEDS • ALL SPECIFIC OF LIFE ARE TREATED AS BEING EQUALLY IMPORTANT

	• PURPOSEFUL/RESPONSIBLE WORK • KNOWLEDGE ON WHAT IS BENEFICIAL FOR ALL SPECIES OF LIFE (MATERIAL AND NON-MATERIAL BENEFITS) • MAINTENANCE/ SUSTANABILITY	• ALL SPECIES OF LIFE ARE ALLOWED TO LIVE TO THE END OF THEIR NATURAL LIFE-SPAN • NO SPECIES OF LIFE ARE EXPLOITED
MATERIAL RAJAS GUNA ↓		
AASI SCORES: 1. SA 24 % **2. BA 38 % (hs)** 3. NEU 17 % 4. BD 13 % 5. SD 4 % 6. NRS 4 % 7. BL -	• KNOWLEDGE GATHERED THROUGH THE MATERIAL SENSES (EMPIRICISM) • ADHERENCE TO MUNDANE KNOWLEDGE • SEEKING FAME, GLORIFICATION AND ADMIRATION • AMBITION/CAREER-MINDEDNESS • NATIONALISM • MATERIAL COMPLEXITY • GREAT ENDEAVOUR • FALSE PRIDE • SENSE ENJOYMENT • PROPRIETORSHIP • ATTACHMENT TO THE FRUITS/RESULTS OF WORK • ECONOMIC PRIORITISATION • THE ACCUMULATION AND/OR SPENDING OF MONEY FOR MATERIAL PURPOSES • GREED	• NON-HUMAN LIVING BEINGS ARE APPRECIATED PRIMARILY FOR THEIR INSTRUMENTAL VALUE • THE INSTRUMENTAL VALUE/CAPACITY OF NON-HUMAN LIVING BEINGS IS MADE THE RESEARCH PRIORITY • MATERIAL NEEDS OF NON-HUMAN LIVING BEINGS ARE CONSIDERED SECONDARY TO THE NEEDS OF HUMANS. THEIR NON-MATERIAL NEEDS ARE MOSTLY IGNORED. • INEQUALITY BETWEEN DIFFERENT SPECIES • NON-HUMAN LIVING BEINGS ARE OFTEN NOT ALLOWED TO LIVE TO THE END OF THEIR NATURAL LIFE-SPANS, DUE TO HUMANS KILLING THEM FOR THEIR INSTRUMENTAL VALUE
↓ MATERIAL TAMAS GUNA ↓		
AASI SCORES: 1. SA 10 % 2. BA 19 % 3. NEU 15 % **4. BD 27 % (hs)** 5. SD 26 % 6. NRS 2 % 7. BL -	• IGNORANCE/NESCIENCE • FOOLISH, MATERIALISTIC KNOWLEDGE • WORK IMPELLED BY ENVY • THE FAILING OF AWARENESS OF A HIGHER SPIRITUAL NATURE WITHIN ALL MANIFESTATIONS • DISHONESTY • ACTING WHIMSICALLY, FOR NO PURPOSE • EXPLOITATION • SPEAKING (PUBLICISING) WITHOUT SCRIPTURAL AUTHORITY • HELPLESSNESS	• NEITHER THE INTRINSIC NOR INSTRUMENTAL VALUE OF LIVING BEINGS ARE APPRECIATED • NO RESEARCH IS DIRECTED TOWARDS EITHER THE INTRINSIC OR INSTRUMENTAL VALUE OF LIVING BEINGS • LIVING BEINGS OTHER THAN ONESELF ARE EXPLOITED • DESTRUCTION OF OTHER LIVING BEINGS, INCLUDING DESTRUCTION OF THEIR HABITATS, EVEN WHEN SUCH

	• INDULGENCE IN FALSE HOPES • DESTRUCTION	DESTRUCTION DOES NOT BRING ANY GAIN TO THE DESTROYER

4.2 Examination of AASI Scores for Individual Gunas

4.2.1 Examination of AASI Scores for Sattva Guna

According to the guide Significance and Implications of Guna Situatedness (SIGS) (see section 3.3.1) the immediate implications of scientists predominating within sattva guna are very favourable for scientists achieving higher ethical environmental goals and acquiring real knowledge about the natural environment. Potential future implications, the achievement of global environmental sustainability, may also eventuate if rajas and tamas gunas influences can be kept to an absolute minimum. Although sattva guna was not the AASI's highest scoring guna, general trends in scores for sattva guna followed those of rajas guna relatively closely, in terms of overall support and opposition. The following table presents results for individual AASI sattva guna statements, including comments on the meaning and anticipated ramifications of scores:

TABLE 4.2.1.1: Examination of AASI Scores for Sattva Guna

- Comments by the thesis researcher on the meaning and anticipated ramifications of scores are founded on descriptions of guna characteristics entered in Appendix A. Further sources of information include readings from publications listed in Appendix A.
- AASI SCORE KEY: SA = Strongly Agree; BA = Basically Agree; NEU = Neutral; BD = Basically Disagree; SD = Strongly Disagree; NRS = No Response Selection; BL = Blank/no mark made on paper
- Statements have been numbered in the table according to how they appear within the AASI itself. Scores have been rounded off to their nearest whole value.

AASI STATE-MENT NO.	AASI STATEMENTS	AASI SCORES	COMMENTS ON THE MEANING and ANTICIPATED RAMIFICATIONS OF SCORES
5	I am usually aware of the state or condition of my own consciousness during my working day.	SA = 27 % BA = 49 % NEU = 17 % BD = 3 % SD = 3 % NRS = 2 % BL = 0	This statement received strong support (SA + BA = 76 %) from scientists, meaning that most scientists are under the impression that they are aware of the state of their consciousness during working hours. This type of *awareness* is an important sattvic characteristic and generally is associated with an awareness of one's own spirituality. Scientists may have responded to this statement without spiritual considerations, however, interpreting the glossary definition of consciousness (the awareness of an individual living being) as pertaining to, for example, biological sensing. This would be more consistent with scores to other statements addressing spiritual topics (Statements No.16 and 17).
9	It is very important to me to be thoroughly honest in all of my work as a scientist.	SA = 77 % BA = 18 % NEU = 4 % BD = 0 SD = 0 NRS = 0 BL = 1 %	*Honesty* is an important cornerstone of sattva guna. A very high score (SA + BA = 95 %) indicates scientists' strong dedication to be honest in their scientific activities. Although this is so, this does not guarantee that information presented by scientists will always be accurate. Due to the influences of rajas and tamas gunas, scientists' may unwillingly be disseminating inaccurate information, even though they may desire to act honestly.
	I believe spiritual insight and	SA = 13 %	The scores for agreeing (BA and SA = 30 %) and disagreeing (BD + SD = 32

10	wisdom should play an active role in contemporary scientific research such as physics and biology.	BA = 17 % NEU = 28 % BD = 15 % SD = 17 % NRS = 7 % BL = 3 %	%) with the statement are fairly well balanced. A significant number of scientists (28 %) preferred the neutral position on this guna characteristic, which may be attributed to scientists' unfamiliarity with the suggestion that spiritual insight and wisdom should play a role in science. They may not have previously spent time contemplating the idea, therefore choosing to not commit themselves either way.
12	As I believe that no person can assert proprietorship over the Earth or any part of her, I support the view that claimant countries such as Australia should withdraw their territorial claims on Antarctica.	SA = 3 % BA = 8 % NEU = 24 % BD = 27 % SD = 27 % NRS = 9 % BL = 2 %	As Australia's claim on Antarctica is what gives Australian scientists the 'right' and 'facility' to carry out Antarctic science, the scores for this statement are significant. SA + BA = 11 % meaning that more than one in every ten Australian Antarctic scientists holds the opinion that Australia should withdraw her claim on the Antarctic continent. However, the general lack of support for this sattvic characteristic means that most scientists do support the concept of *proprietorship*, which is inherent to rajas guna.
13	I would describe myself as detached and aloof from my physical body.	SA = 3 % BA = 1 % NEU = 8 % BD = 37 % SD = 45 % NRS =5 % BL = 1 %	There is little support for the sattvic characteristic underpinning this statement, meaning that scientists are generally attached to their physical bodies. This means that they value their physical bodies. It also indicates that they choose to experience life through their physical bodies (through the material senses, the material mind and intellect etc.). According to the Vedanta, this means that scientists' consciousness is primarily experienced through the two lower modes of nature (passion and ignorance) as within the mode of goodness, the individual begins to detach from experiencing life through the physical senses and intellect, instead experiencing life through purer uncontaminated consciousness.
16	I describe myself as a very alert person, aware of myself, my immediate environment and my remote environments.	SA = 31 % BA = 53 % NEU = 10 % BD = 4 % SD = 1 % NRS = 0	This sattvic statement gained much support (SA + BA = 84 %) indicating that scientists see themselves as being alert to and aware of their environments. These characteristics are akin to other sattvic characteristics such as *wakefulness* and generally being conscious of one's surroundings. It shows a higher quality of consciousness than its equivalent in rajas guna (see Appendix A) in which the individual's consciousness is more covered by the subtle

		BL = 0	material energy, meaning a lesser degree of general *alertness*; *awareness*; and *wakefulness*.
19	It is my opinion that scientific research into the consciousness of Antarctic fauna should be made a research priority by Australian Antarctic management.	SA = 5 % BA = 10 % NEU = 27 % BD = 18 % SD = 35 % NRS = 4 % BL = 1 %	Most scientists (BD + SD = 53 %) opposed the suggestion made in this statement. This is to be expected of a community of scientists engaged in empirical research methods, in which research is not ordinarily directed towards non-material phenomena such as consciousness. These results reflect the lack of acknowledgment of the significance of consciousness by broader society at large. Whilst psychologists and physicians within Western mainstream society address consciousness within rudimentary biological research parameters, the topic on its own is generally not given much attention by academic and other professional communities. Such research, when conducted is specifically affiliated with the sattvic *pursuit of greater and real knowledge*.
26	It is important to me to work in an environment that is clean, smoke-free, light, airy and free from foul language.	SA = 37 % BA = 43 % NEU = 11 % BD = 3 % SD = 3 % NRS = 2 % BL = 2 %	*Cleanliness*, as a sattvic characteristic, is relevant to both internal cleanliness (the mind, intentions etc.) as well as external cleanliness (the physical body, the physical environment etc.). A high score on this statement reveals scientists' preference for a less materially contaminated working atmosphere, although they may not themselves recognise it as being specifically that.
27	Ordinarily I am well organised, self-controlled and regulated in my work duties.	SA = 37 % BA = 43 % NEU = 5 % BD = 13 % SD = 2 % NRS = 0 BL = 0	Overall support for this sattvic characteristic (SA + BA = 80 %) is the same as for the previous sattvic statement (No.26). As with *cleanliness*, the characteristics of *being self-controlled*; *regulated*; *organised*; and *efficient* in performing work duties assist the individual to maintain a higher quality of consciousness, as they help to keep the individual's consciousness from being further contaminated, and thereby disturbed by the material energy.
31	Whether or not I achieve my desired results, I usually remain	SA = 26 % BA = 59 %	*Non-attachment to specific results of work*, such as scientific research, means that the individual does not expose his/her consciousness to being

	steadfast and equipoised in my determination to carry out my duties as a scientist.	NEU = 10 % BD = 3 % SD = 1 % NRS = 1 % BL = 0	contaminated by the lower material modes, in which the individual becomes attached to specific results of work (rajas guna). *Steadfastness* and *determination* to carry out one's prescribed duties is only achievable from the platform of goodness (sattva guna). Very high support for this statement (SA + BA = 85 %) indicates that most scientists have the ability to remain focused on work tasks regardless of results considered desirable or undesirable.
34	It is my opinion that Australian Antarctic scientific research should include careful study of both the past and the future.	SA = 47 % BA = 41 % NEU = 10 % BD = 2 % SD = 0 NRS = 1 % BL = 0	As the Australian Antarctic scientific program involves a substantial amount of palaeontologic research, as well as modeling of predicted trends in future climate, sea-level rise etc., the high support (SA + BA = 88 %) for this sattvic characteristic is not surprising. The characteristic itself (*careful study of the past and future*) is symptomatic of a higher quality of consciousness or awareness, in which one seeks to understand one's current position in relation to past and future events.
35	I understand the difference between auspicious and inauspicious work.	SA = 14 % BA = 44 % NEU = 19 % BD = 10 % SD = 3 % NRS = 9 % BL = 1 %	The AASI glossary entry for *auspicious* is 'favourable, promising, showing as a good omen' (see section 3.2.1). Most scientists basically agreed with this sattvic characteristic, indicating that they understand the difference between science that will be effective and science that will be ineffective. It must be noted, however, that effectiveness, as well as that which seems promising and favourable, are in response to this statement determined according to scientists' own criteria. As such, scores for this AASI statement must be accepted with appropriate discretion.
37	I usually experience a sense of happiness during my working day.	SA = 30 % BA = 41 % NEU = 23 % BD = 4 % SD = 0 NRS = 1 % BL = 0	In *Bhagavad-gita As It Is* (Bhaktivedanta 1989, 14:6) sattva guna is described as resulting in *a sense of happiness and knowledge*. Such happiness and knowledge are the products of the material mode of goodness, which, although representing a purer quality of consciousness than the material modes of passion and ignorance, is still a type of conditioning by matter. Real or complete happiness is described as being attained only when the individual is situated on the transcendental platform (suddha-sattva) free from all three material modes. The high support for this statement (SA + BA = 71 %)

			suggests a moderately strong presence of the mode of goodness amongst scientists.
38	One of the main reasons for me becoming an Antarctic scientist is that the 'otherworldly' nature of the Antarctic environment allows me to escape mundane realities.	SA = 2 % BA = 21 % NEU = 17 % BD = 31 % SD = 25 % NRS = 2 % BL = 2 %	This statement represents the sattvic characteristics of *clear awareness of the existence of a higher, spiritual nature within all entities* and *being interested in and concerned about spiritual matters*. As overall scores reveal a general lack of support for these characteristics, it can be surmised that most scientists became Antarctic scientists for other reasons i.e not because 'the 'otherworldly' nature of the Antarctic environment allows me to escape mundane realities.' It must also be mentioned, however, that the statement itself does not secure scientists' positions on whether or not they actually *do* escape mundane realities by experiencing the Antarctic environment, only that it was not a primary reason for their career-choice.
41	I am content to carry out my work duties without attachment for specific results.	SA = 6 % BA = 27 % NEU = 9 % BD = 35 % SD = 17 % NRS = 5 % BL = 1 %	This statement represents *non-attachment to specific work and to specific results of work*. Most scientists disagreed (SD + BD = 52%) meaning that most scientists' are attached to specific results from their work If such desires on behalf of scientists become prominent, the outcomes of their research could become blemished, rather than allowing the results to speak for themselves. Inaccurate research outcomes may in turn impact on environmental policy.
45	I am interested in how the spiritual soul is situated within the physical body of a living being.	SA = 3 % BA = 22 % NEU = 30 % BD = 20 % SD = 23 % NRS = 3 % BL = 0	*Being interested in and concerned about spiritual matters* is an important sattvic characteristic, whereas being uninterested in such topics is inherent to tamas guna, the mode of ignorance. Whilst there is some support for this statement (SA + BA = 25 %) many scientists did not support it (SD + BD = 43 %). A relatively high score for the neutral position (30 %) suggests a general disinterest in spiritual topics on behalf of scientists. Greater support for this statement by scientists would have indicated that *pursuit of greater and real knowledge* is important to Australian Antarctic scientists.
49	Antarctica's aesthetic nature inspires me to seek my spiritual	SA = 6 % BA = 20 %	Overall scores reveal a lack of support for this sattvic characteristic, although almost one third of scientists (32 %) chose the neutral position. As explained

	self.	NEU = 32 % BD = 23 % SD = 14 % NRS = 4 % BL = 0	above in comments on Statement No.45, interest in spiritual topics is an important sattvic characteristic. As scientists are not inspired to seek their spiritual selves from experiencing the Antarctic environment, they are experiencing that environment on the mundane level i.e. scientists are more interested in experiencing Antarctica through their material senses, including the subtle material mind and subtle material intellect, than through spiritual consciousness.
50	I believe real progress in science means an increase in knowledge by which one can distinguish material from non-material elements, and understand their interaction within this world.	SA = 6 % BA = 26 % NEU = 31 % BD = 16 % SD = 10 % NRS = 7 % BL = 3 %	There is more support (SA + BA = 32 %) than opposition (BD + SD = 26 %) to this sattvic characteristic. Almost one third of scientists (31 %) however, took the neutral position. These scores are surprising, as scientists in general work to advance materially based sciences only, and do not adhere to spiritually based or non-material sciences. Scores are encouraging in that they reveal a moderate interest in such research, meaning that a significant portion of the Australian Antarctic scientific community can see the value of knowledge on the interactions between matter and non-matter, which is an important aspect of knowledge within sattva guna.
54	I maintain that the purer one's consciousness is, the better scientist one is.	SA = 1 % BA = 10 % NEU = 40 % BD = 21 % SD = 16 % NRS = 12 % BL = 0	Four out of ten scientists took the neutral position on this statement. This could be due to scientists' lack of knowledge on the significance of quality of consciousness. There is greater opposition (BD + SD = 37 %) than what there is support (SA + BA = 11 %) for the relevant characteristics, namely *purity*; *knowledge concerning the spirit soul beyond the body*; *clear awareness of the existence of a higher, spiritual nature within all entities*; and *awareness of non-material phenomena, such as consciousness*. As already stated, these results point toward a lack of knowledge on scientists' behalf about the role and significance of quality of consciousness, as defined by Vedic and Buddhist teachings.
57	I am happy to carry out my professional duties for the satisfaction of the Supreme.	SA = 2 % BA = 10 % NEU = 25 %	Of particular significance within the scores for this statement, are the 22 % of scientists who chose to not respond to this statement (NRS). The AASI glossary definition of *The Supreme* is 'the ultimate controlling force of life

		BD = 15 % SD = 25 % NRS = 22 % BL = 1 %	itself, independent of any specific religious or non-religious designation' (see section 3.2.1). A high NRS score could mean that 22 % of scientists do not maintain that an ultimate controlling force of life exists at all. 40 % (BD + SD) of scientists did not support this statement, whilst 12 % (SA + BA) did support the statement, indicating that overall, scientists are not happy to carry out their professional duties for the satisfaction of the Supreme, whichever ontological premises may be attached to such a notion. Such a lack of support on behalf of scientists points towards rajas guna, in which activity (scientific research) without its offering to the Supreme (sattva guna) remains within rajas guna.

4.2.2 Examination of AASI Scores for Rajas Guna

The SIGS table (see section 3.3.1) states that scientists predominance within rajas guna means less-than ideal, or inferior outcomes of scientific research, due to the tendency of scientists' *intellect to become distorted due to too much activity* (the CGCG defines activity as 'physical, mental and intellectual activity for material purposes'). As the material potency of rajas guna covers or clouds the individual's mind and intellect, rendering the individual unable to perceive matters clearly, predominance within rajas guna eventuates in deficient conservation programs. Long-term implications are likely to be an increasing deterioration of the natural environment due to continuous compromises being made within the context of the prioritisation of material advancement, such as economic advancement, over both material and non-material needs of all species of life.

That rajas guna is the predominating guna amongst Australian Antarctic scientists supports Bhaktivedanta's (1989) and Kaur and Sinha's (1992) claims that modern society is highly characteristic of this guna (see sections 2.2.3 [4] and 2.2.5). The following table presents results for individual rajas guna statements, including comments on the meaning and anticipated ramifications of scores:

TABLE 4.2.2.1: Examination of AASI Scores for Individual Rajas Guna

- Comments by the thesis researcher on the meaning and anticipated ramifications of scores are founded on descriptions of guna characteristics entered in Appendix A. Further sources of information include readings from publications listed in Appendix A.
- AASI SCORE KEY: SA = Strongly Agree; BA = Basically Agree; NEU = Neutral; BD = Basically Disagree; SD = Strongly Disagree; NRS = No Response Selection; BL = Blank/no mark made on paper
- Statements have been numbered in the table according to how they appear within the AASI itself. Scores have been rounded off to their nearest whole value.

AASI STATE-MENT NO.	AASI STATEMENTS	AASI SCORES	COMMENTS ON THE MEANING and ANTICIPATED RAMIFICATIONS OF SCORES
1	I am passionate about my work.	SA = 47 % BA = 41 % NEU = 10 % BD = 2 % SD = 0 NRS = 0 BL = 1 %	As perhaps the most obvious or clear-cut representation of the material mode of passion, the strong support (SA + BA = 88 %) for this guna characteristic is significant. The quality of passion underpins all other rajasic characteristics, just as the quality of goodness underpins all sattvic characteristics and the quality of ignorance underpins all tamasic characteristics. The rajasic characteristic of *pratyaksa* or *knowledge derived through the material senses* (empirical knowledge), highly relevant to the activities of contemporary mainstream scientists, is underpinned by *passion* within the context of scientists' strong desires to satisfy their senses in the form of *extended sense gratification* (seeking stimulation from one's material environment, community, country etc.). *Concentrated selfishness/sense gratification* is also relevant, as scientists seek to stimulate their minds through directly engaging in empirical activities (Bhaktivedanta 1987-8, 1:2:8).
3	I like to engage my senses to experience things "Antarctic" (seeing pictures of Antarctica; hearing about expeditions etc.).	SA = 32 % BA = 45 % NEU = 13 % BD = 8 % SD = 0	Again, this rajas statement received much support from scientists (SA + BA = 77 %). *Gratifying the material senses* is a typical characteristic of rajas guna, and as mentioned above, includes the material mind as the sixth sense. As also stated above, when an individual indulges in gratifying his/her senses by exposing them to material pleasures, the pure consciousness of the jiva

		NRS = 1 % BL = 1 %	becomes cloudy, resulting in inferior decision-making. Whilst this phenomenon may be easy to theoretically understand, VCS states that whilst the individual is succumbing to such contamination, he/she is often unaware of its potency, or its ramifications, as such contamination occurs on the subtle material level (see section 2.2.5).
7	I am driven by the desire to enjoy the benefits reaped from working hard.	SA = 20 % BA = 43 % NEU = 23 % BD = 10 % SD = 3 % NRS = 0 BL = 0	*Material desire*; *attachment to the results (fruits) of work*; and *intense endeavour* are all endemic to rajas guna. As most scientists support this statement, the quality of consciousness of the Australian Antarctic scientific community can be described as being conditioned by scientists' desires for material gain, which is achieved by scientists pursuing material goals such as material knowledge.
11	I maintain that when the material body of a living being expires (death), the consciousness of the deceased individual dissolves (ceases to exist).	SA = 28 % BA = 28 % NEU = 23 % BD = 8 % SD = 5 % NRS = 6 % BL = 3 %	Most scientists supported this statement, which represents the feature of believing that the existence of non-material consciousness is dependent upon the existence of the material body. Maintaining such an understanding of consciousness is in itself a characteristic of rajas guna. Whilst empirical science has tried to produce viable theories as to the origins and functioning of consciousness, consciousness largely remains a mystery to scientists, as is evident from contemporary research literature. According to VCS, non-material consciousness can not be properly understood according to *empirical methods*, which is often a source of frustration and confusion for scientists. Whilst remaining a non-material phenomena, consciousness exists both objectively and subjectively according to Vedic conclusions, which is, in addition to other features of consciousness, difficult to accommodate by empirical science.
14	I do/would enjoy seeing my name appear in scientific publications, or even just mentioned within science-circles.	SA = 24 % BA = 58 % NEU = 13 % BD = 1 %	SA + BA = 82 %. This is very strong support for this statement, representing the characteristics of *seeking fame, glorification and admiration/a fondness for hearing oneself praised/ seeking honour, recognition and status within society*. This statement presents this characteristic in conjunction with another

		SD = 1 % NRS = 2 % BL = 1 %	rajasic characteristic, namely *ambition for material pursuits*. The strong support shown for this statement may indicate that these two characteristics combined underpin scientists' primary dedication to Antarctic science.
17	For most of my professional life I have strived towards attaining an enjoyable and comfortable lifestyle for my family and myself.	SA = 28 % BA = 47 % NEU = 11 % BD = 9 % SD = 3 % NRS = 3 % BL = 0	The rajasic characteristic of being *attached to the results of work* is also closely linked to the characteristic of *ambition for material pursuits*. Thus strong support (SA + BA = 75 %) for this statement is not surprising. It is indicative of a quality of consciousness that is directed towards *sense enjoyment*, even though that enjoyment may be extended through family, friends etc. A fundamental premise of VCS is that whilst one is directing one's consciousness towards enjoying through the material senses, a higher quality of consciousness is almost impossible to achieve.
18	I would describe myself as ambitious, as I am always endeavouring towards greater facility for achieving my goals as a scientist.	SA = 17 % BA = 46 % NEU = 18 % BD = 14 % SD = 3 % NRS = 1 % BL = 0	The scores for this statement add validity the scores for the two above statements, which also address *ambition for material pursuits* and being *attached to the results of work*. For this statement, SA + BA = 63 %, showing another strongly supported rajasic statement. *Ambition for material pursuits* can lead to too much activity on behalf of the individual, which can in turn distort the intelligence, according to Bhaktivedanta (1987-8, 11:25:17). Thus scientists, through their own ambition, may end up hampering their own efforts to achieve the goal of attaining accurate knowledge on the natural environment.
20	I tend to seek out scientific projects that are satisfying to my sense of curiosity and stimulating for my mind.	SA = 46 % BA = 43 % NEU = 6 % BD = 3 % SD = 0 NRS = 2 % BL = 0	As mentioned in the comments to Statement No.3, the material mind is described in Vedic literature as the sixth material sense (composed of subtle matter) after the five gross material senses of seeing, hearing, touching, smelling and tasting (Bhaktivedanta 1992, 3:2). Thus seeking to enjoy through the material mind is one form of *sense gratification*. An extremely high support for this statement (SA + BA = 89 %) suggests that the consciousness of Australian Antarctic scientists is highly directed towards finding ways in which to enjoy the science that they engage in. This may introduce a bias into the selection of Antarctic research projects, if projects considered interesting

			and stimulating are prioritised over projects considered boring, but necessary.
22	I never think about giving up my professional position for a simpler life.	SA = 6 % BA = 17 % NEU = 13 % BD = 50 % SD = 12 % NRS = 2 % BL = 0	This statement represents *attachment* to *material luxury*, or even just material comforts. Scores reveal that most scientists (BD + SD = 62 %) do not support the statement, meaning that most scientists *do* at times think about giving up their professional positions for a simpler life. This is indicative of a quality of consciousness endemic to sattva guna, in which the individual seeks to *renounce* his/her involvement with complex material affairs in order to focus on higher ethical and spiritual considerations.
23	I believe that acquiring scientific knowledge on the physical natural environment is the most important factor for achieving environmental sustainability.	SA = 23 % BA = 41 % NEU = 12 % BD = 17 % SD = 3 % NRS = 2 % BL = 1 %	The strong support for this statement (SA + BA = 64 %) reveals that most scientists believe in the superiority of their empirical scientific methods over other methods of acquiring knowledge, such as through scripture or from spiritually enlightened persons. As *maintenance, sustainability* and *preservation* of the material environment are characteristic of sattva guna, the type of knowledge required to achieve sustainability is also endemic to sattva guna (*greater* and *real knowledge*; *scriptural knowledge*).
25	I agree with the premise that consciousness can be reduced to the workings of physical structures such as atoms, molecules, organic cells and neural networks.	SA = 14 % BA = 23 % NEU = 22 % BD = 24 % SD = 12 % NRS = 4 % BL = 1 %	The scores for this statement reveal an unusually even balance of support (SA + BA = 37 %) and opposition (BD + SD = 36 %) to the statement. The rajasic characteristics represented in the statement were *the understanding that consciousness expires when the material body expires*; and *the understanding that the material body is the living entity*. The community of scientists as a whole thus appear to be equally disposed towards seeing consciousness as a material phenomenon and as a non-material phenomenon. The neutral option also has high support (22 %) suggesting that a significant number of scientists are not committed to either perspective.
29	It is my understanding that every living being on Earth has a different intrinsic nature, with greater variation occurring amongst different taxonomical phyla and classes, than	SA = 21 % BA = 41 % NEU = 16 % BD = 5 % SD = 1 %	This statement supports the rajasic characteristics of *knowledge by which one sees that in every different body there is a different type of living entity*; and *the understanding that the material body is the living entity*. In sattva guna, one adheres to knowledge *by which one undivided spiritual nature is seen in all living beings, although they are divided into innumerable different forms*.

	amongst genera and species etc.	NRS = 17 % BL = 0	As 62 % (SA + BA) of scientists adhere to the former type of knowledge, it can be surmised that scientists predominate within rajas guna in regards to their understanding of biological issues. The unusually high score for the NRS selection also suggests that several scientists feel unable or are unwilling to take any position on the matter.
33	I am proud of Australia's standing within the Antarctic Treaty System (ATS).	SA = 20 % BA = 50 % NEU = 22 % BD = 3 % SD = 0 NRS = 5 % BL = 0	*False pride*, which means being proud of one's material prowess, according to the triguna, is characteristic of rajas guna. It is akin to other rajasic characteristics such as *seeking fame, glorification and admiration/a fondness for hearing oneself praised/ seeking honour, recognition and status within society*. *Nationalism* is also endemic to rajas guna. The high support for this statement (SA + BA = 70 %) reflects the tendency for Australian Antarctic scientists and managers to promote Australia's role within the international Antarctic arena, as has been well documented. *Nationalism* is also, according to VCS, an extended form of *sense gratification*, another rajas guna characteristic.
36	Two of the main reasons for me becoming an Antarctic scientist have been that the science is interesting and the setting (the Antarctic environment) is stimulating.	SA = 47 % BA = 35 % NEU = 9 % BD = 4 % SD = 3 % NRS = 1 % BL = 2 %	A very high support for this statement (SA + BA = 82 %) indicates that it is very important for scientists that they are stimulated by the science they engage in. As mentioned under Statement 20, if scientists prioritise interesting science over necessary science, environmental policy could end up lacking necessary guidelines.
39	I have a desire to be honoured as an Antarctic scientist by my colleagues and by the rest of society.	SA = 6 % BA = 23 % NEU = 39 % BD = 14 % SD = 15 % NRS = 2 % BL = 1 %	The neutral position scored the highest (39 %) for this statement, suggesting that most scientists neither agree nor disagree with the statement. These results are inconsistent with the results for Statement No.14 (representing a kin rajasic characteristic) in which most scientists (82 %) indicated that they like to see their name in science publications and to be mentioned within science circles. Inconsistencies in scores between two kin guna characteristics may be due to scientists' affiliation with certain words and terms present within one

			statement but not within the other.
42	I am proud to be an Antarctic scientist.	SA = 31 % BA = 41 % NEU = 27 % BD = 0 SD = 1 % NRS = 0 BL = 0	As explained under Statement No.33, *nationalism* is an extended form of *sense gratification*. As with Statement No.33, this statement received much support (SA + BA = 72 %) indicating the prominence of *false pride* and *nationalism* amongst Australian Antarctic scientists. If attachment to the identity of being an Antarctic scientist is very strong, it may be difficult for scientists to raise their quality of consciousness to the mode of goodness, in which *false pride* and *nationalism* do not exist as psychological characteristics.
44	I adhere to knowledge that is based on the bodily functioning of floral and faunal species, not to knowledge that is based on the spiritual functioning of species.	SA = 32 % BA = 42 % NEU = 16 % BD = 5 % SD = 0 NRS = 5 % BL = 0	The rajasic characteristic represented in this statement is *knowledge derived through the material senses* (empirical knowledge) on the material world or environment. Adversely, adherence to spiritual knowledge on the environment is endemic to sattva guna. The statement received much support (SA + BA = 74 %) strengthening the overall support for the rajasic characteristic of *acquiring scientific knowledge on the material body/material world*.
48	Outside my knowledge of the compulsory ethical guidelines established by my professional organisation, I would not describe myself as knowledgeable in the field of ethics.	SA = 10 % BA = 30 % NEU = 17 % BD = 27 % SD = 11 % NRS = 4 % BL = 0	A moderate number of scientists supported this statement (SA + BA = 40 %), with opposition to it being almost as strong (BD + SD + 38 %). *Ethics* and *morals* are inherent to sattva guna, in which characteristics such as *showing compassion towards others*; *unselfishness*; *the distaste for harming or killing any living being*; and *realisation of spiritual and ethical considerations,* are important characteristics. The lack of knowledge about ethics on behalf of scientists is therefore indicative of a quality of consciousness inherent to rajas, or even tamas guna, the mode of ignorance.
52	If a project I am working on ends in disaster or just disappointment, I tend to become distressed and upset.	SA = 6 % BA = 33 % NEU = 17 % BD = 34 % SD = 8 %	Being *emotional* and *being attached to results of work* are both symptomatic of consciousness that is absorbed in rajas guna. Support and opposition to this statement are fairly well balanced (SA + BA = 39 %) and (BD + SD = 42 %). The moderately high support of the statement should, however, be acknowledged as significant, specifically if steps are to be taken to remedy

		NRS = 2 % BL = 0	such qualities, based on the results of this research project.
59	I maintain that scientific knowledge that produces theories based on secular and common-sense logic is superior to other types of knowledge when it comes to learning about the natural environment.	SA = 18 % BA = 27 % NEU = 19 % BD = 17 % SD = 6 % NRS = 13 % BL = 0	45 % of scientists agreed with this statement (SA + BA), once again supporting the Australian Antarctic scientific community's subscription to empirical research methodology. As this statement says that empiricism is the superior means by which the individual learns about the universe, scientists' consciousness, as indicated by support for the statement, is engrossed in material understanding. The significant support for the rajasic characteristics underpinning this statement (*knowledge derived through the material senses* and other rajasic characteristics affiliated with empiricism) may represent the most difficult obstacle for scientists to overcome, should they desire to raise their quality of consciousness to the level of sattva guna.

4.2.3 Examination of AASI Scores for Tamas Guna

The SIGS table (see section 3.3.1) asserts that scientists' predominance within tamas guna may produce seriously detrimental ramifications for the natural environment. In addition to negligence in work duties on behalf of scientists, their total lack of understanding of ethical and pragmatic concerns and research resources being ill spent, research will fail to respond to both material and non-material needs of the natural environment. As the lowest scoring guna within AASI scores, tamas guna may remain a minor influence for Australian Antarctic scientists in future years. However, due to the severity of its symptoms, ongoing monitoring of its prevalence, especially the prevalence of tamasic characteristics that received high support from scientists, is certainly supported by triguna theory as necessary. The following table presents results for individual tamas guna statements, including comments on the meaning and anticipated ramifications of scores:

TABLE 4.2.3.1: Examination of AASI Scores for Tamas Guna

- Comments by the thesis researcher on the meaning and anticipated ramifications of scores are founded on descriptions of guna characteristics entered in Appendix A. Further sources of information include readings from publications listed in Appendix A.
- AASI SCORE KEY: SA = Strongly Agree; BA = Basically Agree; NEU = Neutral; BD = Basically Disagree; SD = Strongly Disagree; NRS = No Response Selection; BL = Blank/no mark made on paper
- Statements have been numbered in the table according to how they appear within the AASI itself. Scores have been rounded off to their nearest whole value.

AASI STATE-MENT NO.	AASI STATEMENTS	AASI SCORES	COMMENTS ON THE MEANING and ANTICIPATED RAMIFICATIONS OF SCORES
2	My higher awareness often fails me, resulting in a lack of focus on my work.	SA = 2 % BA = 10 % NEU = 21 % BD = 32 % SD = 26 % NRS = 7 % BL = 2 %	Tamasic characteristics represented in this statement include *the failing of awareness of a higher spiritual nature* and other similar statements addressing awareness of a higher spiritual nature. Such failing inevitably leads to the mind being 'ruined' (Bhaktivedanta 1987-8, 11:25:18) and succumbs to *ignorance*. As this statement did not gain much support (SA + BA = 12 %) it may be assumed that scientists' consciousness is generally not affected by impediments of this particular kind.
4	I often carry out my work tasks without really making an effort.	SA = 0 BA = 8 % NEU = 3 % BD = 30 % SD = 57 % NRS = 0 BL = 1 %	That BD + SD = 87 % reveals strong opposition to this statement. Tamasic characteristics underpinning this statement include *working but making no endeavour*; and *determination which cannot go beyond dreaming, fearfulness, lamentation, moroseness and illusion-such unintelligent determination*. Results reveal that the Australian Antarctic scientific community does not suffer from these characteristics, which can also be witnessed through the amount of research that is carried out annually by Australian Antarctic scientists.
6	I often suffer from inertia and lethargy at work.	SA = 4 % BA = 11 % NEU = 12 %	According to results, *lethargy* and *inertia* do not encumber most scientists during working hours. If scientists did experience such problems, their work could be greatly hampered, resulting in flawed or uncompleted work tasks.

		BD = 45 % SD = 25 % NRS = 2 % BL = 0	The 15 % (SA + BA) of scientists who are encumbered by *lethargy* and *inertia* should ideally seek to remedy such problems. Whilst it has not been discussed elsewhere in this thesis, the *Bhagavad-gita* includes discourse on how to maintain a healthy and vibrant physical body, as well as a healthy mind and intellect, by avoiding certain habits within the lower modes of passion and ignorance. Amongst several factors discussed are dietary and sleeping habits, as well as lifestyle habits in general.
8	Although I usually don't talk about it, I am envious of other scientists who have excelled in their scientific fields.	SA = 6 % BA = 27 % NEU = 20 % BD = 23 % SD = 23 % NRS = 0 BL = 1 %	One third (SA + BA = 33 %) of scientists have admitted to being envious of the successes of other scientists. *Envy* is explained in numerous passages of Bhaktivedanta's *Bhagavad-gita As It Is* (1989) and *Srimad Bhagavatam* (1987-8) as impeding the individual in his/her endeavours to attain greater knowledge and happiness. It is described as a disease, which encumbers all who are materially embodied (Bhaktivedanta 1987-8, 4:19:35). *Envy* may propel an individual towards taking action in the mode of ignorance, which may for the scientist mean cheating (in data collection), lying (about research results), and stealing (ideas) in order to satisfy his/her *envy*.
15	My research often forces me to indulge in false hopes, as such predicaments are a part of the empirical research process.	SA = 3 % BA = 17 % NEU = 26 % BD = 30 % SD = 20 % NRS = 3 % BL = 1 %	Half of the scientific community opposed this statement (BD + SD = 50 %). Its underpinning characteristics include *false expectations* and *indulging in false hopes*. These characteristics are akin to the tamasic characteristic of *foolish materialistic knowledge*. In tamas guna the individual's consciousness becomes so covered over by the material energy, that he/she is rendered unable to make rational estimations of the outcomes of different types of activities.
21	I do not consider it important or relevant to understand the higher purpose of the work I carry out.	SA = 3 % BA = 2 % NEU = 7 % BD = 41 % SD = 43 % NRS = 3 %	The AASI glossary defines *higher purpose* as a 'reason for a cause that exceeds ordinary or mundane reasons' (see section 3.2.1). As most scientists (BD + SD = 84 %) disagreed with this statement, it appears that most Australian Antarctic scientists *do* consider it important to understand the purposes of their work that may exceed ordinary or mundane reasons. As the most common antonym to the word *mundane* is *spiritual*, the scores for this

		BL = 0	statement are inconsistent with scores to other statements addressing interest in or concern about spiritual issues. It may be the case that scientists were not familiar with the antonym to the word *mundane,* causing them to think of it as meaning *extraordinary*, but not necessarily as *spiritual*.
24	I consider the exploitation of non-human faunal and floral species by humans as acceptable.	SA = 10 % BA = 43 % NEU = 8 % BD = 19 % SD = 16 % NRS = 4 % BL = 0	SA + BA = 53 %. This score is the fourth highest scoring statement within tamas guna*,* the mode of ignorance, indicating that scientists' consciousness is dragged down into this lower mode specifically by maintaining this perspective. Tamasic characteristics underpinning this statement include *living as a parasite (exploitation)*; *violence towards others/causing others harm*; and *amoral practices*. If scientists do not respect the intrinsic value of non-human living beings, plant and animal alike, they may not find strong enough reason to refrain from exploiting them.
28	I am attached to my work and do not foresee myself ever changing my vocation, even if my work should somehow become very meagre or somehow fail to contribute anything substantial.	SA = 2 % BA = 10 % NEU = 19 % BD = 38 % SD = 30 % NRS = 1 % BL = 0	Most scientists, according to these scores (BD + SD = 68 %), *would* consider changing their jobs if their work somehow became insubstantial. If most scientists had supported this statement, meaning that they would never change their work even if it became futile, this would have indicated a community whose attachment to mundane and repetitious habits exceeds their motivations to protect the natural environment. This is one tamasic characteristic that the Australian Antarctic scientific community is not significantly affected by.
30	I do not seek, nor do I feel the need to seek authorisation from scriptural injunctions in order to present my scientific findings.	SA = 58 % BA = 22 % NEU = 6 % BD = 4 % SD = 2 % NRS = 8 % BL = 0	The tamasic characteristic that represents this statement is *speaking* (especially publicly) *without scriptural authority*. SA + BA = 80 %, making this statement the tamasic statement that received the most support from scientists. Four out of every five scientists feel that they can present their findings and discuss important scientific issues without scriptural authority. These scores are not surprising, when one considers that empirical science produces knowledge based on manipulation of matter, whereas scriptural knowledge is received from spiritually enlightened personalities who do usually not care for manipulating matter. The contrast in support for these two different sources of knowledge is vast. The scores to this statement, as the highest scoring

			statements within tamas guna, exemplify the consciousness of scientists, namely that they seek authority from each other, via the peer-review system, rather than from scripture.
32	I am uninterested in researching spiritual dimensions of the Antarctic environment.	SA = 29 % BA = 30 % NEU = 26 % BD = 12 % SD = 3 % NRS = 0 BL = 0	*Being uninterested in and unconcerned about spiritual matters* is a prominent tamasic characteristic. As 59 % of scientists (SA + BA) are not interested in researching the spiritual dimensions of the Antarctic environment, hopes for such research in the future, which would enhance the mode of goodness within the community, look bleak. As a community of environmental scientists, Australian Antarctic scientists must learn to value the intrinsic spiritual nature of *all* living beings within the Antarctic environment (even seemingly insignificant creatures such as molluscs, echinoderms, algae etc.) if they are to come to predominate within the material mode of goodness.
40	I try to give myself as much relaxation time and rest as is possible during my working day.	SA = 3 % BA = 19 % NEU = 20 % BD = 38 % SD = 20 % NRS = 0 BL = 0	The tamasic characteristics of *the worker who is … lazy, always morose and procrastinating*; *working but making no endeavour*; *laziness*; *inertia*; and *absorbing the mind in sleeping* represent this statement. As most scientists disagree with it (BD + SD = 58 %) *laziness* and *indolence* are not prevalent within the Australian Antarctic scientific community.
43	I am uninterested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul.	SA = 19 % BA = 27 % NEU = 26 % BD = 19 % SD = 5 % NRS = 3 % BL = 0	As discussed above in the comments to Statement No.32, *having no interest in or concern about spiritual issues* is a prominent tamasic characteristic. 46 % of scientists (SA + BA) support the statement, suggesting that almost half of the entire scientific community are not interested in whether or not Antarctic wildlife are spiritual beings. This would certainly influence the direction of research programs.
46	I work with the understanding that advancement of sciences based in physics and mathematics will	SA = 8 % BA = 28 % NEU = 26 %	Scientists' support for (SA + BA) and rejection of (BD + SD) this statement are exactly the same: 36 %. This unusual balance, with a relatively high score for neutral (26 %), indicates that community-members are fairly well

	undoubtedly lead to advancements in the quality of life.	BD = 23 % SD = 13 % NRS = 3 % BL = 0	distributed in their opinions on this statement. More scientists strongly disagreed than strongly agreed with the statement, however, indicating a trend towards opposition to, rather than support for, the statement.
47	Much of the time, the science I engage in is not directed towards any specific goal.	SA = 0 BA = 10 % NEU = 6 % BD = 32 % SD = 50 % NRS = 2 % BL = 0	82 % of scientists (BD + SD) do not agree with this statement. The characteristics that this statement represents include *acquiring knowledge for sense gratification, … without any higher purpose* and *acting whimsically, for no purpose*. The fact that most scientists disagreed with this statement suggests that most Australian Antarctic science *is* directed towards specific goals.
51	I often procrastinate in my daily schedule.	SA = 10 % BA = 21 % NEU = 21 % BD = 36 % SD = 11 % NRS = 0 BL = 1 %	The characteristic of *procrastination* underpins this tamasic statement. 47 % of scientists disagree with the statement (BD + SD), whilst only 31 % of scientists agree with it (SA + BA). Whilst this tells us that almost half of the community of scientists do not consider that they suffer from procrastinating in their work duties, the remaining scores are significant. 31 % (SA + BA) means that almost one in every three scientists *do procrastinate*. As carrying out Australian Antarctic scientific research demands the utilisation of many resources, such as time and money, procrastination on behalf of scientists could seriously impact on those resources.
53	In carrying out daily professional tasks, my determination is usually dissipated by thoughts about my leisure-life that awaits me at the end of the day.	SA = 0 BA = 9 % NEU = 18 % BD = 47 % SD = 26 % NRS = 0 BL = 0	Weak support for this statement indicates that most scientists work with the type of determination that is endemic to either rajas guna: *determination by which one holds fast to fruitive results in religion, economic development and sense gratification,* or sattva guna: *determination which is unbreakable, which is sustained with steadfastness by yoga practice, and which thus controls the activities of the mind, life and senses*. Statement No.31 of sattva guna: 'Whether or not I achieve my desired results, I usually remain steadfast and equipoised in my determination to carry out my duties as a scientist,' received strong support from scientists (SA + BA = 85 %) indicating that scientists are

			inclined towards sattva guna in their determination.
55	I often experience a sense of helplessness in striving to achieve environmental sustainability.	SA = 11 % BA = 30 % NEU = 20 % BD = 27 % SD = 10 % NRS = 3 % BL = 0	SA + BA = 41 % for this statement and BD + SD = 37 %. Scientists may feel *helpless* in their efforts to achieve environmental sustainability, due to the immense task set before them. Without coming to the platform of sattva guna, scientists risk succumbing to the tamasic characteristic of *helplessness* in their conservation efforts.
56	I work towards acquiring knowledge for the purpose of creating a more comfortable and enjoyable life, regardless of whether or not such acquisition involves a higher purpose.	SA = 18 % BA = 46 % NEU = 21 % BD = 10 % SD = 0 NRS = 3 % BL = 2 %	Tamasic characteristics underpinning this statement include *acquiring knowledge for sense gratification, absorbing the mind in varieties of eating, sleeping, defending and sex, without any higher purpose*; and *knowledge concerned only with keeping the body comfortable*. SA + BA = 64 % making this statement the second highest scoring statement within tamas guna. In other words, more than half of the Australian Antarctic scientific community supports this statement, which represents their acquisition of knowledge for purposes of enjoying material life. Without a higher purpose underlying any such gathering of knowledge, the individual is firmly situated within the mode of ignorance, also described as the mode of "darkness" (Bhaktivedanta 1989, 14:8) with his/her consciousness aimed only at gratifying the material senses.
58	It is not unusual for me to consume alcohol during my lunch-break at work.	SA = 3 % BA = 0 NEU = 0 BD = 10 % SD = 84 % NRS = 1 % BL = 1 %	*The taking of intoxication*, which exposes the individual's consciousness to the mode of ignorance, leads the individual towards *foolishness* and *nescience*. The very prominent lack of support for this statement is thus encouraging in terms of scientists' propensity to engage in such behaviour during working hours. It must also be mentioned, however, that whilst scientists were not tested on their consumption of alcohol outside working hours, indulgence in intoxication in general drags the individual's consciousness into the lower modes, which will inevitably present many obstacles for environmental scientists.
	I tend to quarrel and argue a lot with	SA = 2 %	*Intolerant anger*; *quarrel*; and *violence towards others* are all endemic to

60	my work-colleagues.	BA = 2 % NEU = 3 % BD = 29 % SD = 63 % NRS = 1 % BL = 0	tamas guna. As only 4 % of scientists supported this statement (SA + BA), these qualities do not appear to be prevalent within the Australian Antarctic scientific community. Such qualities are often associated with other tamasic qualities such as *abominability*; *slander*; *vilification*; and *the taking of intoxication*, as the individual fails to remain equipoised in his/her demeanour and to remain in control of his/her behaviour.

4.2.4 Examination of the Consistency of AASI Scores
As discussed in section 3.3.2, in addition to the examination of the consistency of AASI scores carried out under section 4.1.3, another analysis of consistency and cohesion of scores was carried out using an as-yet-untried method. This examination appears in TABLE I1, Appendix I. The following three stages were carried out:

Stage 1: Statement Grouping
Statements from each guna that represented the same guna characteristics were grouped together. It is important to note that only a few characteristics within each guna were represented in more than one statement.

Stage 2: Scores Correlation within Groups
Scores for statements that had been grouped together were then examined against each other, in order to identify correlation. This was done by adding the percentages of the scores for SA (Strongly Agree) and BA (Basically Agree) to determine scientists' support for characteristic/s, and by adding BD (Basically Disagree) and SD (Strongly Disagree) to determine scientists' opposition to the characteristic/s. Correlation was then calculated.

Stage 3: Remarks Regarding Consistency
Overall, evaluating the correlation between scores for statements that represented the same guna characteristics showed a moderate to high degree of consistency. Whilst a small number of scores suggested a definite lacking of consistency, meaning that scores for different statements that represented the same guna characteristics varied significantly, such occurrences were few. There was one incidence of exact correlation of scientists' support, with both statements (Statements 26 and 27) scoring 37 % for the Likert-scale option of Strongly Agree and 43 % for the Likert-scale option of Basically Agree. Both statements were represented by the sattvic characteristics of *cleanliness*; *tidiness*; being *well organised*; and *efficient*, whilst Statement 27 was also represented by the characteristic of c*ontrol of the mind and the senses/control of the self*.

After this correlation had been carried out, another table was constructed to further determine consistency in AASI scores, by examining disparities in scores for a single topic as it appears within the three different gunas. In other words, scientists' treatment of a single topic within the three gunas was examined. The topic chosen was *determination* on behalf of scientists to carry out their professional duties. Results showed that the topic of *determination* was treated differently by scientists when it appeared within different gunas. Scores further revealed that such differences were consistent with triguna theory, in that the predominant guna within scores (sattva guna) was followed by rajas guna, which was then followed by tamas guna. Had this order appeared as 1.sattva; 2.tamas; and 3.rajas, then the premises of the triguna with regards to the hierarchical presentation of gunas (see SHPS in section 3.3.1) would be weakened. Detailed results appear in TABLE I2, Appendix I.

As this types of analysis was created specifically for this thesis, meaning that no similar analysis has been located in peer-reviewed literature, results from this second item of alternative analysis will also be accepted as tentative only.

4.3 IGSQ

4.3.1 IGSQ Distribution, Participation Rate and Procedure

Not all Australian Antarctic science organisations listed in section 1.1.2 were approached in collecting data for the IGSQ. As the AAD, BOM and CCCAMLR had already produced (or committed to producing) a high number of participants for other data collection items (the AASI and the Interview Series), only the ACE CRC and the IASOS were approached. An initial group email was sent out to scientists inviting them to participate. This email appears in Appendix D (Item D3). Whilst all efforts were made to secure large numbers of participants (a number of scientists were also telephoned and invited personally) only nine scientists completed the IGSQ.

An email was then sent to subscribers to the international conservation psychology list-serve, maintained by the University of Michigan, USA. This email may be viewed in Appendix D (Item D4). A total of 11 IGSQs were completed and returned by conservation psychologists. Vedic scholars were approached either through personal contact (via phone or in person). 13 Vedic scholars returned completed IGSQs. As overall numbers of participants in the IGSQ were thus fairly small, conclusions from IGSQ results will be drawn very tentatively. Ideally, participant numbers should be substantially higher for each professional group, allowing an item analysis to be carried out.

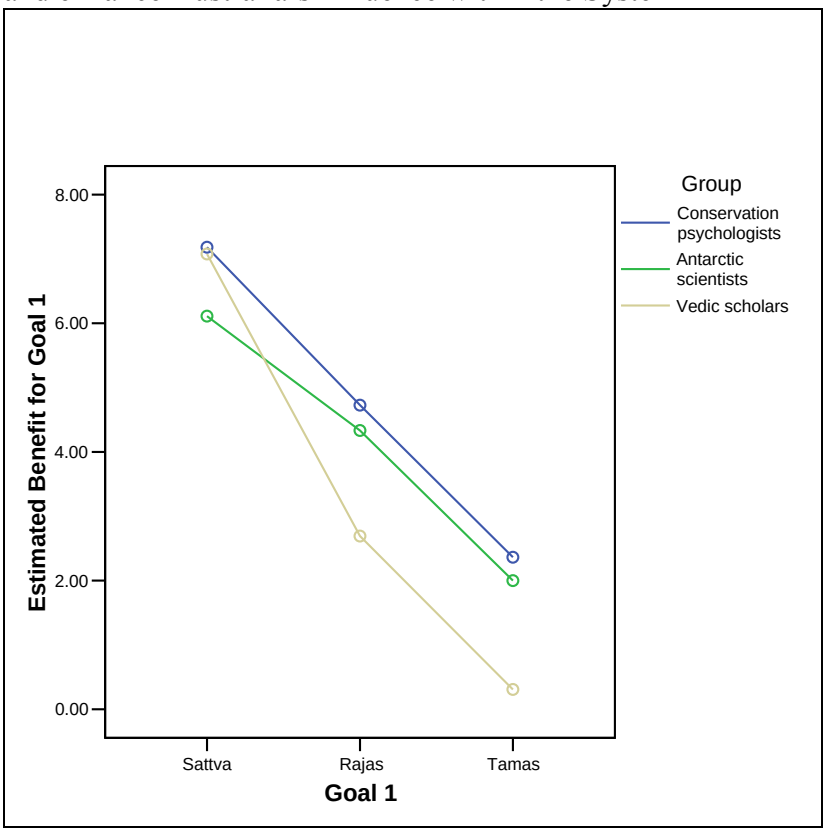
After potential participants had been invited to participate, IGSQs were distributed either via email or in person, depending on participants' geographical proximity to the researcher. Completed IGSQs were returned via the same means by which they were distributed (via email or forwarded in person to the researcher).

4.3.2 IGSQ Results

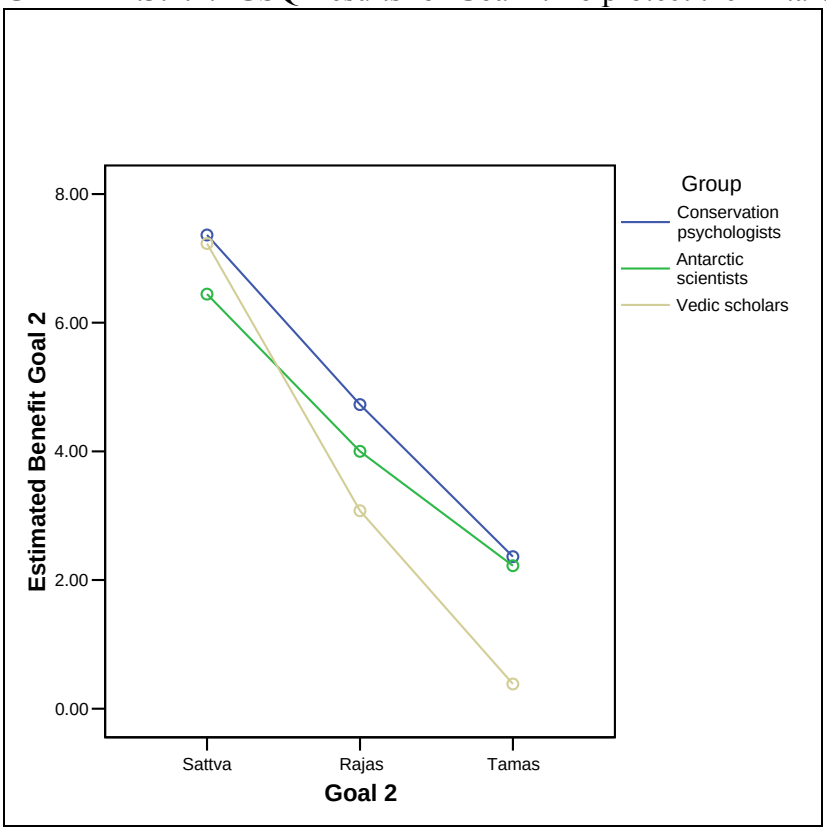
Raw IGSQ scores were entered into six tables (one for each IGSQ goal) appearing in Appendix J. All further processing of IGSQ results appear in Appendix K. Group scores are first presented followed by scores for individual participants. Scores for individual participants were given the following values: 2 for *definitely beneficial*; 1 for *possibly beneficial*; and 0 for *not at all beneficial*. Scores for characteristics representing each guna were then added together in order to obtain each individual IGSQ participant's support for each guna, in relation to each environmental science goal.

For the purpose of presenting results in the following graphs, responses to the four characteristics representing each guna were added together and given an overall score between 0 and 8. Accordingly, a score of zero means that respondents viewed all characteristics within the same guna as not at all beneficial for achieving the relevant goal, whereas a score of eight implies that respondents viewed all characteristics within the same guna as definitely being beneficial for the achievement of the goal. Intermediate scores reflect intermediate levels of support:

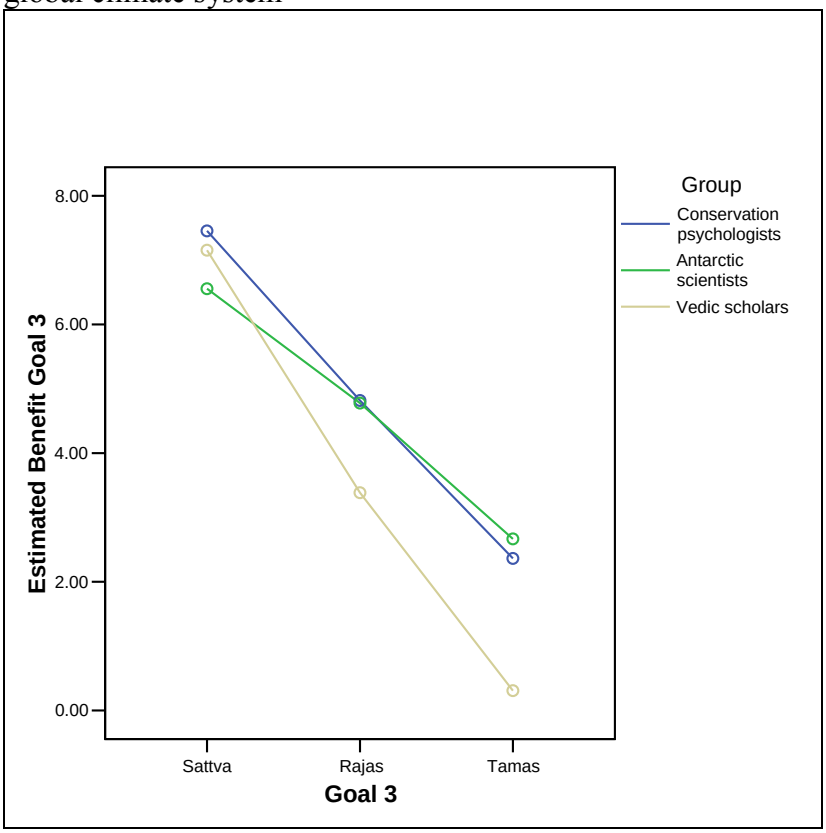
GRAPH 4.3.2.1: IGSQ Results for Goal 1: To maintain the Antarctic Treaty System and enhance Australia's influence within the System



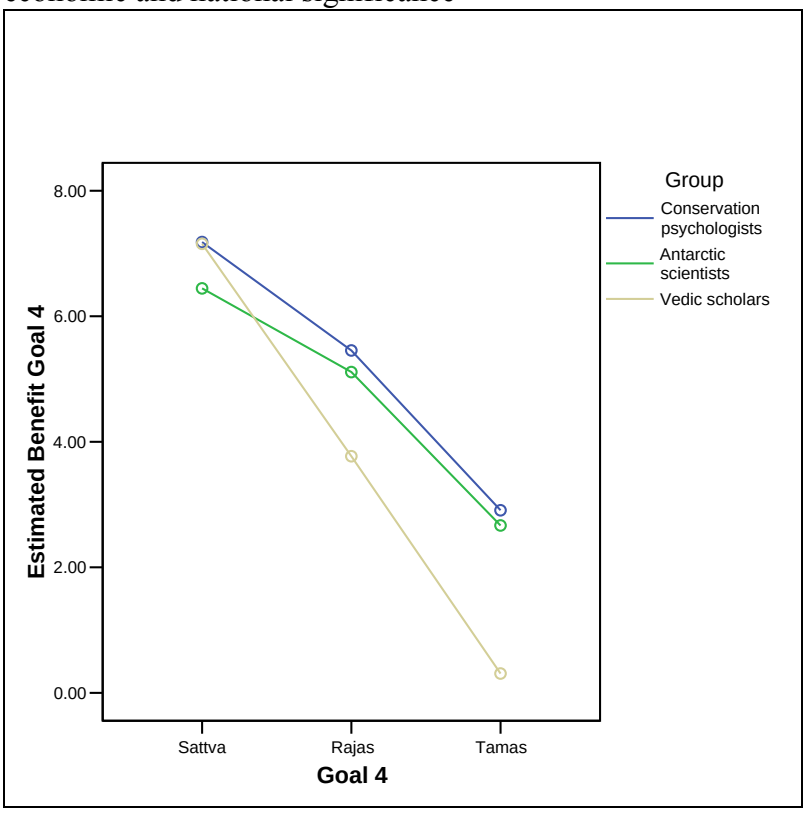
GRAPH 4.3.2.2: IGSQ Results for Goal 2: To protect the Antarctic environment



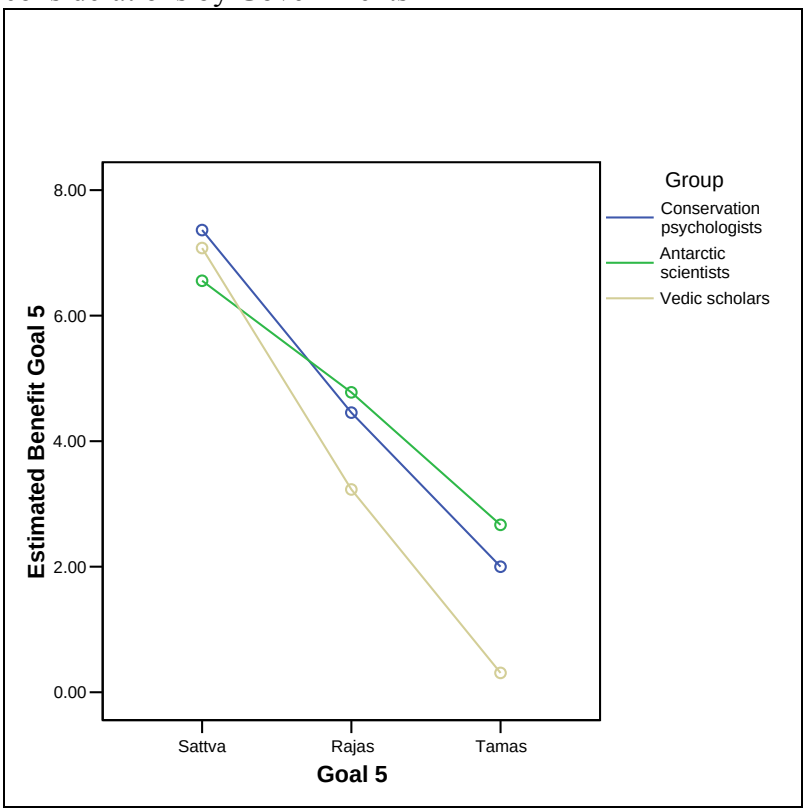
GRAPH 4.3.2.3: IGSQ Results for Goal 3: To understand the role of Antarctica in the global climate system



GRAPH 4.3.2.4: IGSQ Results for Goal 4: To undertake scientific work of practical, economic and national significance



GRAPH 4.3.2.5: IGSQ Results for Goal 5: To ensure that emerging environmental problems of wide international significance receive appropriate and adequate considerations by Governments



GRAPH 4.3.2.6: IGSQ Results for Goal 6: To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature

According to overall IGSQ results, scientists should ideally predominate within sattva guna, the mode of goodness, in order to achieve all six environmental science goals. In other words, Australian Antarctic scientists are currently not ideally situated within the triguna, as they currently predominate within rajas guna according to AASI results. According to Bhaktivedanta, scientists furthering the material paradigm:

> manufacture their own worldly plans and consequently complicate the problems of material existence in their vain attempts to solve them. Because material energy (nature) is so powerful, it can resist the unauthorized plans of atheists and baffle the knowledge of "planning commissions." (Bhaktivedanta 1989, 7:15)

All six environmental science goals posed in the IGSQ can themselves be assessed against the triguna. In other words, each goal has its own inherent situatedness within the triguna. An examination of such situatedness of each individual goal, in relation to IGSQ results, appears in Appendix L. In summary, this examination found that four goals were situated within sattva guna, whilst two were predominated by both sattvic and rajasic characteristics. As scientists themselves supported sattva guna as the ideal guna for scientists to attain all six goals, they may consider the quality of consciousness underpinning goals that contained rajasic elements, in terms of the capacity of those goals to inspire ideal behaviour in scientists.

Further processing of IGSQ scores included a repeated measures ANOVA for each individual environmental science goal. The three professional groups were included as a between-subjects factor, enabling a comparison between the perceived benefit of each of the twelve guna characteristics (four from each guna). It also allowed differences of perception between the three groups. Finally a one-way ANOVA was carried out to compare the three professional groups' scores for each individual guna characteristic. Scores for all six goals were tested.

Support for the different gunas appeared to be consistent for all six goals. All professional groups designated sattva guna as the ideal guna, followed by rajas guna and lastly, by tamas guna. Patterns created by differences in support appear to be basically consistent across all three professional groups, but there were also some significant fluctuations (as shown in the results from the one-way ANOVAs [see Appendix K]). These fluctuations may be summarised as follows:

For sattvic characteristics there were no significant differences between Goals Four and Five. For all other goals Antarctic scientists rated sattvic characteristics significantly lower than how sattvic characteristics were rated by conservation psychologists and Vedic scholars (with the exception of Goal Four, where Vedic scholars gave an intermediate rating not significantly different from either of the other groups). For rajasic characteristics there were no significant differences between professional groups for Goals Two, Three, Four and Five. Vedic scholars rated rajasic characteristics as significantly less beneficial for the achievement of Goals One and Six, than the other two professional groups did, and generally as less beneficial for the achievement of all other goals.

For tamasic characteristics, the ratings of perceived benefit were significantly lower for Vedic scholars than what they were for Antarctic scientists and conservation psychologists. As with scores for rajas guna, this lack of support for tamas guna by Vedic scholars is highly likely to be due to scholars' knowledge of the detrimental ramifications of tamasic characteristics (whereas the other two groups may not be aware of such ramifications). Australian Antarctic scientists and conservation psychologists scored relatively equally for all tamas guna characteristics for all six environmental science goals.

4.4 Chapter Conclusion

Assessing quality of consciousness by means of psychometrics is a relatively new research procedure. Outside research carried out into the triguna by means of personality inventories (such as those designed by Das 1987; Pathak, Bhatt and Sharma 1992; Rao and Harigopal 1979; Sitamma and Rao 1995; and Wolf 1999) psychometric evaluation of quality of consciousness has not been located within other peer-reviewed research literature. Results from the AASI thereby support an as-yet-largely-untried process by which to ascertain the overall condition of an individual's consciousness. The fact that AASI results showed a predominance of rajas guna characteristics amongst Australian Antarctic scientists thus claims that the overall condition of the conscious awareness or mindfulness of scientists is less-than-ideal (sattva guna being the ideal) yet not at its lowest (tamas guna being the least desirable).

As all three professional groups participating in the IGSQ supported sattva guna as being the optimum guna from which scientists could achieve environmental science goals, this 'idealistic' portrayal of sattva guna by the ancient VCS extends to contemporary academic opinions. Having said this, however, the small number of IGSQ participants must be kept in mind.

In addition to evaluating scientists' quality of consciousness by using the Vedic triguna, Chapter Five also assesses scientists' consciousness by processing data by using the Theravada Abhidharma. Scientists' responses to a series of interview questions are examined for the presence of guna characteristics and Abhidharma factors.

CHAPTER FIVE

AUSTRALIAN ANTARTIC SCIENCE INTERVIEW SERIES

It may be that the degree of corporate consciousness within an organisation influences perceptions of fairness within that organisation, and so influences a wide range of behaviours and outcomes observed in organisations, such as motivation, whistle-blowing, and pro-social behaviour.

Michael A. Campion and David K. Palmer in
"Discovering Corporate Consciousness" (1996, 399)

Chapter Outline
Chapter Five describes Interview Series procedures, including the participation rate and interview transcription procedures. After transcription, responses to interview questions are analysed using Vedic triguna characteristics, followed by an analysis using Theravada Abhidharma factors. Responses are examined to identify quantifiable response-segments and significant statements made by interviewees. Finally, an overall appraisal is made of each individual interview. Results are summarised in preparation for a final analysis to be carried out in Chapter Seven.

5.1 Introduction

5.1.1 Interview Series Participation Rate and Procedure

Potential interviewees were contacted via phone and personally invited to participate in an interview. Once scientists had agreed to be interviewed, they were asked to choose a suitable date, time and venue for their interview. They were also either sent via email, or delivered by hand, a copy of the Interview Information Sheet, the Interview Consent Form and a list of the Interview Series questions, in order to familiarise them with scheduled questions prior to their interview. The Interview Information Sheet and Consent Form can be viewed in Appendix D.

Out of 24 scientists invited to participate, 23 agreed to be interviewed. Whilst all 23 scientists who agreed to be interviewed were male, this was not intentional on behalf of the thesis researcher. Efforts were made to also contact female scientists, yet they were either in Antarctica, elsewhere overseas or were unable to be contacted due to work commitments. Whilst this was so, it should also be noted that within the AAD, Australia's biggest employer of Antarctic scientists, male scientists have always outnumbered women scientists.

One scientist chose to be interviewed at the Australian Antarctic Division cafeteria, with the remaining 20 choosing to be interviewed in their own offices at their places of employment. All interviews were conducted during July and August of 2004. At the start of each interview, the interviewee had to sign the Consent Form, officially agreeing to be interviewed and agreeing that his responses could be processed and possibly published. A SONY minidisk CD recorder was used to record all interviews. Interviewees' shirt-collars were fitted with a small microphone, which was attached to the minidisk recorder. Once interviews were completed, interviewees were told that they would receive an electronic version of the transcript of their

interview, to give them the opportunity to amend their responses before they were processed.

5.1.2 Interview Series Transcription Procedures
Recorded interviews were transferred onto mini-cassettes in preparation for the transcriber. A professional transcriber from Precise Administration Solutions (ABN: 87 647 087 286) then transcribed all the interviews into WORD documents. The transcriber communicated to the thesis researcher that in every interview there were at least a few words that she could not transcribe, due to the words being either inaudible or unfamiliar to her (scientific terminology). As a result, every transcription contains a few minor gaps in the conversation. Many interviewees amended these gaps themselves after being forwarded their transcripts for them to review. Final versions of interviews were then returned to the thesis researcher. The thesis researcher made no adjustments to the contents, grammar, spelling or punctuation of final transcripts. As this is so, imperfections of these types appear throughout transcripts.

Whilst 23 of the 24 scientists invited to participate agreed to be interviewed, only 21 scientists entered into the final agreement of the interview procedure, which stipulated that scientists themselves should view the transcripts of their interviews in case they wanted to alter their responses. Whilst most scientists chose to make some amendments to their transcripts, a small number declined, communicating that they were content to let their interviews be processed without amendment (although they had viewed their transcripts). One interviewee communicated that he was too busy to look at his transcript, but did not want it processed without his chance to amend it. A joint decision was then made by the interviewee and the thesis researcher to omit his interview from the collective data pool. Another interviewee retired from his professional position shortly after the interview, declining the invitation to participate in the final stage of the interview procedure. Final versions of interview transcripts appear in Appendix M.

5.2 Processing Using the Vedic Triguna

As stated in section 3.1.2, determining the presence of different gunas within science data items is prone to obscurity. The following results of the examination of Australian Antarctic scientists' responses to Interview Series questions are therefore accepted as giving an estimation only.

5.2.1 Identification of Quantifiable Responses to Interview Questions
The quantification, or totaling, of scientists' responses to interview questions proved to be the most challenging component of this data-collection item. Such challenges specifically manifested through the task of attempting to identify representation of gunas within phrases, expressions and descriptions of scientific activities and phenomena given by scientists. Due to the lengthy and often ad hoc dialogues that eventuated from scientists' responses to questions, identification of guna representation was often difficult.

In order to demonstrate which responses were quantifiable and which ones were not, a sample of a response to each of Questions 1, 2, 3, 4, 5, 6, 8, and 9 is given in Table N1, Appendix N. For the purposes of this sample, responses to these eight questions have been chosen from all 21 interviews, not entirely at random, but to demonstrate a typical response to each question. In addition to giving examples of the quantifiability of responses, Table N1 also determines which questions can have their

responses quantified (totaled) and which ones can't. In the final processing, either all 21 responses to a specific question will be quantified, or none at all.

As is evident from the analysis in Table N1, responses to Interview Questions 4, 5, 6 and 8 are not easily quantifiable due to the lack of clear and consistent guna representation. Therefore, responses to Questions 1, 2, 3 and 9 only will be processed against the triguna and hence, quantified. Table N2 in Appendix N presents the initial processing of all interviewees' responses to these questions. Results of this quantification are presented below (see section 5.2.2) with discussion on significant statements made by interviewees. As stated in section 3.3.4 point ii, significance will be determined according to the clarity of statements in representing one of the three gunas, as well as the overall prevalence of specific topics and their respective gunas, within an interview as a whole. In some cases significance will be determined according to the professional position of the interviewee in relation to what he has said. Processing of interviews to identify significant statements can be viewed in Appendix O. Processing of interviews also included an overall appraisal of guna representation within each interview.

Interviewee's responses to Question 9, addressing scientists' interests in whether or not Antarctic fauna and flora have, or are, a spiritual soul, has been given special attention in overall appraisals of interviews according to the triguna. This is due to such interest being a good indicator of the presence of sattva guna, and adversely, the lack of such interest being a good indicator of the presence of tamas guna. The topic of such interest or lack of interest is thus seen as a good indicator of an individual's general situatedness within the triguna.

5.2.2 Results of Quantification, Significant Statements and Overall Appraisals of Individual Scientist Responses to Interview Series Questions, According to the Triguna

5.2.2.1 Adams, Neil: Meteorologist, Bureau of Meteorology

TABLE 5.2.2.1.1: Adams, Neil: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response
1	What inspires/excites you the most about being an Antarctic scientist?	SATTVA/ RAJAS
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	RAJAS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	RAJAS
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	SATTVA

Adams' one significant statement suggested that he predominates within rajas guna. The statement itself is affiliated with rajasic characteristics of *sense gratification* and *attachment to material circumstances*. Coupled with his responses to the above-listed

four interview questions it appears that Adams' consciousness is predominated by rajasic characteristics. Sattva guna follows, with a clear representation of his interest in the spiritual aspects of Antarctic fauna and flora. There is little if any indication of representation within tamas guna, although we know from guna methodology that every materially embodied individual is always represented within each of the three modes to some extent (see section 2.2.3 [4]) even if all modes are not overtly observable within the individual.

5.2.2.2 Allison, Ian: Program Leader of Glaciology, Antarctic Climate and Ecosystems Cooperative Research Center/Australian Antarctic Division

TABLE 5.2.2.2.1: Allison, Ian: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response
1	What inspires/excites you the most about being an Antarctic scientist?	RAJAS
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	RAJAS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	RAJAS
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	TAMAS

Allison's two significant statements were both representative of sattva guna. The first was affiliated with the sattvic characteristics of *clear-sightedness* and *being aloof from material/mundane circumstances*, whilst the second was affiliated with the sattvic characteristics of *self-realisation*; *honesty*; and *humbleness*. He responded within tamas guna to Question 9, when asked whether or not he was interested in Antarctic fauna and flora having or being a spiritual soul i.e. he has no interest in the matter.

Most of the rest of Allison's interview corresponds with rajas guna which is perhaps not so surprising for someone in his professional position as Leader of the Australian Antarctic Glaciology Program, which focuses solely on physical aspects of the Antarctic environment (ice, atmosphere, geology etc.). It is estimated that overall, Allison predominates within rajas guna, followed fairly evenly by sattva and tamas gunas.

5.2.2.3 Barmuta, Leon: Freshwater Ecologist, University of Tasmania

TABLE 5.2.2.3.1: Barmuta, Leon: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response

1	What inspires/excites you the most about being an Antarctic scientist?	RAJAS
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	SATTVA/ RAJAS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	RAJAS
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	RAJAS

Barmuta's interview as a whole indicates a fairly even balance between sattva and rajas gunas, with perhaps a slightly higher representation of rajas guna. His significant statements showed a high representation of sattva guna, with rajas guna also being significant. Relevant sattvic characteristics included *the desire to maintain/sustain/ preserve*; *action that is responsible to both material and non-material needs of others*; and *clear-sightedness*. The relevant rajasic characteristic is *knowledge gathered through the material senses* and other rajasic characteristics affiliated with empiricism.

His response to Question 9 typified within rajas guna, as his appreciation of Antarctic fauna and flora did not exceed his enjoyment of their aesthetic natures, which constitutes the rajasic characteristic of *sense gratification*. An interesting feature of his overall interview is his usage of the word *passion* to describe his work colleagues and himself. He uses the word seven times. Tamas guna is not significantly represented within his interview.

5.2.2.4 Bindoff, Nathan: Oceanographer, CSIRO Marine Research/University of Tasmania

TABLE 5.2.2.4.1: Bindoff, Nathan: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response
1	What inspires/excites you the most about being an Antarctic scientist?	RAJAS
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	RAJAS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	RAJAS
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	TAMAS

Bindoff's interview shows a very strong predominance within rajas guna, with his significant statements showing a strong presence of the rajasic characteristic of *sense gratification*. The rajasic *intense endeavour* and *hard work/great endeavour to enjoy*

material comforts were also represented. Bindoff responded to Question 9 within tamas guna, meaning he has no interest in the spiritual dimensions of Antarctic fauna or flora. It appears that overall, Bindoff predominates within rajas guna followed by tamas guna. Sattva guna is not significantly represented within his interview.

5.2.2.5 Bowman, John: Microbiologist, University of Tasmania/Australian Food Safety Centre of Excellence

TABLE 5.2.2.5.1: Bowman, John: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response
1	What inspires/excites you the most about being an Antarctic scientist?	RAJAS
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	RAJAS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	SATTVA/ RAJAS
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	SATTVA

Bowman's responses to Questions 1, 2, 3 and 9 indicate a strong representation within both rajas and sattva gunas. His significant statements also showed the presence of both gunas, with sattva guna being more prominent than rajas guna. Relevant sattvic characteristics included *tolerance*; *showing compassion towards others*; *unselfishness*; *awareness of and interest in higher ethical and spiritual purposes of work*; *detachment from* (renunciation of) *material/mundane circumstances*; and *the pursuit of greater and real knowledge*. Relevant rajasic characteristics included *a fondness of hearing oneself praised* and *seeking fame, glorification and admiration/ seeking honour, recognition and status within society*.

Bowman shows a fairly strong interest in spiritual matters in general, indicated by his response to Question 9, as well as his consideration of adopting a more spiritual lifestyle later in his life. However, in his current position as microbiologist, Bowman is engaged in work activities typical of rajas guna. Overall, Bowman's interview reveals a fairly even balance between rajas and sattva gunas, followed by tamas guna.

5.2.2.6 Burns, Gary: Principle Research Scientist, Space and Atmospheric Science-Australian Antarctic Division

TABLE 5.2.2.6.1: Burns, Gary: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response

1	What inspires/excites you the most about being an Antarctic scientist?	RAJAS
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	RAJAS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	RAJAS
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	SATTVA

Burns shows a very strong predominance within rajas guna. His focus on family-life and his convictions about the role and nature of material resources are firmly situated within the mode of passion, as confirmed by his significant statements. Relevant rajasic characteristics included *sense gratification*; *attachment to material circumstances*; and *materialism*. As Burns' response to Question 9 was situated within sattva guna, there is also representation within the mode of goodness. Burns response to this question was:

> OK. I guess I don't get to that level in terms of I wouldn't express it in a religious context like you have. But is it something that I'm concerned about … I would say, yes, without the religious context (Burns Appendix M, 46).

Being concerned about the spiritual welfare of non-human beings is endemic to sattva guna, whether or not such concern is expressed within a religious context. Burns predominates within rajas guna, followed by sattva guna. Tamas guna was not significantly represented in his interview.

5.2.2.7 Church, John: Program Leader of Sea-Level Rise, CSIRO, Antarctic Climate and Ecosystems Cooperative Research Center

TABLE 5.2.2.7.1: Church, John: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response
1	What inspires/excites you the most about being an Antarctic scientist?	RAJAS
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	RAJAS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	RAJAS
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	SATTVA/ RAJAS/ TAMAS

Church's significant statements revealed the presence of both sattva and rajas gunas. The rajasic characteristic of (extended) *sense gratification* was relevant, as were the sattvic characteristics of *morality/ethics* and *desiring to disassociate oneself from materialistic life*. As the Program Leader of Australia's Sea-Level Rise Program, such representation within the triguna is not surprising. In his role, Church would constantly be dealing with rajasic matters such as empirical research issues, logistical issues involving material resources and economic issues relating to funding. In his position, Church would also be expected to maintain a certain level of awareness of society's expectations of environmental ethics (sattva guna) as his position forces him to advocate on the behalf of scientists' activities to the rest of society. It is estimated that it would be difficult for an individual to take on Church's role without some inherent inclination towards environmental ethics.

Overall results indicate that Church predominates within rajas guna, followed by sattva guna. All three gunas were represented in Church's response to Question 9, to which he responded that he has no interest in spiritual aspects of Antarctic fauna or flora (tamas guna) but in efforts to try to conserve the environment (mixed sattva and rajas gunas). The tamasic *being uninterested in and unconcerned about spiritual matters*, the sattvic *the desire to maintain/sustain* and the rajasic *adherence to mundane knowledge* are relevant.

5.2.2.8 Coleman, Richard: Research Scientist (Physical Sciences) Antarctic Climate and Ecosystem Cooperative Research Centre/University of Tasmania

TABLE 5.2.2.8.1: Coleman, Richard: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response
1	What inspires/excites you the most about being an Antarctic scientist?	RAJAS
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	RAJAS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	RAJAS
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	SATTVA

Coleman's significant statements indicate strong predominance within rajas guna. Relevant rajasic characteristics included *knowledge derived through the material senses* and other rajasic characteristics affiliated with empiricism. Coleman responded to Question 9 within sattva guna. Coleman indicated that he is both interested in, and concerned about, the intrinsic nature of Antarctic animals, and that in his opinion, all creatures have a soul. Such interests and perspectives indicate a significant representation of sattva guna. The sattvic *the pursuit of greater and real knowledge* was also relevant due to Coleman's opinion that Antarctic science should research the spiritual aspects of animals (Appendix M, 57).

Overall it appears that Coleman predominates within rajas guna, but also has significant representation within sattva guna. Tamas guna, whilst present to some degree, is not significantly represented within his interview.

5.2.2.9 Davidson, Garry: Earth Sciences Senior Lecturer at University of Tasmania/Australian Antarctic Division

TABLE 5.2.2.9.1: Davidson, Garry: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response
1	What inspires/excites you the most about being an Antarctic scientist?	RAJAS
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	RAJAS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	RAJAS/ TAMAS
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	SATTVA/ TAMAS

Davidson's significant statements indicate consistency within rajas guna, but also show representation within both sattva and tamas gunas. Davidson's statement that "we're undertaking research that we perceive has a very little impact on the environment" (Appendix M, 62) is considered specifically significant in terms of its representation of the mixture of sattva and rajas gunas. Although scientists desire to not harm the environment (represented by the sattvic *the distaste of harming any living being, or witnessing the harming of any living being*) they are depending on *knowledge gathered through the material senses*, *mundane logic* and *mental speculation* (rajas guna) to inform them how to not cause any harm.

Davidson's response to Question 9 is balanced between sattva and tamas gunas. Relevant sattvic characteristics included *morality*; *showing compassion towards others* and *knowledge by which one undivided spiritual nature is seen in all living entities, though they are divided into innumerable forms*. The relevant tamasic characteristic is *being uninterested in, and unconcerned about, spiritual matters*.

Overall, Davidson predominates within rajas guna, followed equally by both sattva and tamas gunas.

5.2.2.10 Miller, Denzil: Executive Secretary for the Convention on the Conservation of Antarctic and Marine Living Resources

TABLE 5.2.2.10.1: Miller, Denzil: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response
1	What inspires/excites you the most about being an Antarctic scientist?	SATTVA/ RAJAS
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	RAJAS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	SATTVA/ RAJAS/ TAMAS
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	SATTVA

Miller shows a strong representation within sattva guna. The mode of ignorance, tamas guna, is not significantly represented within his interview. His high representation within sattva guna undoubtedly aids him in his work duties as Executive Director of CCCAMLR, in which he constantly communicates with scientists and managers around the world. Sattvic characteristics such as *tolerance*; *speaking words that are truthful, pleasing, beneficial, and not agitating to others*; and *performing one's duty … without false ego, with great determination and enthusiasm* would certainly be beneficial for such tasks (see Kaur and Sinha 1992, 30 in section 2.2.3 [4]).

Miller's significant statements are predominantly within the mode of goodness, with the sattvic characteristic of *enthusiasm* being particularly prevalent. His response to Question 9 was represented by unmixed sattva. Overall, Miller predominates within sattva guna, followed by rajas guna, and lastly by tamas guna.

5.2.2.11 Morgan, Vin: Member of Ice-cores Program, Antarctic Climate and *Ecosystem Cooperative Research Center*

TABLE 5.2.2.11.1: Morgan, Vin: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response
1	What inspires/excites you the most about being an Antarctic scientist?	RAJAS
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	RAJAS/ TAMAS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	TAMAS
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	SATTVA/ TAMAS

Morgan's significant statements show representation within each of the three modes, although in terms of his emphasis on specific issues, sattva and tamas gunas are more

emphasised than rajas guna. The sattvic characteristics of *honesty* and *awareness of, and interest in, higher ethical … purposes of work* are particularly conspicuous. Relevant tamasic characteristics included *acquisition of knowledge without any higher purpose*; *foolish materialistic knowledge*; and *acting whimsically, for no purpose*. Morgan's response to Question 9 also represents both sattva and tamas gunas. First he states he is slightly interested in the spiritual nature of Antarctic fauna and flora (sattva guna), but then he concludes, after becoming bewildered (tamas) that he is in fact not interested in their spiritual nature (tamas guna):

> Yes, I'm slightly interested in whether the whole thing is perhaps a system but no, I can't make any sensible comments on that question at all … I don't think I'm really interested because I … no, I can't make a sensible comment on that (Appendix M, 83).

It appears that overall Morgan predominates within tamas guna, followed closely by sattva guna. Rajas guna is the least represented, although it appears twice within his responses to Questions 1, 2, 3 and 9.

5.2.2.12 Nicol, Steve: Program Leader (Marine Ecosystems) Australian Antarctic Division/Antarctic Climate and *Ecosystems Cooperative Research Center*

TABLE 5.2.2.12.1: Nicol, Steve: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response
1	What inspires/excites you the most about being an Antarctic scientist?	RAJAS
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	RAJAS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	RAJAS/ TAMAS
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	SATTVA/ TAMAS

Nicol's significant statements represent both sattvic and rajasic characteristics. Relevant sattvic characteristics included *greater knowledge*; *clear-sightedness*; and *alertness/wakefulness*. Rajasic characteristics included characteristics affiliated with the empirical research method, such as *knowledge producing many theories and doctrines by dint of mundane logic and mental speculation*. Nicol's response to Question 9 reflected both sattva and tamas gunas (gunas represented have been added into the following dialogue):

> Not really, no (tamas guna). For science it's not a question as a ?…? study for a start. From a scientific point of view it's a non-starter and from a personal point of view I'd actually be more interested to know I had one. I'm not entirely convinced that I do, so

> I shouldn't go out looking for it in krill … it's a fantastic question (sattva guna) but I don't know how you'd do it (Appendix M, 90).

Overall, Nicol shows a rather strong predominance within rajas guna, followed by both sattva and tamas gunas.

5.2.2.13 Ramm, David: Data Manager, Commission for the Convention on the Conservation of Antarctic Marine Living Resources

TABLE 5.2.2.13.1: Ramm, David: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response
1	What inspires/excites you the most about being an Antarctic scientist?	RAJAS
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	RAJAS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	RAJAS
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	SATTVA

In continuity with his responses to Questions 1, 2, 3 and 9, Ramm's significant statements indicate predominance within rajas guna, with sattva guna following fairly closely behind. Whilst Ramm shows a relatively strong interest in spiritual matters, which is usually a reliable indicator for predominance within sattva guna, his perseverance with, and strong interest in, his approach to empirical research and data management (which constitutes a highly materially-orientated focus) keeps him predominating within rajas guna. The relevant sattvic characteristic (represented in his response to Question 9) included *being interested in, and concerned about, spiritual matters*; *clear-sightedness*; and *greater and real knowledge*.

Rajasic characteristics such as *knowledge that is dependent on mundane circumstances,* addressing the empirical research method, were also relevant. Tamas guna, although present, is not significantly represented in Ramm's interview.

5.2.2.14 Reid, James: Dean, Faculty of Science, Engineering and Technology, University of Tasmania

TABLE 5.2.2.14.1: Reid, James: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response
1	What inspires/excites you the most about being an Antarctic scientist?	RAJAS
	Can you tell me about your original motivations for becoming an	

2	Antarctic scientist?	TAMAS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	RAJAS
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	TAMAS

Reid's one significant statement typifies within both rajas *and tamas* gunas, as does most of the rest of his responses within his interview. His significant statement revealed that he finds it difficult to cope with the demands of his professional position, indicating the presence of the rajasic characteristics of *stress*; *anxiety*; and *frustration*, as well as the tamasic characteristics of *helplessness* and *hopelessness*.

His response to Question 9 was "I don't have any thoughts about that at all" (Appendix M, 99). This response indicates a definite representation of tamas guna. Overall, Reid predominates within rajas guna, followed closely by tamas guna. Sattva guna is not significantly represented anywhere throughout his interview.

5.2.2.15 Riddle, Martin: Leader of Human Impacts Program, Australian Antarctic Division

TABLE 5.2.2.15.1: Riddle, Martin: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response
1	What inspires/excites you the most about being an Antarctic scientist?	SATTVA/ RAJAS
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	SATTVA/ RAJAS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	RAJAS
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	SATTVA/ RAJAS

Riddle's significant statements reveal a high representation within sattva guna, with a lesser representation within rajas guna. Tamas guna is not significantly represented anywhere within his interview. Relevant sattvic characteristics included *being interested in, and concerned about, spiritual matters*; *the pursuit of greater and real knowledge*; and *knowledge by which one undivided spiritual nature is seen in all living entities, though they are divided into innumerable forms*. Riddle's responses to Question 9 revealed his interest in spiritual matters (sattva guna) but also that he believes that the spirit does not exist beyond the material body (rajas guna).

It is here important to mention that of the 21 scientists interviewed, Riddle is the only one who works within the HI program. From the perspective of VCS, such situatedness is itself more closely affiliated with sattva guna than other science

research programs that are typically aimed at accumulating information for purposes of management intervention and/or economic gain (rajas guna). This strong correlation between Riddle's individual situatedness within the triguna and the situatedness of his area of work is considered noteworthy. It suggests that research programs characterised by sattvic qualities attracts individuals who themselves predominate within sattva guna and/or that individuals who are influenced by sattva guna generate programs that predominate within sattva guna. Employees may also be inspired to cultivate sattvic characteristics once employed within such research programs.

Overall, Riddle predominates within sattva guna, followed by rajas guna. Tamas guna is not significantly represented within his interview.

5.2.2.16 Rintoul, Steve: Physical Oceanographer, Program Leader of the Climate Change and *Variability Program, Antarctic Climate and Ecosystems Cooperative Research Center*

TABLE 5.2.2.16.1: Rintoul, Steve: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response
1	What inspires/excites you the most about being an Antarctic scientist?	RAJAS
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	RAJAS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	RAJAS
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	SATTVA

The only significant statement identified in Rintoul's interview places him within rajas guna. The remainder of his interview reflected a number of other factors also typical of rajas guna, in that they addressed being stimulated and attracted by the Antarctic environment, empirical research activities and the organisation of those activities. For example, Rintoul discusses to some length his attraction to the Antarctic geographical region and the opportunities it has presented him as a scientist. Relevant rajasic characteristics included *sense enjoyment* and *attachment to material circumstances*.

Rintoul responded to Question 9 within sattva guna. His considering the possibility of non-human entities such as sea-ice as possibly having a soul, is typical of sattva guna, in which the individual can see spirit, or the possibility of spirit, within all types of entities. Overall, it appears that Rintoul predominates within rajas guna, followed by sattva guna. Although sattva guna is not specifically strong in Rintoul's interview, as it represents his response to Questions 9 it is considered more significant than any representation of tamas guna within his interview.

5.2.2.17 Robertson, Graham: Seabird Ecologist, Australian Antarctic Division

TABLE 5.2.2.17.1: Robertson, Graham: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response
1	What inspires/excites you the most about being an Antarctic scientist?	RAJAS
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	RAJAS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	RAJAS
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	SATTVA

Robertson's interview shows a fairly strong predominance of rajas guna, followed closely by sattva guna. Relevant sattvic characteristics included *residing* (or being present) *in a secluded place* (away from materialistic life); *being interested in, and concerned about, spiritual matters*; and *knowledge by which one undivided spiritual nature is seen in all living entities, though they are divided into innumerable forms*.

Relevant rajasic characteristics included *misery*; *stress/anxiety/frustration*; *self-indulgence*; *economic prioritisation*; and *seeking fame, glorification and admiration/a fondness for hearing oneself praised/ seeking honour, recognition and status within society*. Robertson's response to Question 9 was quite extensive. He expressed his definite interest in the topic of Antarctic flora and fauna having or being a spiritual soul. Rajas guna, however, still predominates the overall interview. Sattva guna followed rajas guna, with tamas guna not being significantly represented within his interview.

5.2.2.18 Southwell, Colin: Ecologist, Australian Antarctic Division

TABLE 5.2.2.18.1: Southwell, Colin: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response
1	What inspires/excites you the most about being an Antarctic scientist?	RAJAS
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	RAJAS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	SATTVA
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you	SATTVA

	explain your answer?	

Southwell's significant statements represent all three gunas, with a stronger overall representation of rajas guna. Rajasic characteristics included *sense gratification*; *false pride*; and *the seeking of fame, recognition and prestige* etc. *within society*. Tamasic characteristics included *depression*, *hopelessness*; and *helplessness*. Southwell's response to Question 9 was a clear representation of the characteristic of *being interested in and concerned about spiritual matters*.

The remainder of Southwell's interview is mostly representative of rajas guna, as it contains many details of his ordinary mundane work tasks. He also discusses to some length the importance of his family in his decision-making about his employment, which is affiliated with the rajasic characteristic of *attachment to family members*. Overall, Southwell predominates within rajas guna, followed by sattva guna, and lastly by tamas guna.

5.2.2.19 Trull, Tom: Program Leader of Ocean Control of CO2-Climate and Ecosystems Program, Antarctic Climate and Ecosystems Cooperative Research Center

TABLE 5.2.2.19.1: Trull, Tom: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response
1	What inspires/excites you the most about being an Antarctic scientist?	RAJAS
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	RAJAS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	RAJAS
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	TAMAS

Trull's two significant statements were represented within both rajas and tamas gunas. Relevant rajasic characteristics included *ambition for material pursuits* and *seeking fame, glorification and admiration/a fondness for hearing oneself praised/ seeking honour, recognition and status within society*. Relevant tamasic characteristics included *the failing of awareness of a higher spiritual nature*; *understanding which considers irreligion to be religion and religion to be irreligion, under the spell of illusion and darkness, and strives always in the wrong direction*; and *faithlessness*.

Trull's response to Question 9 was "I don't have any interest in that … I've always thought that was some of the stupidest bits of science I've ever heard of" (Appendix M, 140). Trull is obviously firm about his lack of interest in, and lack of concern about, the spiritual nature of Antarctic fauna and flora, indicating a significant presence within tamas guna. Overall, it appears that Trull predominates

within rajas guna, followed closely by tamas guna. Sattva guna is not significantly represented anywhere in his interview.

5.2.2.20 Woehler, Eric: Honorary Research Associate (Biology), Institute of Antarctic and Southern Ocean Studies/Australian Antarctic Division

TABLE 5.2.2.20.1: Woehler, Eric: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response
1	What inspires/excites you the most about being an Antarctic scientist?	SATTVA/ RAJAS
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	RAJAS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	RAJAS
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	TAMAS

Woehler's two significant statements revealed a strong representation within tamas guna, as well as within rajas guna. Relevant tamasic characteristics included *being uninterested in and unconcerned about spiritual matters*. The rajasic characteristic of *attachment* was also relevant. Woehler's response to Question 9 (represented by tamas guna) constituted one of his significant statements, as his response was considered particularly pertinent to his overall quality of consciousness.

The rest of Woehler's interview most closely represents rajas guna, as he discusses in detail many different aspects of the empirical scientific process. Overall, Woehler appears to predominate within rajas guna, followed by tamas guna. Sattva guna, although less significant, is also represented.

5.2.2.21 Wright, Simon: Senior Research Scientist (Marine Microbial Ecology) Australian Antarctic Division

TABLE 5.2.2.21.1: Wright, Simon: Responses to Interview Questions 1, 2, 3 and 9, According to the Triguna

Question No.	Question	Guna/s represented within response
1	What inspires/excites you the most about being an Antarctic scientist?	SATTVA/ RAJAS/ TAMAS
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	RAJAS
	Can you tell me anything about your own consciousness during	

3	your working day i.e. what usually goes through your mind during an ordinary working day?	RAJAS
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	SATTVA

Wright's significant statements revealed a strong representation within both rajas and sattva gunas. Relevant sattvic characteristics included *satisfaction within oneself*; *a sense of happiness and knowledge*; *one who performs his duty … without false ego, with great determination and enthusiasm, and without wavering in success or failure*; and *the pursuit of greater and real knowledge*. Wright's response to Question 9 is considered particularly significant, with regards to the strong representation of sattva guna:

> I don't often think too much about killing single cell algae but sometimes I'm aware of it at least, when you see them under the microscope you're aware that they are living things trying to do their thing. I certainly don't believe that humans are qualitatively different from other animals and that we are unique in having a soul whatever that means. (Appendix M, 154)

Relevant rajasic characteristics included *stress/ anxiety/frustration* and *envy*. Towards the end of his interview, Wright discusses to a considerable length, his interest in spiritual topics, characteristic of sattva guna. He also expresses to some length his understanding of the many influences of the variables that individual scientists bring to the scientific process through their own individual consciousness and subjectivism. Such insight is endemic to sattva guna. Within rajas guna, such insights are rare, or at least limited, whilst within tamas guna such insight is non-existence. Wright also expresses to some lengths his interests in the empirical research process, which is endemic to rajas guna. Overall it appears that Wright predominates fairly evenly within both rajas and sattva gunas. Tamas guna, whilst present, is not very significant within his interview.

5.2.3 Summary of Interview Series Results According to the Triguna

The results from the quantification of responses to Questions 1, 2, 3 and 9 have been entered in the following table:

TABLE 5.2.3.1: Results of the Quantification of All Interview Responses to Questions 1, 2, 3 and 9, According to the Triguna

QUES-TION NO.	QUESTION	SATTVA	SATTVA /RAJAS	RAJAS	RAJAS/ TAMAS	TAMAS	SATTVA /TAMAS	SATTVA /RAJAS/ TAMAS
1	What inspires/excites you the most about being an Antarctic scientist?	-	4	16	-	-	-	1
2	Can you tell me about your original motivations for becoming an Antarctic scientist?	-	2	17	1	1	-	-

3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	1	1	15	2	1	-	1
9	As a scientist, are you at all interested in whether or not species of Antarctic fauna and flora have (or are) a spiritual soul? Can you explain your answer?	10	1	1	-	5	3	1
TOTAL Scores have been rounded off to their nearest whole value.		11 = 13 %	8 = 10 %	49 = 58 %	3 = 4 %	7 = 8 %	3 = 4 %	3 = 4 %

In order to determine results from the overall appraisals of interviews, results were further entered into the following table. Predominating guna/s within each individual interview were given a value of 2, with the guna/s showing the second-highest representation being given a value of 1. In cases where a guna is described as not being significantly represented within an interview, its presence is still acknowledged and therefore in some rare cases represents the second-highest scoring guna (as all three gunas are always manifest to some degree) (see section 2.2.3 [4]):

TABLE 5.2.3.2: Results from the Overall Appraisal of All Interviews, According to the Triguna

- Values of gunas are written in **bold**. Values of frequencies of gunas have been left un-bolded.
- Scores have been rounded off to their nearest whole value.

SATTVA	SATTVA/ RAJAS	RAJAS	RAJAS/ TAMAS	TAMAS	SATTVA/ TAMAS	SATTVA/ RAJAS/ TAMAS
10 x **1** + 2 x **2** = 14 = 22 %	3 x **2** = 6 = 9 %	2 x **1** + 15 x **2** = 32 = 51 %	-	7 x **1** + 1 x **2** = 9 = 14 %	2 x **1** = 2 = 3 %	-

Above results show that overall, rajas guna predominated within scientists' responses to Interview Series questions, followed by sattva guna. A comparison was carried out of results of scientists' responses to Interview Series Questions 1, 2, 3 and 9 and results of overall appraisals of all Interview Series responses. This was done for the purpose of determining the consistency of both examinations:

TABLE 5.2.3.3: Comparison of Results from Tables 5.2.3.1 and 5.2.3.2
Scores have been rounded off to their nearest whole value.

GUNA → / ↓ TABLE	SATTVA	SATTVA/ RAJAS	RAJAS	RAJAS/ TAMAS	TAMAS	SATTVA/ TAMAS	SATTVA/ RAJAS/ TAMAS
5.2.3.1	13 %	10 %	58 %	4 %	8 %	4 %	4 %
5.2.3.2	22 %	9 %	51 %	-	14 %	3 %	-

Whilst a certain amount of fluctuation is present amongst scores representing the same guna within both tables, overall the comparison reveals a considerable amount of consistency, especially with regards to the sequential order of predominating gunas. This consistency adds weight to the results of the AASI, which stated that rajas guna is the overall predominant guna amongst Australian Antarctic scientists, followed by sattva guna. The following table lists guna characteristics represented the most often within each of the three gunas, within scientists' responses to Interview Series questions:

TABLE 5.2.3.4: Interview Series Results: Guna Characteristics Represented the Most Frequently Within Each Guna

Numerical ordering of guna characteristics represents an approximate sequence of gunas represented most frequently to least frequently.

1. SATTVA	2. RAJAS	3. TAMAS
1. BEING INTERESTED IN AND CONCERNED ABOUT SPIRITUAL MATTERS 2. KNOWLEDGE BY WHICH ONE UNDIVEDED SPIRITUAL NATURE IS SEEN IN ALL LIVING ENTITIES, THOUGH THEY ARE DIVIDED INTO INNUMERABLE (material) FORMS 3. SHOWING COMPASSION TOWARDS OTHERS 4. MORALITY 5. HONESTY 6. THE DESIRE TO MAINTAIN/SUSTAIN/ PRESERVE	1. SENSE GRATIFICATION 2. KNOWLEDGE GATHERED THROUGH THE MATERIAL SENSES (EMPIRICAL KNOWLEDGE) 3. ACQUIRING SCIENTIFIC KNOWLEDGE ON THE MATERIAL BODY/MATERIAL WORLD 4. KNOWLEDGE PRODUCING MANY THEORIES AND DOCTRINES BY DINT OF MUNDANE SPECULATION 5. ADHERENCE TO MUNDANE KNOWLEDGE 6. STRESS/ANXIETY/FRUSTRATION 7. SEEKING FAME, GLORIFICATION AND ADMIRATION/A FONDNESS FOR HEARING ONESELF PRAISED/ SEEKING HONOUR, RECOGNITION AND STATUS WITHIN SOCIETY	1. BEING UNINTERESTED IN AND UNCONCERNED ABOUT SPIRITUAL MATTERS 2. THE ACQUISITION OF KNOWLEDGE WITHOUT ANY HIGHER ETHICAL AND SPIRITUAL PURPOSE 3. THE FAILING OF AWARENESS OF GREATER/HIGHER (MATERIAL OR NON-MATERIAL) INCENTIVES FOR ACTION 4. FOOLISH MATERIALISTIC KNOWLEDGE 5. ACTING WHIMSICALLY, FOR NO PURPOSE

5.3 Processing Using the Buddhist Theravada Abhidharma

5.3.1 Identification of Quantifiable Responses to Interview Questions

As with the quantification of interview responses using the Vedic triguna, quantification of responses using the Abhidarma proved to be the most challenging component of the processing of interview responses using Abhidharma factors. This was specifically so due to the limited entries in the CAFG-GACTA that describe mental events, emotions and perfections, but not specific actions nor activities, as the CGCG does.

In keeping with the data processing techniques of the Vedic triguna, a sample of a response to each of Questions 1, 2, 3, 4, 5, 6, 8, and 9 is given in Table P1 in Appendix P. These samples demonstrate which questions can and can not be quantified, or totaled, using Abhidharma factors. Responses to the eight above-listed questions have been chosen from all 21 interviews in order to demonstrate responses to each question that were typical of most scientists.

As Table O1 has demonstrated, responses to Questions No. 3, 5, 6 and 8 only can, and therefore will be, quantified. Table P2 in Appendix P presents the processing of all interviewees' responses to these questions. Quantified results are also presented below with discussion on overall appraisals of interviews. In addition to the results of the quantification of responses to Questions 3, 5, 6 and 8, evaluation of interviews also included an examination into significant statements made by interviewees. Processing of interviews using Abhidharma factors to identify significant statements can be viewed in Appendix Q.

Interviewee's responses to Question 8, asking whether or not scientists have considered giving up their professional positions for a simpler life, with 'simpler life' meaning renouncing involvement in material life for the sake of austerity and spiritual advancement, was given special attention in overall appraisals. This is due to such considerations being particularly relevant within the Abhidharma and overall Buddhist doctrine of living simply and focusing on inner peace and the cessation of mundane activities, especially mundane activities involving mundane stimulation of the mind (Snelling 2000, 62-6; Toropov and Buckles 2004, 197).

Scientists' considerations for such a change in vocation would be representative of the Positive Perfection of *renunciation* and also with the Positive Mental Events of *non-deludedness/non-bewilderment* and *non-attachment/detachment,* described by the CAFG-GACTA as "awareness in which there is no discontentment" (Appendix B, 3). As being unattached and clear-minded are both cornerstones of the Buddhist notion of wellbeing or wholesomeness, scientists' considerations for such changes to their activities are considered good indicators of their general quality of consciousness, according to the Abhidharma.

Whilst scientists may be capable of remaining detached and clear-minded, and still carry out their scientific activities, without considering the renouncing of worldly involvement, scientists would not be viewed by the Abhidharma as subscribing to the Positive Perfection of *renunciation*. This perfection is described by the CAFG-GACTA as departing from "sense pleasure and existence" and in its place, instigating "a sense of spiritual urgency" (Appendix B, 20). Showing significant correlation with a number of sattvic characteristics, the Positive Perfection of *renunciation* would allow scientists to perform their scientific duties without becoming entangled in the fruits/results of their work. Such entanglement would unavoidably tie them to the wheel of *samsara* (repeated birth and death), the source of suffering, according to the premises of both Vedic and Buddhist teachings.

5.3.2 Results of Quantification, Significant Statements and Overall Appraisal of Individual Scientist Responses to Interview Series Questions, According to the Abhidharma

5.3.2.1 Adams, Neil: Meteorologist, Bureau of Meteorology

TABLE 5.3.2.1.1: Adams, Neil: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	+ MENTAL EVENTS
5	Do you have any thoughts on the idea that spiritual insight and wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	- EMOTIONS
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	+ MENTAL EVENTS/ + PERFECTIONS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	- EMOTIONS/ - MENTAL EVENTS

Adams' general outlook on Antarctic science is constituted of the Positive Mental Events of *alertness/suppleness* of, and *concern/conscientiousness* for, the Antarctic environment and its inhabitants. Yet his response to Question 8 was represented by the Negative Emotion of *attachmen*t, described by the CAFG-GACTA as "attachment to material life" (Appendix B, 16). The Negative Mental Events *of desultoriness/non-discernment*, described as manifesting when "the mind is scattered over the five desirable objects of the sensuous world" (Appendix B, 15) and *lack of trust/faithlessness*, described as "lack of confidence in the laws of karma" (Appendix B, 12) were also relevant. In Adams' case, he may be suffering from a lack of confidence necessary to renounce material attachments.

His significant statements represented both positive and negative factors, as did his responses to Questions 3, 5, 6 and 8. Relevant factors included the Positive Perfections of *energy* and *determination/resolution*, considered highly representative of most interviewees' overall responses to interview questions. Relevant Negative Emotions included *lack of intrinsic awareness/ ignorance*, described as "a mental event that is confused about reality as it is" [Appendix B, 18]). Overall, Adams' interview is balanced between positive (Factor Contrast Group 1) and negative (Factor Contrast Group 2) factors.

5.3.2.2 Allison, Ian: Program Leader of Glaciology, Antarctic Climate and Ecosystems Cooperative Research Center/Australian Antarctic Division

TABLE 5.3.2.2.1: Allison, Ian: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	+ PERFECTIONS
5	Do you have any thoughts on the idea that spiritual insight and wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	- EMOTIONS/ - MENTAL EVENTS
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	+ MENTAL EVENTS/ + PERFECTIONS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	- MENTAL EVENTS/ - EMOTION

Allison's responses to Questions 3, 5, 6 and 8 reveal a moderate balance between positive and negative factors. Both his significant statements indicate a strong presence of the Negative Emotion of *attachment*, as well as the Positive Perfection of *morality/virtue*, which is described by the CAFG-GACTA as "practiced in order to avoid doing harm to beings" (Appendix B, 20). The emotion of *attachment* was specifically prevalent amongst other interviewees' responses, specifically amongst their responses to Question 8.

Abhidharma factor representation within Allison's entire interview appears neither specifically positive nor negative throughout Allison's interview. His response to Question 8 is represented by the Negative Emotion of *lack of intrinsic awareness/ ignorance*, as well as by the Negative Mental Event of *unconcern/ unconscientiousness*, described as "to prioritise and pursue sensuous, temporary things over eternal things" (Appendix B, 13). The Negative Mental Event of *inattentiveness*, described as lacking "watchfulness" and as causing "one to enter a state of careless indifference" (Appendix B, 14), suggests a strong influence of negative factors. Overall, Allison shows a slightly higher representation of negative factors (Factor Contrast Group 2).

5.3.2.3 Barmuta, Leon: Freshwater Ecologist, University of Tasmania

TABLE 5.3.2.3.1: BARMUTA, LEON: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	- EMOTIONS/ - MENTAL EVENTS/ + PERFECTIONS
5	Do you have any thoughts on the idea that spiritual insight and wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	- EMOTIONS/ + PERFECTIONS
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	- EMOTIONS/ + MENTAL EVENTS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	- EMOTIONS/ - MENTAL EVENTS

Barmuta's responses to the above questions reveal a stronger representation of negative factors, with Negative Emotions being represented in every response. His significant statements drew attention to his view of non-human living beings in relation to human beings, namely that his response indicated *lack of intrinsic awareness/ignorance* of non-human beings' spiritual constitutions, which was fairly typical of all interviewees. On four different occasions Barmuta discusses problematic emotional experiences in relation to his work, whilst also drawing attention to his being overwhelmed by his workload and other commitments. Such experiences indicate a strong presence of the Negative Emotion of *attachment*, described by the CAFG-GACTA as always resulting in suffering (Appendix B, 16).

The Negative Mental Event of *mental inflation* (described by the CAFG-GACTA as "desiring social status through factors such as wealth, appearance, education, youth and power" [Appendix B, 9]) was also recognised. Barmuta's response to Question 8 also represented the Negative Emotion of *attachment*, due to his lifestyle choices. Overall, Barmuta's interview is predominated by negative Abhidharma factors (Factor Contrast Group 2).

5.3.2.4 Bindoff, Nathan: Oceanographer, CSIRO Marine Research/University of Tasmania

TABLE 5.3.2.4.1: BINDOFF, NATHAN: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	- EMOTIONS/ - MENTAL EVENTS
5	Do you have any thoughts on the idea that spiritual insight and wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	- EMOTIONS/ + MENTAL EVENTS
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	- EMOTIONS/ - MENTAL EVENTS/ + PERFECTIONS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	- EMOTIONS/ - MENTAL EVENTS

Bindoff's responses to the above questions indicate a predominance of negative Abhidharma factors. Negative Emotional factors are present within every response. His one significant statement suggested the presence of the Negative Emotion of *attachment*, as well as the presence of negative factors through the Negative Mental Event of *gloominess/dullness*, described as being "associated with listlessness" (Appendix B, 11). His response to Question 8 is a clear representation of the Negative Emotion of *attachment*, as he has never considered renouncing material involvement for a life of simplicity and spiritual self-realisation. As there are no other outstanding features within his interview that influence factor representation towards a more positive predominance, overall Bindoff's interview predominates in Factor Contrast Group 2.

5.3.2.5 Bowman, John: Microbiologist, University of Tasmania/Australian Food Safety Centre of Excellence

TABLE 5.3.2.5.1: BOWMAN, JOHN: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	- EMOTIONS/ + PERFECTIONS
	Do you have any thoughts on the idea that spiritual insight and	

5	wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	- MENTAL EVENTS
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	+ MENTAL EVENTS/ + PERFECTIONS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	- EMOTIONS

Bowman's responses to the above questions suggest a balance of both positive and negative Abhidharma factors. His one significant statement was affiliated with the Negative Emotion of *attachment*, as was his response to Question 8, which specifically showed his attachment to the mental stimulation that his work provides. His interview responses indicate a fairly strong representation of Positive Mental Events through *diligence/enthusiasm*, described as "inclination towards the wholesome" (Appendix B, 4) and *alertness/suppleness*, described as "pliability of body and mind" (Appendix B, 5). The Positive Perfection of *morality/virtue* was also manifest. These factors showed a moderate representation within other interviewees' overall responses.

Bowman's general mood is one of *decorum/consideration for others*, described as that which "restrains harmful conduct of body, speech and mind" (Appendix B, 2) and *concern/ conscientiousness*, represented through Bowmans' concern and conscientiousness about the environment, his colleagues and his students. His interview therefore shows a fairly even balance between Factor Contrast Group 1 and Factor Contrast Group 2.

5.3.2.6 Burns, Gary: Principle Research Scientist, Space and Atmospheric Science-Australian Antarctic Division

TABLE 5.3.2.6.1: BURNS, GARY: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	- EMOTIONS/ + PERFECTIONS
5	Do you have any thoughts on the idea that spiritual insight and wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	- EMOTIONS
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	+ PERFECTIONS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	- EMOTIONS

Burns' responses to the above questions show a slightly higher representation of negative factors. His one significant statement shows his affiliation with the Positive Perfections *of energy* and *determination/resolution*. *Determination/resolution* is described by the CAFG-GACTA as "being unshakable in regards to beings' welfare and happiness" (Appendix B, 22). This factor is quite prevalent throughout Burns' interview responses. His response to Question 8 was represented by the Negative Emotion of *attachment*, due to Burns' preoccupation with material comforts for his family and himself. Overall, Burns' responses showed a higher representation of Negative Abhidharma factors (Factor Contrast Group 2).

5.3.2.7 Church, John: Program Leader of Sea-Level Rise, CSIRO, Antarctic Climate and *Ecosystems Cooperative Research Center*

TABLE 5.3.2.7.1: CHURCH, JOHN: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	- EMOTIONS
5	Do you have any thoughts on the idea that spiritual insight and wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	- MENTAL EVENTS
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	+ MENTAL EVENTS/ + PERFECTIONS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	+ PERFECTIONS

Church's responses to the above questions showed a fairly even balance of positive and negative factors, with positive factors slightly outweighing the negative. His significant statement consisted of a dialogue in which he expresses his frustrations and overwhelmedness with his professional and personal responsibilities. Such expressions were linked to the Negative Emotion of *attachment* and to the Negative Mental Event of *indignation/wrath*, described by the CAFG-GACTA as being associated with anger and as judging "what is just, according to one's own material desires" (Appendix B, 6).

Church's response to Question 8 showed affiliation with the Positive Perfection of *renunciation*, described as that which "departs from sense pleasure and existence" (Appendix B, 20). There are no further outstanding factors within Church's interview that may significantly contribute towards either positive or negative factors. Overall, Church's interview shows a slightly higher representation within Factor Contrast Group 1 (positive factors).

5.3.2.8 Coleman, Richard: Research Scientist (Physical Sciences) Antarctic Climate and Ecosystem Cooperative Research Centre/University of Tasmania

TABLE 5.3.2.8.1: COLEMAN, RICHARD: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	- MENTAL EVENTS
5	Do you have any thoughts on the idea that spiritual insight and wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	+ MENTAL EVENTS/ + PERFECTIONS
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	+ PERFECTIONS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	+ MENTAL EVENTS/ + PERFECTIONS

Coleman's responses to the above interview questions show a higher representation of positive factors. His significant statement also reflects both Positive Mental Events and Positive Perfections through factors such as *energy* and *concern/ conscientiousness*. His response to Question 8 showed affiliation with the perfection of *determination/resolution* and with the Positive Mental Event of *non-attachment/ detachment*, considered irregular within scientists' responses to interview questions.

There is no other outstanding representation of factors within his interview, except his affiliation with the Positive Perfection of *morality/virtue* and the Positive Mental Event of *non-deludedness/non-bewilderment*, described as "distinct discriminatory awareness" (Appendix B, 4). These factors are manifest through his commitments to conserving the natural environment, including individual non-human living beings. Overall, Coleman predominates within Factor Contrast Group 1.

5.3.2.9 Davidson, Garry: Earth Sciences Senior Lecturer at the University of Tasmania/Australian Antarctic Division

TABLE 5.3.2.9.1: DAVIDSON, GARRY: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	- MENTAL EVENTS/ + PERFECTIONS
	Do you have any thoughts on the idea that spiritual insight and	

5	wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	- EMOTIONS
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	+ MENTAL EVENTS/ - EMOTIONS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	- EMOTIONS

Davidson's responses to the above questions show a predominance of negative Abhidharma factors. His two significant statements showed affiliation with the Negative Mental Events of *mental inflation* and *lack of trust/faithlessness*. The Positive Mental Events of *decorum/consideration for others*; *non-hatred* (described by the CAFG-GACTA as "compassion for all sentient beings" [Appendix B, 3]); *concern/ conscientiousness* (described as that which "cherishes accumulated knowledge/ wisdom and detracts from what is unwholesome" [Appendix B, 5]); and *non-violence* (described as "compassion" [Appendix B, 6]) are also relevant.

The Positive Perfections of *morality/virtue* and *loving-kindness*, although not frequently represented within other scientists' interviews, were represented within Davidson's responses. Davidson's response to Question 8 also showed affiliation with the Negative Emotions of *attachment* and *opinionatedness/afflicted views*, described by the CAFG-GACTA as "speculation about what is perishable and what is not perishable" (Appendix B, 19). There is no other outstanding factor representation within Davidson's interview. Overall, his interview shows a slightly higher representation within Factor Contrast Group 2 (negative factors).

5.3.2.10 Miller, Denzil: Executive Secretary for the Commission on the Convention of Antarctic and Marine Living Resources

TABLE 5.3.2.10.1: MILLER, DENZIL: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	- EMOTIONS/ + MENTAL EVENTS/ + PERFECTIONS
5	Do you have any thoughts on the idea that spiritual insight and wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	- EMOTIONS/ + MENTAL EVENTS/ + PEFECTIONS
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	+ MENTAL EVENTS/ + PERFECTIONS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means	+ MENTAL

	renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	EVENTS/ + PERFECTIONS

Miller's responses to the above interview questions show a strong predominance of positive Abhidharma factors. His two significant statements represented the positive factors of *non-deludedness/non-bewilderment*; *truthfulness/does not deceive*; and *diligence/enthusiasm*. His response to Question 8 was represented by the Positive Mental Events of *diligence/enthusiasm* and *non-deludedness/non-bewilderment,* and by the Positive Perfection of *renunciation*. Such a response to Question 8 was atypical of most scientists' responses to Question 8.

The rest of Miller's interview showed significant representation of both Positive Perfections and Positive Mental Events. Overall, Miller's interview responses show that he strongly affiliates with positive factors (Factor Contrast Group 1).

5.3.2.11 Morgan, Vin: Member of Ice-cores Program, Antarctic Climate and *Ecosystem Cooperative Research Center*

TABLE 5.3.2.11.1: MORGAN, VIN: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	- EMOTIONS
5	Do you have any thoughts on the idea that spiritual insight and wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	+ PERFECTIONS
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	+ PERFECTIONS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	- EMOTIONS/ + PERFECTION

Morgan's responses to the above questions show a balance of both positive and negative factors. His two significant statements showed affiliation with the Positive Mental Event of *diligence/enthusiasm* and with the Positive Perfection of *morality/virtue*. His response to Question 8 revealed that he had briefly contemplated renouncing his professional life for spiritual realisation (the Positive Perfection *renunciation*) but primarily that he had not considered it seriously (the Negative Emotion *attachment*). The Negative Emotion of *indecision*, described by the CAFG-GACTA as "to be in two minds about the truth" (Appendix B, 19) was relevant.

Throughout the rest of his interview, Morgan shows an unusually high representation of the Positive Perfection of *truthfulness/does not deceive*, described by the CAFG-GACTA as "non-deceptiveness in speech" (Appendix B, 22) which was

not significantly represented within other scientists' overall interviews. Statements such as the following indicate his dedication to this quality:

> There's higher principles, such as just being honest, and you can be honest in different ways I suppose in research. Again, this is just scientific research anywhere. I mean it isn't specifically Antarctic research of course. There's a lot of discussion at the moment about … and there's been a few cases of people being dishonest. (Appendix M, 80)

Overall, Morgan's interview shows a fairly even balance between positive and negative Abhidharma factors.

5.3.2.12 Nicol, Steve: Program Leader (Marine Ecosystems) Australian Antarctic Division/Antarctic Climate and *Ecosystems Cooperative Research Center*

TABLE 5.3.2.12.1: NICOL, STEVE: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	- EMOTIONS/ - MENTAL EVENTS
5	Do you have any thoughts on the idea that spiritual insight and wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	- MENTAL EVENTS
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	+ MENTAL EVENTS/ + PERFECTIONS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	- EMOTIONS

Nicol's responses to the above interview questions show a slight predominance of negative Abhidharma factors. His significant statement is affiliated with the Negative Mental Event of *resentment*, described as "bitterness at not having one's own material desires fulfilled" (Appendix B, 6) and with the Negative Emotion of *arrogance/self importance*, described as "an inflated mind as to what is perishable" (Appendix B, 17). These factors were atypical of most interviewees' overall responses.

Nicol's response to Question 8 revealed his determination to remain involved in material affairs through the Negative Emotion of *attachment*. The remainder of his interview shows significant representation of the Positive Mental Event of *non-deludedness/ non-bewilderment* through his insight into the biases and uncertainties of science, as well as the Negative Emotion of *attachment*, revealed through his frustration with the scientific process. Overall, Nicol's interview was predominated by Factor Contrast Group 2.

5.3.2.13 Ramm, David: Data Manager, Commission for the Convention on the Conservation of Antarctic Marine Living Resources

TABLE 5.3.2.13.1: RAMM, DAVID: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	- EMOTIONS
5	Do you have any thoughts on the idea that spiritual insight and wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	+ MENTAL EVENTS
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	- EMOTIONS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	+ MENTAL EVENTS/ + PERFECTIONS

Ramm's responses to the above questions show a slightly higher representation of positive Abhidharma factors. His two significant statements suggest the presence of a number of negative factors including *lack of intrinsic awareness/ignorance*; *shamelessness* (described as "taking one's perversions as one's norms" [Appendix B, 10]); *a lack of a sense of propriety/inconsideration for others*; and *unconcern/ unconscientiousness*. These factors were manifest through scientists' treatment of Antarctic krill (as revealed in Ramm's interview) being primarily concerned with their (the krills') market value and their accessibility for research purposes. As many Antarctic scientists somehow contribute towards research using animals such as krill, such representation of Abhidharma factors may be considered typical of Australian Antarctic scientists.

Ramm's significant statements were represented by the Positive Mental Event of *concern/conscientiousness*, due to his statement that some scientists do care for individual animals, not just populations of animals. His response to Question 8 showed the presence of the Positive Perfection of *renunciation* and the Positive Mental Event of *non-deludedness/non-bewilderment*. The remainder of his interview shows a moderate representation of the Positive Mental Event of *non-deludedness/non-bewilderment*, made conspicuous through his ability to discern the bigger picture of the progress of science, in view of its current limitations.

Overall, Ramm's interview shows a slightly stronger representation within Factor Contrast Group 1.

5.3.2.14 Reid, James: Dean, Faculty of Science, Engineering and Technology, University of Tasmania

TABLE 5.3.2.14.1: REID, JAMES: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	- EMOTIONS/ - MENTAL EVENTS
5	Do you have any thoughts on the idea that spiritual insight and wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	- EMOTIONS/ - MENTAL EVENTS
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	- EMOTIONS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	- EMOTIONS

Reid's responses to the above questions represent only negative Abhidharma factors, with Negative Emotions being present within every response. His one significant statement was affiliated with the Positive Mental Event of *non-deludedness/non-bewilderment*, which was considered uncommon amongst interviewees' general responses. His response to Question 8 revealed the presence of the Negative Emotion of *attachment*, which was prevalent within scientists' responses, specifically to this question. The remainder of his interview shows a fairly even representation of positive and negative factors of which several are represented only once within his responses. Overall, Reid shows a higher representation within Factor Contrast Group 2.

5.3.2.15 Riddle, Martin: Leader of Human Impacts Program, Australian Antarctic Division

TABLE 5.3.2.15.1: RIDDLE, MARTIN: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	- EMOTIONS
5	Do you have any thoughts on the idea that spiritual insight and wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	- EMOTIONS
	What do you think the goals and values are that are most	+ MENTAL

6	prominent in your work culture at the Australian Antarctic Division?	EVENTS/ + PERFECTIONS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	- EMOTIONS/ - MENTAL EVENTS

Riddle's responses to the above interview questions show a slightly higher representation of negative Abhidharma factors. His significant statement, also represented under his response to Question 8, is affiliated with the Negative Emotions of *attachment* and *lack of intrinsic awareness/ignorance* and with the Negative Mental Event *ebullience/restlessness/distraction*, described by the CAFG-GACTA as "the unsettled mind" (Appendix B, 11). Such affiliation was considered highly representative of scientists in general, as *lack of intrinsic awareness/ignorance* is described by the CAFG-GACTA as "to invest oneself in enjoyment of the senses instead of focusing on one's spiritual goals" (Appendix B, 18). Several scientists showed that they were unaware of the differences between material (sensual) and spiritual activities.

An outstanding feature present throughout Riddle's responses is his discussion of his specific science area: human impacts. He discusses both his own involvement with the field and the involvement of others. As human impact studies are themselves affiliated with the Positive Mental Event of *decorum/consideration for others*; *concern/ conscientiousness*; and *non-violence*, as well as with the Positive Perfection of *morality/virtue*, his overall interview is strongly affiliated with positive Abhidharma factors. Overall, Riddle shows a fairly even balance between Factor Contrast Group 1 and Factor Contrast Group 2.

5.3.2.16 Rintoul, Steve: Physical Oceanographer, Program Leader of the Climate Change and *Variability Program, Antarctic Climate* and *Ecosystems Cooperative Research Center*

TABLE 5.3.2.16.1: RINTOUL, STEVE: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	- EMOTIONS/ + MENTAL EVENTS
5	Do you have any thoughts on the idea that spiritual insight and wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	- EMOTIONS
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	+ MENTAL EVENTS/ + PERFECTIONS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means renouncing material life for a life of austerity and spiritual self-	- EMOTIONS

	realisation). Can you explain your answer?	

Rintoul's responses to the above interview questions show a balance between negative and positive factors. His one significant statement showed affiliation with the Negative Emotion of *attachment* and with the Negative Mental Event of *desultoriness/non-discernment*. The remainder of his interview shows a fairly steady representation of *non-deludedness/non-bewilderment* (a Positive Mental Event) with regards to his insights into the influence of the researcher him/herself on the scientific process:

> If you're measuring something that's – the length of something or the time that something takes – it's reasonably objective I suppose. For the more qualitative aspects of science it may be more difficult to achieve the – and this gets back to the second example – the objectivity which we – our goal I think, and it may be possible, is to do our science in a way that it's not strongly dependent on the individual who is doing the observing because we're after truths if you like that are bigger than us individually. (Appendix M, 113)

His response to Question 8 was represented by Negative Emotions of *attachment* and *lack of intrinsic awareness/ignorance* due to his unwillingness to change his lifestyle for spiritual considerations, under the premise that increased material involvement means a simpler lifestyle. Overall, Rintoul's interview is predominated by Factor Contrast Group 2.

5.3.2.17 Robertson, Graham: Seabird Ecologist, Australian Antarctic Division

TABLE 5.3.2.17.1: ROBERTSON, GRAHAM: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	- EMOTIONS
5	Do you have any thoughts on the idea that spiritual insight and wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	+ MENTAL EVENTS
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	+ MENTAL EVENTS/ + PERFECTIONS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	- EMOTIONS

Robertson's responses to the above interview questions show a balance between positive and negative Abhidharma factors. His one significant statement showed affiliation with the Positive Mental Events of *non-deludedness/non-bewilderment* and *alertness/suppleness* and with the Negative Mental Events of *lack of a sense of*

propriety/inconsideration for others and *unconcern/unconscientiousness*. It also showed affiliation with the Negative Emotion of *arrogance/self-importance*.

It is considered significant that on three different occasions throughout his interview, Robertson discusses scientists' self-interests and self-indulgence in choosing the science they pursue. The Negative Mental Event of *avarice*, described by the CAFG-GACTA as "selfishness" (Appendix B, 8) is relevant. Robertson's response to Question 8 showed the presence of the Negative Emotion of *attachment*. There are no other outstanding factors within the rest of Robertson's interview. Overall, Robertson's interview predominates within Factor Contrast Group 2.

5.3.2.18 Southwell, Colin: Ecologist, Australian Antarctic Division

TABLE 5.3.2.18.1: SOUTHWELL, COLIN: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	+ PERFECTIONS
5	Do you have any thoughts on the idea that spiritual insight and wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	+ MENTAL EVENTS
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	+ MENTAL EVENTS/ + PERFECTIONS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	- EMOTIONS/ - MENTAL EVENTS

Southwell's responses to the above interview questions show a higher affiliation with positive factors. His two significant statements were both affiliated with negative factors in relation to *opinionatedness/afflicted views* and *desultoriness/non-discernment*. The Negative Emotion of *opinionatedness/afflicted views* showed a moderate representation within other scientists' interviews, although it was not always present within their direct responses to questions being asked.

Southwell's response to Question 8 revealed the presence of the Negative Emotion of *attachment*, as well as the Negative Mental Events of *desultoriness/non-discernment* and *lack of trust/ faithlessness*. The only other representation considered outstanding in Southwell's overall interview is his attachment to his family i.e. his personal sensual life, in making decisions about his professional life. The Negative Emotion of *attachment* is relevant. Overall, Southwell's interview predominates slightly within Factor Contrast Group 2.

5.3.2.19 Trull, Tom: Program Leader of Ocean Control of CO2-Climate and Ecosystems Program, Antarctic Climate and Ecosystems Cooperative Research Center

TABLE 5.3.2.19.1: TRULL, TOM: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	- MENTAL EVENTS/ + PERFECTIONS
5	Do you have any thoughts on the idea that spiritual insight and wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	- EMOTIONS
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	+ MENTAL EVENTS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	- EMOTIONS

Trull's responses to the above interview questions showed a slightly higher representation of negative factors. His significant statement showed his affiliation with the Negative Emotion of *lack of intrinsic awareness/ignorance* and with the Negative Mental Event of *desultoriness/non-discernment*. Specifically, Trull showed a lacking of *intrinsic awareness* which is described by the CAFG-GACTA as that which "pertains to awareness of inner, spiritual considerations" (Appendix B, 18). This was divulged by statements such as the following:

> I don't really know what spiritual insights are. I guess people have intuitions. I can think of those as some kind of subconscious assessment of how things are likely to work and then projecting them onto their physical environment... So from that sense I don't see any spiritual input to Antarctic or other science. (Appendix M, 137)

Trull's response to Question 8 revealed the Negative Emotion of *attachment*, typical of other scientists' responses to the same question. There are no other outstanding aspects of Trull's interview within the context of the Abhidharma. Overall, Trull's interview shows greater affiliation with Factor Contrast Group 2.

5.3.2.20 Woehler, Eric: Honorary Research Associate (Biology), Institute of Antarctic and Southern Ocean Studies

TABLE 5.3.2.20.1: WOEHLER, ERIC: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	- EMOTIONS
5	Do you have any thoughts on the idea that spiritual insight and wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	- EMOTIONS
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	+ MENTAL EVENTS/ + PERFECTIONS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	- EMOTIONS/ + PERFECTIONS

Woehler's responses to the above interview questions indicate a balance between positive and negative Abhidharma factors. His one significant statement showed an affiliation with the Negative Emotion of *lack of intrinsic awareness/ignorance*. His response to Question 8 showed affiliation with the Negative Emotion of *attachment* (typical of other scientists' responses to the same question) as well as with the Positive Perfection of *morality/virtue* (atypical of other interviewees' responses to the same question).

In the remainder of his interview, Woehler's responses are fairly consistent in terms of his addressing his own dedication to Antarctic science, as well as the dedication of other scientists. He states that:

> People generally when they go south really work their butts off. They really put in the effort. I suppose the phrase is they work hard and they play hard. They work really, really hard and work stupid hours. People put in long days, day after day after day of sustained effort. (Appendix M, 148)

Such statements are affiliated with the Positive Mental Event of *diligence/enthusiasm,* as well as with the Positive Perfections of *energy* and *determination/resolution*. Overall it appears that Woehler's interview responses are fairly equally balanced within Factor Contrast Group 1 and Factor Contrast Group 2.

5.3.2.21 Wright, Simon: Senior Research Scientist (Marine Microbial Ecology) Australian Antarctic Division

TABLE 5.3.2.21.1: WRIGHT, SIMON: Responses to Interview Questions 3, 5, 6 and 8, According to the Abhidharma

Question No.	Question	Factor/s represented within response
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	- EMOTIONS/ + MENTAL EVENTS
5	Do you have any thoughts on the idea that spiritual insight and wisdom should play, or do already play, an active role in contemporary scientific research such as physics and biology?	+ MENTAL EVENTS
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	- EMOTIONS/ + PERFECTIONS
8	Have you ever considered giving up your professional position as a scientist for a simpler life (*simpler life* here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	- EMOTIONS

Wright's responses to the above interview questions are balanced between positive and negative Abhidharma factors. His significant statement also showed affiliation with both positive and negative factors. Positive Mental Events of *decorum/ consideration for others* and *concern/conscientiousness* were relevant, as was the Positive Perfection of *morality/virtue*. The Negative Mental Event of *unconcern/unconscientiousness* and the Negative Emotion of *attachment* were also relevant. Wright's response to Question 8 revealed the presence of two Negative Emotions, namely *jealousy/envy* (described by the CAFG-GACTA as when one "is unable to bear others' excellences by being overly attached to gain and honour" [Appendix B, 8]) and *attachment*.

Wright's entire interview responses show a fairly strong representation of the Positive Mental Events of *decorum/consideration for others*; *concern/ conscientiousness*; and *non-violence* through his care for the preservation of the environment. The positive factors of *morality/proper conduct* and *loving-kindness* are also relevant for the same reason. Statements such as "in fact when I got into biochemistry in the first place, one of the reasons I started on plants was I hated killing animals" (Appendix M, 154) confirm this. The Positive Perfection of *loving-kindness* is relevant, which, although appearing within a small number of other interviews, was atypical of most interviews. Overall, Wright's interview shows a fairly even balance between Factor Contrast Group 1 and Factor Contrast Group 2.

5.3.3 Summary of Interview Series Results According to the Abhidharma

The results from the quantification of responses to Questions 3, 5, 6 and 8 have been entered in the following table:

TABLE 5.3.3.1: Results of Quantification of All Interview Responses to Questions 3, 5, 6 and 8

QUES -TION NO.	QUESTION	POSITIVE FACTORS		NEGATIVE FACTORS	
		POSITIVE MENTAL EVENTS	POSITIVE PERFECTIONS	NEGATIVE MENTAL EVENTS	NEGATIVE EMOTIONS
3	Can you tell me anything about your own consciousness during your working day i.e. what usually goes through your mind during an ordinary working day?	4	8	7	15
5	Do you have any thoughts on the idea that spiritual insight and wisdom should play, or does already play, an active role in contemporary scientific research such as physics and biology?	7	4	5	12
6	What do you think the goals and values are that are most prominent in your work culture at the Australian Antarctic Division?	14	16	1	6
8	Have you ever considered giving up your professional position as a scientist for a simpler life (simpler life here means renouncing material life for a life of austerity and spiritual self-realisation). Can you explain your answer?	3	6	6	17
FACTOR GROUP TOTAL Scores have been rounded to their nearest whole value.		28 = 21 %	34 = 26 %	19 = 14 %	50 = 38 %
FACTOR CONTRAST GROUP TOTAL		62 = 47 %		69 = 52 %	

The above results showed that unwholesome or negative factors predominate marginally over positive factors within interviewees' responses to Questions 3, 5, 6 and 8. Overall appraisals of interviews also showed that Factor Contrast Group 2 predominates within scientists' interviews in their entirety. A considerable number of interviews were represented equally by positive and negative factors (a balance of Factor Contrast Group 1 and Factor Contrast Group 2). Predominance of factors according to overall appraisals was as follows:

Factor Contrast Group 1 (Positive Mental Events and Positive Perfections): 4

Factor Contrast Group 2: (Negative Mental Events and Negative Emotions): 11

An equal Balance of Group 1 and Group 2: 6

The following table lists Abhidharma factors represented the most often within interviews, listed under Factor Groups:

TABLE 5.3.3.2: Interview Series Results: Abhidharma Factors Represented Most Frequently Within Each Factor Group

Ordering of Abhidharma factors represents an approximate sequence of factors appearing most frequently to least frequently.

FACTOR GROUP	POSITIVE MENTAL EVENTS	POSITIVE PERFECTIONS	NEGATIVE MENTAL EVENTS	NEGATIVE EMOTIONS
FACTOR	CONCERN/ CONSCIEN-TIOUSNESS NON-DELUDEDNESS/ NON-BEWILDERMENT DECORUM/ CONSIDERATION FOR OTHERS ALERTNESS/ SUPPLESSNESS NON-VIOLENCE	ENERGY MORALITY/VIRTUE DETERMINATION/ RESOLUTION TRUTHFULNESS/DOES NOT DECEIVE LOVING-KINDNESS	UNCONCERN/ UNCONSCIEN-TIOUSNESS LACK OF SENSE OF PROPRIETY/ INCONSIDERATION FOR OTHERS DESULTORINESS/ NON-DISCERNMENT GLOOMINESS/ DULNESS	ATTACHMENT LACK OF INTRINSIC AWARENESS/ IGNORANCE OPINIONATEDNESS/ AFFLICTED VIEWS ARROGANCE/ SELF IMPORTANCE

Of all the above factors, the Negative Emotion of *attachment* appeared the most frequently within all interview responses.

5.4 Chapter Conclusion

That scientists have been asked to personally present their opinions on their own psychological and behavioural dispositions was an invitation for scientists to 'put their best feet forward' and to draw attention to issues chosen by them, within the parameters of research questions chosen by the interviewer. Whilst scientists may not be conscious of *why* they maintain certain motivations, opinions and behaviours, all scientists interviewed delivered detailed explanations of *what comprised* such elements.

Both the Vedic triguna and the Buddhist Theravada Abhidharma assert that every individual living being maintains free will. If the individual chooses to act according to his/her material desires, rather than to his/her non-material/spiritual desires, then the consciousness of the individual becomes materially contaminated and the individual becomes bewildered by the illusory material energy. The pursuit of sense-

pleasure is thereby seen by both schools of thought as being responsible for the suffering of the individual within the material world. If Australian Antarctic scientists thus choose to invest their consciousness in prioritising material pursuits over spiritual pursuits, their predominance within the lower modes of material nature and within negative Abhidharma factors can not be blamed on others.

Vedic teachings assert that it is ultimately the false ego, as one of the three subtle material elements of the materially embodied self, that keeps the individual ensnared within the material cosmos, as the individual experiences the dualities of material life (pleasure and pain, good days and bad days etc.). Information processed by the subtle material mind and subtle material intellect manifests either as false ego or as real ego, depending on the quality of the information. If the information is accurate regarding the identity and functioning of the jiva, then it enhances the jiva's higher qualities of consciousness, characterised by greater and real knowledge. If the information is *in*accurate, meaning that the mind and the intellect feeds false facts to the individual regarding his/her real spiritual identity, then the false ego is enhanced, eventuating in an increase in false, or lower, qualities of consciousness. This is necessarily so, as the individual's elevation to higher spiritual realms of existence demands that the individual is conscious of his/her spiritual identity (Bhaktivedanta 1989, 5:2, 6:2).

Similar conclusions are made by the Abhidharma, which states that cessation to the journey of *samsara*, repeated birth and death, can only take place when the individual puts an end to desiring to enjoy, and identifying with, material life. The individual's realisation that he/she does not belong within the material realm of existence is seen as pertinent to such cessation.

As the last data processing chapter, Chapter Six investigates scientists' quality of consciousness within Australian Antarctic science literature.

CHAPTER SIX

AUSTRALIAN ANTARCTIC SCIENCE LITERATURE FEATURES

The duty of scientists and technologists is not only to conduct their own work at the highest possible level of quality but also to make the societies in which they live more aware of the powers and limits of science. Since, by definition, scientists and technologists are the first to know of scientific advances they can be described as 'the cartographers of the future'.

The Lord Dainton, FRS in "Knowledge is Our Destiny" (1992, 119)

Chapter Outline
As the last data collecting and processing chapter, Chapter Six investigates scientists' qualities of consciousness as determined by features of Australian Antarctic science literature. It examines the contents of Australia's Antarctic Animals Ethics Committee's *Animal Experimentation Guidelines* (2006), responses to Interview Series Question No. 7 and the contents of peer-reviewed science literature. Both the Vedic triguna and the Buddhist Theravada Abhidharma assess all literature items. Results are summarised in preparation for a final analysis to be carried out in Chapter Seven.

6.1 Processing Using Vedic Triguna

6.1.1 Analysis of the Contents of the Antarctic Animals Ethics Committee's Animal Experimentation Guidelines

The 2006 version of the Antarctic Animals Ethics Committee's (AAEC's) *Animal Experimentation Guidelines* appear in Appendix R. As stipulated by the committee, their guidelines for scientific research are relevant only to birds, fish, mammals and certain cephalopods (squids and octopuses). Species falling outside these categories are not considered. The guidelines' research parameters have been established to "complement the Australian Code of Practice for the care and use of animals for scientific purposes to which all Australian researchers must conform" (Appendix R, 2).

It must here be stated that scientific experimentation using animals is in itself situated within rajas and tamas gunas. This is for the following reasons: 1. Gathering knowledge by means of experimentation is founded on empiricism, which is affiliated with several rajasic characteristics such as *knowledge gathered through the material senses*; 2. Experimenting on animals necessarily means manipulating them, their environments and/or their circumstances, in order to interpret their responses to relevant criteria. The rajasic *propensity to manipulate and control material nature* is thus relevant; and 3. Scientific experimentation often causes animals harm, distress, bewilderment and sometimes death, whether accidental or intentional. Such behaviour on behalf of scientists is underpinned by the tamasic characteristics of *violence towards others/causing others harm* and *the taking of life without a higher ethical and spiritual reason*.

Processing the guidelines using the Vedic triguna was relatively unencumbered, in that there were no specific difficulties in identifying guna representation within

clauses. Points i and ii of the GDEG were adhered to in examining the contents of the guidelines against the triguna. The guidelines are divided into seven sections, of which the first six address different research activities. Section 7 contains a list of references only. The contents of each of the first six sections were examined within the context of the triguna:

Section 1: Capture of Seals and Birds
Sattvic characteristics predominate within Section 1. Clauses such as "in order to reduce stress, capture should be rapid, and the pursuit kept to a minimum" (Appendix R, 3); "restraint should be terminated and the seal released, if the animal is judged to be distressed" (Appendix R, 3); and "to reduce the chance of injury to the bird, capture of flying birds at the nest should be done by hand, preferably without the use of gloves, to increase handler sensitivity" (Appendix R, 5) are numerous. Provisos such as these show that a great deal of care is imposed upon researchers in their capture of seals and birds. Such care is affiliated with the sattvic characteristics of *morality*; *showing compassion towards others*; and *the distaste for harming or killing any living being*.

A small number of tamas guna clauses also appear, however. In particular, the following clause draws attention to its strong representation of tamas guna: "Southern phocid pups and weaners can be physically restrained by sitting astride the animal's shoulders and lifting the fore-flippers off the ground. If necessary a second operator can put pressure on the animal's pelvis" (Appendix R, 4). This clause indicates a severe lack of sensitivity towards animals on behalf of the AAEC and scientists accordingly, should they follow these instructions. If such efforts are required to restrain animals then it must be concluded that animals do not wish to be captured i.e. they do not submit willingly to scientists' handling them. This type of behaviour is affiliated with the tamasic characteristics of *amoral practices* (meaning practices that cause harm, distress or death to others without any higher ethical and spiritual purposes) and *violence towards others/causing others harm*.

Apart from its presence through empirical research methods, rajas guna is not significantly represented within Section 1 of the guideline clauses.

Section 2: Killing Seals and Birds
Section 2 does not address the issue of why animals can or should be killed, or under what circumstances they can or should be killed. Killing animals for scientific research purposes is in itself situated within tamas guna, being affiliated with the tamasic characteristics of *amoral practices*; *violence towards others*; and *the taking of life without a higher ethical and spiritual reason*. The tamasic characteristic of *being uninterested in and unconcerned about spiritual matters* is also relevant. Although Section 2 discusses the killing of animals within the context of euthanasia, there are no contents of clauses that address concern as to pain or fear experienced by animals when they are being killed, nor awareness of animals' own desires to stay alive. The spiritual welfare of animals being killed is also not addressed within the guidelines.

One clause within Section 2 is affiliated with sattva guna. It addresses the disposal of carcasses after animals have been killed with drugs: "The carcass should be disposed of in a fashion that prevents the intoxication of scavenging birds by ingestion of the drug contaminated carcass" (Appendix R, 7). This clause is represented by the sattvic *morality*; *showing compassion towards others* and *action that is responsible to both material and non-material needs of others*.

Outside its presence through empirical research methods, rajas guna is not significantly represented in Section 2, which is predominated by tamasic features.

Section 3: Transport and Restraint
Section three contains both sattvic and rajasic elements. Clauses such as "transporting penguins away from their colonies will inevitably cause distress and so should be avoided unless absolutely necessary" (Appendix R, 8) and "if the bird shows any signs of distress it should be returned to its place of capture immediately" (Appendix R, 8) represent sattvic characteristics of *morality*; *showing compassion towards others*; and *the distaste of harming any living being*.

Clauses such as "sedation should be used at the discretion of and under the direct supervision of the veterinarian" (Appendix R, 7) represent care for the animals' physical comforts in accordance with veterinarian advise. Such statements are affiliated with rajasic characteristics of *acquiring scientific knowledge on the material body/material world* and *adherence to mundane knowledge*; as well as other rajasic characteristics affiliated with empirical research activities. They do not in themselves constitute sattvic elements of concern and compassion aimed at animals' distress. Overall, Section 3 shows a fairly equal representation of sattvic and rajasic elements. Tamas guna is not significantly represented.

Section 4.1: Sedation and/or Anaesthesia of Seals and *Section 4.2: Guidelines for Seal Anaesthesia*

These two sub-sections are both predominated by rajas guna. Both sub-sections contain extensive lists of procedures for anaesthetising animals according to their different species, biological conditions and drugs being applied. One sattvic clause is identified: "The operator must reduce, to a negligible level, the chance that the animal will return to the sea in a sedated or disoriented state" (Appendix R, 10). This point is raised twice and indicates some concern that animals may not cope if returned to the sea too soon after being sedated. As animals are of no further use to scientists after they have been involved in research procedures, care for them after their release indicates the presence of the sattvic quality of *morality*; *showing compassion towards others*; and *action that is responsible to both material and non-material needs of others*. Tamas guna is not significantly represented in either sub-section.

Section 5: Specific Procedures
Section 5 contains clauses from all three gunas. Sattva guna is represented by clauses such as "the apparent tameness of wildlife is a superficial impression and studies have shown that birds and seals may be under stress even when they show no obvious reactions" (Appendix R, 11) and "while the method of euthanasia should be selected so as not to interfere with the objectives of the research, the welfare of the animal must take priority" (Appendix R, 15).

Relevant sattvic characteristics include *morality*; *showing compassion towards others*; and *action that is responsible to the material and non-material needs of others*. The sattvic characteristic of *awareness of non-material phenomena, such as consciousness* is also relevant in the former of the two clauses, due to awareness of animals' inner or non-physical (non-observable) experiences. Rajas guna is represented by the many research procedures present within Section 5, including veterinary procedures. They are affiliated with rajasic characteristics such as

adherence to mundane knowledge and other rajasic characteristics affiliated with empiricism.

Tamas guna is represented by clauses such as "double tagging of all seals is recommended to overcome the problems induced by tag loss. Physical restraint may be required for tag checking" (Appendix R, 12). This clause suggests that scientists, or perhaps just the AAEC, prioritises the inconveniences caused for themselves by tag loss, over the impositions on penguins by being double-tagged. Stomach-flushing penguins to study their diets is represented by the mixed rajas and tamas gunas through the characteristics of *acquiring scientific knowledge on the material body/material world* (rajas) and *amoral practices* and *violence towards others/causing others harm* (tamas guna). Euthanasia, whilst represented to a certain degree by sattva guna (through researchers *showing compassion towards others*) predominates within tamas guna, due to the presence of the characteristic of *the taking of life without a higher ethical and spiritual reason*.

The Vedanta strongly argues that all living beings, regardless of species, must be allowed to live out their lives to their natural ends (Bhaktivedanta 1989, 14:16). As material embodiment in itself means suffering, a greater degree of suffering on behalf of an individual is generally not considered as a valid reason to end his/her life earlier prematurely.

Section 5 also contains a short discussion on environmental ethics in relation to legislation. Much such legislation contains significant representation of sattva guna due to efforts required of scientists to reduce human impacts on the natural environment. Overall, Section 5 shows a fairly even representation of all three gunas.

Section 6: What Constitutes an 'Invasive' and *'Non-invasive' Procedure*

Section 6 is affiliated with characteristics from all three gunas. Of specific importance are the two introductory clauses (Appendix R, 15):

> An **invasive** technique can be defined as any procedure which removes samples of any body tissue including blood, skin, fat, and stomach contents from a vertebrate animal, or which requires the administration of an anaesthetic.
>
> A **non-invasive** procedure is one that is restricted to the exterior of an animal, such as the attachment of leg rings to flighted birds, flipper bands on penguins, or the temporary attachment of location recording/time-depth recording devices to birds or mammals. It includes the attachment of cattle ear tags in the rear flipper membranes of seals.

These clauses are significant in terms of the AAEC's judgement on what constitutes non-invasive procedures. According to the CGCG, harming other individuals does not only refer to physical harming but also emotional, psychological and social harming. In addition to animals being traumatised by being tagged, their interactions with humans may also impinge on their social organisation within their own species. This is potentially relevant for both invasive and non-invasive procedures. Actions on behalf of researchers that may impinge detrimentally are affiliated with the tamasic characteristic of *action performed in illusion, in disregard of scriptural injunctions, and without concern for future bondage or for violence or distress caused to others*.

Information presented from the *Australian Code of Practice for the Care and Use of Animals for Scientific Purposes* (entered under Section 1 [Appendix R, 1]) contains sattvic clauses such as "death as an end-point must be avoided wherever possible and

if unavoidable must be fully justified by the investigator. Measures to be taken to minimise pain or distress must be detailed" (Appendix R, 17). This statement indicates the presence of the sattvic characteristics of *morality*; *showing compassion towards others*; *the distaste for killing any living being, or witnessing the killing of any living being*; and *the distaste of harming any living being, or witnessing the harming of any living being*. Rajasic representation is relevant through requirements of researchers to detail their procedures in their reports (*adherence to mundane knowledge*). All three gunas have significant presence within Section 6.

6.1.2 Results from Interview Series Question No. 7, Regarding Peer-review: Discussion

The issue of peer-review becomes relevant within the context of scientists' sense of normality underpinning their research efforts and methodology. Scientists may choose to utilize the system of peer-review for purposes endemic to any one of the three material modes, for any number of reasons. The system in its entirety is underpinned by scientists' association with each other through conducting research together, reading each other's scientific publications, authoring publications together, attending conferences and pursuing educational and academic pursuits in general. Thus the direction of science is largely determined by the current status quo of scientists' collective quality of consciousness.

Theoretical parameters of contemporary science are thereby determined by the current predominant mode of the consciousness of scientists. If the predominant mode of consciousness of academics is currently the mode of passion, individual scientists who may predominate within either the mode of goodness or ignorance may find it difficult to have their theories accepted by the greater body of academics. Ramifications of this may be that attempts by certain individual scientists to introduce science characterised by higher qualitative levels of consciousness (higher than the current qualitative level) may not be successful, even if accuracy, purpose and high ethical tenets earmark such efforts. Similarly, science characterised by lower qualitative levels of consciousness (lower than the current qualitative level) may also be rejected.

Scientists' responses to Interview Series Question 7 appear in Appendix S. Whilst defining scientists' responses at times proved difficult in terms of identifying clearly defined representations of gunas within interviewees' responses, such incidences were few. As with the processing of responses to the other eight Interview Series questions, points i, ii and v of the GDEG were adhered to in the examination of scientists' responses to Question 7, which reads:

> Do you have any thoughts on the process of peer-review, as a means by which to ensure rigor in Antarctic scientific research?

Most of the 21 interviewees responded to Question No. 7 by stating that they were of the opinion that peer-review increases the likelihood of rigor, but that it does not ensure it. Two scientists stated that they were of the opinion that peer-review does ensure rigor. Many scientists responded with statements such as "well, it is about the only system we've got. Yes, I mean you can't think of anything else" (Morgan Appendix S, 12) and "yes, and the other thing you have to ask is what's the alternative. Nobody seems to have ever come up with a better alternative" (Nicol Appendix S, 13). In other words, several interviewees were of the opinion that scientists should accept and use the system of peer-review due to the apparent lack of

a better alternative. Such acceptance could itself be argued as being 'un-rigorous' in that it infers that scientists are accepting and applying a system of evaluation simply because they are not aware of any better way to ensure rigor.

According to Bhaktivedanta (1981, 27) the vitally important issue within such a scenario is that scientists risk misleading society through their publications with assertions that their scientific findings are rigorous and accurate when they may in fact be faulty. Many interviewees admitted that the system of peer-review *is* faulty. Amongst relevant statements were "it's often flawed…. You can get reviewers that are completely wrong and reject a paper because they don't understand it and if the editor also doesn't understand where they're coming from you can reject a good paper" (Allison Appendix S, 2). Also, "it's not failsafe so it's possible to write a paper in which you confiscate something or you make up data or something like that and there's no guarantee that peer review will catch that" (Rintoul Appendix S, 15). Such statements indicate that scientists are well aware of the deficiencies, or at least the potential deficiencies of peer-review. Yet they accept the system on the grounds of the lack of a better alternative. Such behaviour is endemic to tamas guna for reasons explained below.

In *Bhagavad-gita As It Is* (1989, 7:14) Bhaktivedanta argues that if an individual is to provide guidance to others, then he/she must first be competent to do so. A bona fide source of authority on mundane or worldly subject matters must necessarily be one that has transcended the triguna altogether, due to the triguna's proneness to cloud the individual's clear consciousness. Authority, by its very nature, means one who can clearly oversee the relevant issue in question i.e. one who can objectively observe the relevant phenomenon, without being influenced by it. Scientists' attempts to 'oversee' each other through the system of peer-review, is thereby considered foolish according to the Vedanta, as all scientists, more or less, are materially conditioned and therefore maintain the same level of knowledge.

The system of peer-review, as it is employed within contemporary scientific activities, is thus influenced by tamas guna, being affiliated with the tamasic characteristics of *foolishness* and *ignorance/nescience*. Rajas guna characteristics also maintain a strong presence through the element of empirical knowledge, underpinning all scientists' publications. The following tamasic and rajasic characteristics apply:

1. *Speaking (publicising) without scriptural authority* (tamas guna)
Through the system of peer-review, scientists choose to consult each other about the nature of this universe, instead of seeking knowledge according to scriptural authority. According to the Vedas, bona fide scriptural authority comes from a plane of existence where individuals are more advanced in knowledge than that of this Earthly realm. As scientists present their findings to society, they impress and therefore influence the rest of society, meaning they maintain a position of power in leading society in the development of knowledge. It is due to this potential influence on society that scientists must be held accountable for the ramifications of their publications;

2. *False expectations/indulgence in false hopes* (tamas guna)
If scientists are aware of the faulty nature of peer-review, but still choose to adhere to it, they are trusting and investing in a system known to be faulty i.e. they are maintaining false expectations;

3. *Foolishness* (tamas guna)
Point 2 (above) highlights scientists' foolishness in depending on a system that they know is faulty. This is especially so, given the application of research outcomes to environmental management practices i.e. the seriousness of publications;

4. *Dishonesty/deception* (tamas guna)
By publishing research findings and applying knowledge derived from them, knowing that their system of evaluation of such knowledge is faulty, scientists are involving themselves in dishonest practices. This is validated by Southwell's comment that:

> scientists can't provide certainty because even the best scientific theory, every other scientist is trying to shoot it down. That's the way science works in its traditional sense. So under traditional science philosophy what the public considers as truth, the scientist should be considering as the best hypothesis that is available right now, but maybe a better one's going to come up. In that sense the current accepted hypothesis may not be true, it's just the best right now. (Southwell Appendix M, 129)

The tamasic characteristic of *irresponsible action* may also be relevant within this context, as scientists fail to act responsibly in informing the public as to the limitations of their science. This conclusion is made on the premise that if the public were adequately informed of such limitations, they would not consider scientists' findings as absolute truth. This may encourage them to turn to sattvic knowledge i.e scriptural knowledge, to find answers to environmental management dilemmas;

5. *Action performed in illusion, in disregard of scriptural injunctions, and without concern for future bondage or for violence or distress caused to others* (tamas guna)
Again, if scientists do not adequately communicate to the public the limitations of their findings, then they are not acting in a manner that would imply concern for future ramifications of their findings, for others.

6. *Knowledge gathered through the material senses* (empirical knowledge); *acquiring scientific knowledge on the material body/material world*; *knowledge producing many theories and doctrines by dint of mundane logic and mental speculation*; and *adherence to mundane knowledge* (rajas guna)

Mundane knowledge means knowledge derived either through one's own material senses or through the material senses of someone else. According to VCS, such knowledge is inaccurate, as the material senses are imperfect or faulty as scientific instruments. As the material mind and intellect seek ever-new ways in which to be stimulated, such knowledge changes with the changing desires of the mind and intellect;

7. *Attachment to specific material conceptions* (rajas guna)
Whilst scientists depend on the abilities of each other to guide them towards accurate knowledge, they are, as Allison confirms, attached to their own scientific theories:

> **Ian:** I think that's true and there are certainly ideologists in science and there are people who passionately believe in what they're doing and the problem they're studying and if they were having a hard time changing direction if all the evidence showed that what they passionately believed in was incorrect and the opposite applied.

> **Elli:** Meaning that they're attached to their theories.
>
> **Ian:** They're attached to their theories, or it may be ?…? that they have a very strong environmental ideals. (Appendix M, 12)

In addition to the above-listed tamasic and rajasic characteristics representing interviewees' current approach to peer-review, responses to Interview Question No. 7 also included a significant number of statements regarding the limitations of peer-review:

> I mean it's only as good as the reviewers that are nominated to each paper…. The only way you would improve it would be by having more reviewers for each application or for each paper so you have more opinions, which is still peer-review. (Riddle Appendix S, 14)

In this statement, Riddle admits that the quality of review can not exceed scientists' own level of expertise. He thus confirms that the quality of a peer-reviewed publication will only be as good as the science maintained by the reviewer/s selected for the relevant publication. In other words, he is acknowledging that the quality of peer-review is limited and susceptible to the professional capacities of individual scientists, who are restricted by their own personal dexterity. As he can not think of from where else he may gain an authoritative opinion, he suggests having more opinions from other like-minded scientists for each paper. Whilst the sattvic characteristic of *honesty* is relevant in Riddle's comment, tamasic characteristics listed above also apply.

To conclude, one interviewee admitted his own shortcomings in his lack of understanding the peer-review system altogether, although he himself uses the system. He commented that "the problem is that it isn't clear, and it still isn't really clear to me, even after all this time puddling around reviewing papers, what you should be reviewing" (Morgan Appendix S, 11). As with Riddle's statement above, the sattvic characteristic of *honesty* is relevant in Morgan's response, as he has the integrity to admit that he finds the organisation of peer-review as lacking in clarity. As he keeps pursuing his work as a reviewer, however (as well as publishing articles) even though he is unaware of what his duties as a reviewer are, his response is also characterised by *foolishness* and *ignorance* (tamas guna). Without proper understanding of his duties as a reviewer, he risks giving support to inaccurate knowledge, thereby being instrumental in the creation of environmental policy that is potentially harmful to other living beings. The tamasic characteristic of *helplessness* is also relevant, as Morgan can not determine what his duties are.

Overall, responses to Interview Series Question 7 indicate predominance within tamas guna, followed by rajas guna. For scientists to support a system that they know is flawed, that is maintained only because there is no seemingly better alternative, knowing also that society at large depends on their limited expertise to guide them towards environmental sustainability, is specifically representative of the lower modes of material nature.

6.1.3 Peer-reviewed Journal Articles: Text-category 1: Physical Science

In identifying guna characteristics within physical science publications, points i, ii and v of the GDEG were consulted. Guna characteristics identified as being prevalent within all physical science articles included the following:

List 6.1.3.1: Guna Characteristics Inclusive to All Physical Sciences Articles

The order of characteristics maintains no meaning as to their prevalence within articles.

1. the pursuit of greater and real knowledge (sattva guna)
2. a sense of advancement in material knowledge (sattva guna)
3. knowledge gathered through the material senses (empirical knowledge) acquiring scientific knowledge on the material body/material world; knowledge producing many theories and doctrines by dint of mundane logic and mental speculation; adherence to mundane knowledge (rajas guna)
4. the utilising of material resources for material purposes/spending excessive amounts of money for material purposes/excessive usage of material resources (rajas guna)
5. intense endeavour (rajas guna)
6. lack of awareness of, or interest in, higher ethical and spiritual purpose of work (tamas guna)
7. being uninterested in and unconcerned about spiritual matters (tamas guna)
8. speaking (publicising) without scriptural authority (tamas guna)

This list shows the presence of all three gunas. Following are the results from the examination of individual physical science articles. In this examination, identifying specific literature features that represented guna characteristics in order to give an evenhanded overall appraisal of each article presented challenges. In particular, identifying which characteristics were more prevalent than others within texts proved to be difficult. As stated in section 3.1.2, due to the highly abstract nature of literature features that represent gunas within data, an estimation only can be drawn as to the sequence of characteristics according to their prevalence. Identifying which gunas predominated over other gunas was less challenging:

6.1.3.1: Dunkley, Daniel .J., Clarke, Geoffrey .L., and Harley, Simon .L. 1999. "Diffusion Metasomatism in Silica-Undersaturated Sapphirine-Bearing Granulite from Rumdoodle Peak, Framnes Mountains, East Antarctica." Contributions to Mineral Petrology *134:264-76.*

Article 6.1.3.1 describes rock formations and mineral deposits (reaction bands) within an East Antarctic rock-crop. A number of descriptions are qualitative, giving information on the colour, texture and shape of reaction bands within rock formations. Most descriptions, however, are mathematical, with several graphs, tables and diagrams of relevant results of research being presented. As both the qualitative and quantitative descriptions are restricted to the material aspects of the phenomena being investigated, such descriptions are affiliated with the rajasic characteristic of *knowledge derived through the material senses*, as well as other rajasic characteristics affiliated with the empirical research method.

The results of the study conducted (the diffusion metasomatism in granulite from east Antarctica) were entered into an already-existing analysis model (metasomatic model). The model itself was afterwards adjusted in order to accommodate "significant disparities" between the needs of the data created from this study and the needs of the original data used to create the original model (page 274). Such manipulation of methodology, theoretical frameworks and of data itself, is typical of work and activity within rajas guna, within which the individual is encumbered by *an insatiable desire for results* and *action that creates/re-creates* to further develop the

material paradigm. If existing theories and/or methodology do not accommodate selected data or produce desired results, scientists prefer to rearrange theories and methodologies, rather than accept the limitations of the material energy.

VCS confirms that such endeavours further entangle the materially embodied jiva in material life, by keeping him/her in ignorance of higher or greater knowledge which lies beyond the reach of the material senses and can therefore not be manipulated by them (Bhaktivedanta 1989, 18:2). The rajasic tendency to *lord it over material nature* is also relevant. Overall, Article 6.1.3.1 shows a strong predominance within rajas guna. Sattva and tamas gunas are significant only within their representation in List 6.1.3.1, meaning that tamas guna shows a slightly higher representation than sattva guna.

6.1.3.2: Massell, C., Coffin, M.F., Mann, P., Mosher, S., Frohlich, C., Duncan, C.S., Karner, G., Ramsay, D., and Lebrun, J. F. 2000. "Neotectonics of the Macquarie Ridge Complex, Australia-Pacific Plate Boundary." *Journal of Geophysical Research* 105 (B6):13,457-80.

In this article, the authors interpret a ~5-10 km wide Macquarie Fault Zone between two neotectonic plates south of New Zealand. The article gives lengthy qualitative and quantitative descriptions of plates, rock formations and the Earth's crust using many graphs, diagrams and photographs. This indicates a strong presence of the rajas guna characteristic of *adherence to mundane knowledge* and other rajasic characteristics affiliated with empiricism.

The authors discuss their discoveries of tectonic features previously not discovered, stating that "we identify 14 ocean fracture zones in the MRC region using the new bathymetric and side-scan sonar data (Figure 3). Only three had been identified previously on bathymetry" (page 13,467). Such reports typify many environmental science articles, in which researchers declare their discoveries of different environmental features, claiming discoveries either on their own behalf or on the behalf of others.

Such claims are affiliated with the rajasic characteristic of *proprietorship*, with the individual experiencing a strong sense of ownership, desiring the rights of being recognised as 'discoverer,' 'explorer' or 'inventor.' Within sattva guna the individual is not afflicted with notions of ownership or wanting recognition as the originator of commodities, instead accepting material natural resources as belonging to the Earth who is seen as a conscious living being whom can not be owned.

The article is represented within sattva guna specifically due to the presence of the sattvic characteristic of *careful study of the past and future*. Whilst the article does not contain extensive discussion on future implications of the researchers' newly discovered ocean fracture zones, there is moderate discussion on the possible contributions to the formation of those zones.

The authors state that their "most significant result is the identification of the Australia-Pacific plate boundary along the MRC" (page 13,476) designating this feature of the article to both rajas and tamas gunas, due to the researchers' lack of recognition of any higher spiritual or ethical purposes of their findings. Furthermore, the article contains much discussion on the material causes of movement and development of plates, with the authors repeatedly stating that they are "interpreting" their data according to what the data suggests (pages 13,457 and 13,462). Whilst this may seem to be the only realistic way in which to draw conclusions using the empirical research method, it nevertheless highlights the fact that many scientific

conclusions are based on scientists' personal and professional construing data. The rajas guna characteristic of *knowledge producing many theories and doctrines by dint of mundane logic and mental speculation* is particularly relevant.

Article 6.1.3.2 predominates within rajas guna. Sattva and tamas gunas, although represented within the article's exclusive features as well as in List 6.1.3.1, remain in the background, with tamas guna appearing more often than sattva guna.

6.1.3.3: McIntosh, Peter C., and Rintoul, Stephen R. 1997. "Do Box Inverse Models Work?" *American Meteorological Society* February:291-308.

McIntosh and Rintoul discuss the capacities of box inverse models used in calculating interfacial fluxes of ocean circulation. A number of statements appear within the mixed gunas of sattva and rajas, in addition to the overall material technology discussed which predominates within rajas guna. Statements appearing within the mixed sattva/rajas address the importance of goals, underlying motivation, philosophy and implications of the relevant research.

In sattva guna, work and knowledge are typically characterised by *awareness of and interest in higher ethical and spiritual purposes of work*; *greater knowledge*; and *alertness/wakefulness*, including awareness of the underlying philosophy of one's work. Whilst the features in Article 6.1.3.3, discussed below, do not meet these criteria completely, they do to a degree that satisfies their designation to a mixture of sattva and rajas gunas.

The authors define the main motivation for the study as being "to assess the accuracy of the box inverse method" (page 292). The implications of the study are also referred to throughout the article. The authors raise the issue of questioning the underlying philosophy of one of the features of box inverse models, asking if it is in fact "appropriate for determining the circulation" (page 295). Clauses such as these contain both sattvic and rajasic elements due to the presence of the sattvic characteristics discussed above, as well as the rajasic characteristics of *acquiring scientific knowledge on the material body/material world* (and other rajasic characteristics affiliated with empiricism).

On a number of occasions the authors discuss the importance of previous researchers ignoring important details within their models, potentially leading to inaccurate data being retrieved. They also discuss the many theoretical assumptions that are made by modelers and by other methodologies. Such scrupulous attention to detail, specifically to the limitations of existing theories, typifies within sattva guna, within which the individual's *awareness/wakefulness* of detail is heightened. The sattvic characteristics of *honesty* and *morality* in speaking out against possible scientific error or incompetence are also relevant.

Article 6.1.3.3 predominates within both sattva and rajas gunas due to the article's exclusive sattvic features, coupled with the overall prevalent rajasic representation of empirical research methodology. Tamas guna showed only a moderate representation due to its representation within List 6.1.3.1.

6.1.3.4: Roberts, Andrew, Allison, Ian, and Lytle, Victoria I. 2001. "Sensible-and Latent-Heat-Flux Estimates over the Mertz Glacier Polynya, East Antarctica, from In-Flight Measurements." *Annals of Glaciology* 33:377-84.

Article 6.1.3.4 discusses the results of measurements made of ocean-atmosphere heat fluxes over an area of the Mertz Glacier polynya, East Antarctica. The authors describe their methods of collecting data, namely by flying over the study area and measuring heat fluxes using a probe extending from a helicopter undercarriage. Apart from descriptions of research methods and methodology (rajas guna), the article does not contextualise the practical application or overall intentions of the study in terms of its direction i.e. it demonstrates a low level of reason in design.

With no discussion on the usefulness of data collected on heat fluxes, no mention of the overall purpose of the research and no mention of existing or potential environmental problems being addressed as a result of the data, Article 6.1.3.4 shows a strong affiliation with tamas guna. The tamasic characteristics of *acquisition of knowledge without any higher purpose*; *acting whimsically, for no purpose*; and *the failing of awareness of greater* (material or non-material) *incentives for action* are relevant. The article does not communicate any understanding of the relevant research process beyond descriptions given of immediate research activities. Article 6.1.3.4 predominates within tamas guna due to the prevalence of above-discussed characteristics, as well as the moderate representation of tamas guna within List 6.1.3.1. Rajas guna shows the second highest representation, due to its status within List 6.1.3.1 and the article's exclusive descriptions of research methods.

6.1.3.5: Ables, S.T. Fraser, B.J., Olson, J.V., and Morris, R.J. 2000. "Conjugate ULF Field Line Resonance at Cusp Latitudes." *Advanced Space Research* 26 (1):125-30.

Article 6.1.3.5 discusses in detail the technological capacities of two different space weather stations. Primarily, the technological capacities of the two stations are compared (northern and southern hemisphere stations) within the context of their geographical positioning in relation to their functioning. Such information and knowledge predominates within rajas guna, being affiliated with *adherence to mundane knowledge* and other rajasic characteristics affiliated with empirical knowledge.

The most important result of the study is stated as being specific data collected by the two stations, namely "the phase relationship shown in Figure 4. This illustrates the usefulness of phase as an analysis parameter, which shows greater stability than amplitude or spectral power" (page 129). This phase relationship is described as comprising "interhemispheric crossphase scatterplots" for four different days within the same month i.e. findings considered most important from the study are the results of a correlation analysis between the same atmospheric phenomenon over a given period of time (page 128). This feature predominates within the mixed rajas/tamas gunas for the following reasons.

Knowledge gathered through the material senses (empirical knowledge) predominates within rajas guna. When the individual concludes, however, that such information, void of any higher ethical and spiritual considerations, comprises the most significant finding from the relevant research, then such conclusions become tainted by tamas guna, the mode of ignorance. Within this lowest of material modes, the individual *fixes one's* (their) *mind on the sense objects without higher awareness, perceiving things as a small child or a retarded person does*. In other words, understanding that is derived through the material senses only, without any insight into either the material or spiritual significance of phenomena, is endemic to tamas

guna. The above-stated 'most important result' of the relevant research, is thus represented by both rajas and tamas gunas.

Article 6.1.3.5 predominates fairly evenly within rajas and tamas gunas, due to the article's exclusive representation of rajasic and tamasic characteristics, as well as the moderate representation of both gunas within List 6.1.3.1. Sattva guna is not considered significant within the article, being represented only minimally through characteristics cited in List 6.1.3.1.

6.1.4 Peer-reviewed Journal Articles: Text-category 2: Biological Science

In identifying guna characteristics within biological science publications, points i, ii and v of the GDEG were consulted. Guna characteristics identified as being prevalent within all biological science articles were the same as those for physical science articles presented in List 6.1.3.1. As such, rajasic and tamasic characteristics predominate over sattvic characteristics within features inclusive to all biological science articles examined.

Following are the results from the examination of individual biological science articles. Challenges in this examination were primarily the same as those encountered in examining physical science articles. In addition to such obstacles, challenges included identifying guna representation according to different authors' appreciation and treatment of animals and plants:

6.1.4.1: Arata, Javier, Robertson, Graham, Valencia, Jose, Xavier, Jose C., and Moreno, Carlos A. 2004. "Diet of Grey-Headed Albatrosses at the Diego Ramirez Islands, Chile: Ecological Implications." *Antarctic Science* 16 (3):263-75.

Article 6.1.4.1 presents the results from an investigation into the diet of two species of albatross, namely grey-headed albatrosses and black-browed albatrosses. On the whole, the article contains much qualitative and quantitative description of the stomach-contents of both species of albatross, specifically grey-headed albatrosses. Tables, graphs and diagrams support the presentation of this data, which is affiliated with the rajasic characteristics of *acquiring scientific knowledge on the material body/ material world*, as well as other rajasic characteristics affiliated with the empirical research method.

The authors give detailed explanations of how albatrosses' stomach-contents were examined. Chicks were made to vomit into a bag after being fed, by having their stomachs squeezed and their throats massaged. After vomiting, chicks' stomachs were examined to ensure they were empty. Chicks were also weighed twice per week throughout the period of study (fifteen to sixty days). Such behaviour on behalf of scientists is endemic to tamas guna, in which the tamasic characteristic of *amoral practices* and *action performed in illusion, in disregard of scriptural injunctions and without concern for future bondage or for violence or distress caused to others* are relevant. Rajasic characteristics affiliated with empiricism were also relevant.

The tamasic characteristic of *violence towards others/causing others harm* (harm is not exclusive to physical damage, it includes psychological, emotional and social harm) is also relevant. The authors have not reported any acknowledgement of the emotional and/or psychological distress that their research may have caused albatross chicks or their parents. Whilst researchers may claim that their research has not caused any physical injury, they can not claim to have left the chicks untraumatised.

This feature of the relevant research is characterised by *amoral practices,* endemic to both rajas and tamas gunas. It falls within the AAEC's *Animal Experimentation Guidelines* (2006) Section 6 as "invasive procedures" (Appendix R, 15). *Amoral practices* are defined by the CGCG as practices that cause harm, distress or death without a higher ethical and spiritual purpose. Higher ethical and spiritual purposes are in turn described as consideration for the living being's material and spiritual welfare at all times and under all circumstances.

Whilst describing research methodology extensively (rajas guna) the study lacks discussion on its purpose, whether material or spiritual, making it representative of the tamasic characteristics of *the failing of awareness of greater incentives for action*; *the acquisition of knowledge without any higher purpose*; and *acquiring knowledge for sense gratification … without any higher purpose*. Overall, Article 6.1.4.1 predominates within both rajas and tamas gunas. Sattva guna is not significantly represented outside its presence in List 6.1.3.1.

6.1.4.2: Bowman, John P., Gosink, John J., McCammon, Sharee A., Lewis, Tom E., Nichols, David S., Nichols, Peter D., Skerratt, Jenny H., Staley, Jim T., and McMeekin, Tom A. 1998. "*Colwellia demingiae* sp. nov., *Colwellia hornerae* sp. nov., *Colwellia rossensis* sp. nov. and *Colwellia psychrotropica* sp. nov.: Psychrophilic Antarctic Species with the Ability to Synthesize Docosahexaenoic Acid (22: 6*w*3)." *International Journal of Systematic Bacteriology* 48:1171-80.

Article 6.1.4.2 describes a number of newly discovered species of bacteria. The authors explain how and why the species differ from other bacterial species. Specifically, the authors discuss the bacteria's phenotypic characterisation and differentiation in DNA hybridisation, which places a number of *Colwellia* strain groups outside the already identified strain range (page 1178). The article contains much discussion on the different capacities of the different species of bacteria, including their abilities and tendencies to grow, reproduce, synthesize different chemicals and adapt to different environments. Such knowledge is affiliated with the rajasic characteristic of *acquiring scientific knowledge on the material body/material world* (and other rajasic characteristics affiliated with empiricism), in this case, scientific knowledge on the material bodies of bacteria. The authors state that (page 48):

> *Colwellia hornerae* (hor.neŕ ae. L. adj. *hornerae* in honour of Rita Horner, an American biologist who pioneered studies on sea-ice microbiota).

Such honouring of biological discoveries is affiliated with rajasic characteristics of *seeking fame, glorification and admiration/a fondness for hearing oneself praised* and *seeking honour, recognition and status within society*, as well as *proprietorship*. In this case ownership refers to the owning of the name of the newly discovered species of bacteria.

Article 6.1.4.2 predominates within rajas guna. Sattva and tamas gunas are significant only in their representation within List 6.1.3.1, meaning that tamas guna predominates marginally over sattva guna.

6.1.4.3: Jackson, George D., Buxton, Nicole G., and George, Magnus J.A. 2000. "Diet of the Southern Opah *Lampris Immaculatus* on the Patagonian Shelf: The Significance of the Squid *Moroteythis Ingens* and Anthropogenic Plastic." *Marine Ecology Progress Series* 206:261-71.

Article 6.1.4.3 discusses the stomach contents of a large type of pelagic fish, namely *Lampris immaculatus*, which plays an important role in global ocean food webs. The authors describe in detail the stomach contents of 69 fish made available for their study from the years 1993 and 1994, killed and frozen for research purposes. Descriptions of stomach contents are given, with accompanying photographs, graphs, tables etc. An important feature of this article, according to VCS, is the treatment of aquatic species of life. As many human beings in Western societies eat many species of aquatics, catching and killing them are commonly not seen as being unethical. According to the CGCG, however, the ingestion of animals, aquatic or otherwise, by human beings, is endemic to tamas guna. The killing of *Lampris immaculatus* for research purposes, although justified by scientific research, is designated to tamas guna under the characteristics of *amoral practices* and *the taking of life without a higher ethical and spiritual reason*.

The authors' attention to the presence of plastics within the fishes' stomachs is noteworthy. The stomachs of 14% of the fish studied contained some sort of plastic, believed by the authors to have come primarily from fishing vessels. The authors discuss this issue within several paragraphs, explaining the possible ramifications for fish of such harmful substances in their stomachs and digestive tracts. Whilst such discussion is materially based i.e. the discussion is about the material bodies of the fish, it nevertheless addresses the suffering of the fish and/or inconveniences caused fish in efforts to assimilate plastics.

Such concern for the welfare of non-human species is endemic to sattva guna, in which the individual may begin to understand that the intrinsic nature of non-human species is not different from the intrinsic nature of humans i.e. all species have the capacity to suffer. Relevant sattvic characteristics include *morality*; *showing compassion towards others*; and *knowledge by which one undivided spiritual nature is seen in all living entities, although they are divided into innumerable* (material) *forms*.

The desire to protect the material environment through scientific endeavours is represented by *the desire to maintain/sustain/preserve* (sattva guna) and by *the propensity to manipulate and control material nature/lord it over material nature* and *scientific knowledge on the material body/material world* (rajas guna). Article 6.1.4.3 also contains a significant quantity of both qualitative and quantitative descriptions of the stomach-contents of fish (rajas guna). Overall, Article 6.1.4.3 is represented by all three gunas fairly evenly.

6.1.4.4: Laursen, Gary A., Treu, Roland, Seppelt, Rod D., and Stephenson, Steven L. 1997. "Mycorrhizal Assessment of Vascular Plants from Sub-Antarctic Macquarie Island." *Arctic and Alpine Research* 29 (4):483-91.

The authors of Article 6.1.4.4 describe plants living on Macquarie Island, giving numerous reports on the variability of the abundance of different types of vascular and other sub-Antarctic plants. Vast qualitative descriptions of plants are given, as well as relevant quantitative information. In terms of guna characteristics, the article does not contain any outstanding features that do not already appear within List 6.1.3.1. The article has produced empirical knowledge typical of rajas guna,

describing the physical/material features of physical natural phenomena, in this case the material bodies of living beings in the form of plants.

Article 6.1.4.4 does not contain any discussion on the spiritual/non-material aspects of plants, nor any explanations given of what the higher purpose of the study may be outside the retrieval of information on the root system of vascular plants from sub-Antarctic Macquarie Island (tamas guna). Article 6.1.4.4 follows the representation of gunas within List 6.1.3.1, namely showing a predominance of both rajasic and tamasic characteristics, followed by sattvic characteristics.

6.1.4.5: Chiaradia, Andre F., and Kerry, Knowles R. 1999. "Daily Nest Attendance and Breeding Performance in the Little Penguin *Eudyptula minor* at Philip Island, Australia." *Marine Ornithology* 27:13-20.

Article 6.1.4.5 contains exclusive features that are representative of all the three gunas. The authors give both qualitative and quantitative descriptions of the daily nest attendance of the Little Penguin. The rajasic characteristic *acquiring scientific knowledge on the material body/material world* and other rajasic characteristics affiliated with empiricism, are relevant. On page 13-5 the authors state that:

> all birds were weighed and sexed by bill measurement … and then injected with electronic identification tags (TIRIS) on the first occasion they were observed in nests at the colony. Tags were injected between the shoulder blades (scalpula) and the wound closed with surgical glue.… Unbanded birds were fitted with stainless steel flipper bands.

Such behaviour towards penguins is affiliated with the tamasic characteristics of *violence towards others/causing others harm* and *amoral practices*. There are two other statements that need to be discussed together. The first of these appears on page 13:

> This absence of data is due in part to the need to remove birds from their burrows to read bands … which may cause undesirable disturbance to the individuals and therefore imposes limitations on the frequency with which birds in a colony can be visited … .The use of new technology has overcome this problem and as described below birds can be identified in their burrows without handling them.

and the second on page 15:

> Burrows were checked each day using a hand-held reader which could read tags through the wall of the burrow or nest box without disturbing the birds.… No attempt was made to determine time of laying of the second egg to avoid undue interference.

These two statements confirm that although researchers aim at minimising undue disturbance and interference with birds (sattva guna) such minimisation is in fact for the purpose of researchers' not wanting to limit their own visitations for purposes of collecting more data (rajas guna). This is confirmed by the clause "which may cause undesirable disturbance to the individuals and therefore imposes limitations on the frequency with which birds in a colony can be visited" (page 13). Thus the care extended to birds is in this case represented by the rajasic characteristic of *charity performed with the expectation of some return, or with a desire for fruitive results* (Bhaktivedanta 1989, 17:21).

Whilst the remainder of the article is situated within rajas guna, due to the prevalence of rajasic features affiliated with empiricism, one statement at the very end of the article needs mentioning. The statement appears on page 19:

> The monitoring of bird attendance at the colony combined with radio-tracking of birds with known breeding histories should provide a tool for management of the Little Penguin population of Phillip Island.

The statement is significant because it assumes that the Little Penguin needs to be managed. According to Vedic teachings, it is a gross misconception of contemporary governments to assume that the natural environment will prosper from human interference. What non-human species will benefit from the most is human management of human activity, of which the raising of humankind's quality of consciousness to sattva guna from rajas and tamas gunas is a prerequisite (Bhaktivedanta 1968b). Assumptions that non-human species need managing by humankind, are affiliated with the rajasic characteristics of *the propensity to manipulate and control material nature* and the general lack of the sattvic realisation (through *careful study of the past and future*) that non-human species have never relied on human assistance for their own wellbeing. The tamasic characteristics of *foolishness* and *ignorance/nescience* are therefore relevant.

Article 6.1.4.5 predominates only slightly within rajas guna, followed closely by tamas guna. Sattva guna shows a moderate to low representation.

6.1.5 Peer-reviewed Journal Articles: Text-category 3: Human Impact Studies

In identifying guna characteristics within human impact studies publications, points i, ii and v of the GDEG were consulted. Guna characteristics identified as being prevalent within all human impact articles differed significantly from those presented in List 6.1.3.1, relevant to both physical and biological science articles. The following list shows guna characteristics identified as being relevant to all human impact studies articles:

List 6.1.5.1: Features Inclusive to All Human Impact Studies Articles

The order of characteristics maintains no meaning as to their prevalence within articles.

1. the desire to maintain/sustain/preserve (sattva guna)
2. a sense of advancement in material knowledge (sattva guna)
3. the pursuit of greater and real knowledge (sattva guna)
4. knowledge gathered through the material senses (empirical knowledge); acquiring scientific knowledge on the material body/material world; knowledge producing many theories and doctrines by dint of mundane logic and mental speculation; adherence to mundane knowledge (rajas guna)
5. intense endeavour (rajas guna)
6. the utilising of material resources for material purposes/spending excessive amounts of money for material purposes/excessive usage of material resources (rajas guna)
7. being uninterested in and unconcerned about spiritual matters (tamas guna)
8. speaking (publicising) without scriptural authority (tamas guna)

The above list shows a predominance of both sattvic and rajasic characteristics. Following are the results from the examination of individual articles. There were no challenges specific to the examination of human impact studies that had not already been encountered within examinations of physical and biological science articles:

6.1.5.1: Auman, H.J., Woehler, E.J., Riddle, M.J., and Burton, H. 2003. "First Evidence of Ingestion of Plastic Debris by Seabirds at Sub-Antarctic Heard Island." *Marine Ornithology* 32:105-6.

In this short article the authors describe pieces of plastic found in the stomachs of sub-Antarctic birds. Whilst plastic discovered comprised a relatively small amount, the authors considered its presence significant enough to report. In this case, the authors' concern for the welfare of the birds is best designated to the sattvic characteristic of *showing compassion towards others*. The authors express their concern for the stress that birds may have experienced due to the presence of plastic in their stomachs, stating that:

> the quantities found in the two Antarctic Prions at Heard Island are not likely to cause physiologic stresses seen in other birds, such as starvation… suppressed appetite and reduced growth… lower fledgling masses… decreased fat deposition… increased PCB and other organochlorine assimilation… or satiation and obstruction in the gut. (2003, 105)

The researchers' concern for the impact of the plastics on birds is also, however, affiliated with the rajasic characteristic of *knowledge by which one sees that in every different body there is a different type of living entity*. This characteristic is qualified by the primary concern of environmental scientists being the survival of populations of animals, rather than experiences of individual animals. This prioritisation was confirmed by Ramm in his interview (Appendix M, 94).

Article 6.1.5.1 is predominated by sattvic characteristics, followed by rajasic characteristics. Tamas guna is significant only through its moderate representation within List 6.1.5.1.

6.1.5.2: Deprez, Patrick P., Arens, Michael, and Locher, Helen. 1999. "Identification and Assessment of Contaminated Sites at Casey Station, Wilkes Land, Antarctica." *Polar Record* 35 (195):299-316.

Article 6.1.5.2 discusses a number of waste sites around Casey Station, one of Australia's four permanent Antarctic research stations, listing contaminants present within specific geographical locations. *Cleanliness* and *tidiness* are sattvic characteristics. Within the context of Article 6.1.5.2 these characteristics feature in scientists' efforts to become more aware of the unclean surroundings of their working environments and to take action to minimise pollution for the benefit of the natural environment itself. Efforts on behalf of scientists to minimise human impact on the natural Antarctic environment necessarily means scientists' acknowledgement of the harmful effects (or potential harmful effect) of their own behaviours and the need to restrict such behaviours. In addition to *cleanliness* and *tidiness*, the sattvic characteristics of *knowledge that advances human behaviour in learning how to restrict the material senses* and *action that is responsible to both material and non-material needs of others* are relevant.

The authors discuss a fuel spill that occurred during 1990 at Casey Station, stating that "approximately 90,000 liters of 'Special Antarctic Blend' fuel leaked from a temporary storage tank" into the surrounding environment, which included a wharf (page 308). Whilst the authors discuss their efforts to clean up the spill, more than half of the quantity of fuel was not able to be recovered. Such an environmental disaster, whilst accidental, is potentially extremely harmful for the Antarctic natural environment and its inhabitants, including scientists themselves. Thus merely by their presence in Antarctica, scientists have caused such disasters.

According to the triguna, behaviours that expose innocent living beings to potential harm and death are endemic to tamas guna. If lives were lost, the tamasic *amoral practices*; *violence towards others/causing others harm*; and *the taking of life without a higher ethical and spiritual reason* would also be relevant. Whilst awareness of those mistakes is now being promulgated through the publication of Article 6.1.5.2 and other similar publications (sattva guna), the original behaviour on behalf of scientists was situated within tamas guna. Overall, Article 6.1.5.2 predominates within sattva guna. Rajas and tamas gunas follow fairly equally in their representation.

6.1.5.3: Gasparon, M., and Burgess, J.S. 1999. "Human Impacts in Antarctica: Trace-Element Geochemistry of Freshwater Lakes in the Larsemann Hills, East Antarctica." *Environmental Geology* 39 (9) July:963-76.

The authors of Article 6.1.5.3 discuss the existence of different trace elements in Antarctic freshwater lakes. Overall, the article shows a lesser degree of sattvic representation than other human impact articles. This is primarily due to the article's strong focus on the presentation of rajasic information on the presence of trace-elements, rather than discussion on the purpose of such information being discovered. Yet the overarching purpose of the study is to draw the attention of the reader to the pollutants in the lake caused by humans. Such efforts by scientists to raise awareness of their own irresponsible behaviour in the past (causing pollution/uncleanliness) is affiliated with the sattvic characteristic of *cleanliness* and *action that is responsible to the material and non-material needs of others*.

The bulk of the article contains quantitative data, descriptions of that data and its interpretation by the authors, in their aim to give a thorough analysis of the presence of trace elements introduced through human activity (rajas guna). Conclusive findings were that such trace-elements were currently below detection levels. The authors hypothesised that perhaps this was so due to trace metal contaminants never having been introduced into the lake. They also state, however, that this would be contrary to other field evidence and that contaminants may have been removed from the lake's water by assimilating with other organic materials. Such speculation about causal factors within the material realm is typical of rajas guna. It is characterised by *knowledge producing many theories and doctrines by dint of mundane logic and mental speculation*.

Article 6.1.5.3 is predominated by rajasic characteristics, followed by sattvic characteristics. Tamas guna is not represented significantly within the article's exclusive features.

6.1.5.4: Giese, Melissa, and Riddle, Martin. 1999. "Disturbance of Emperor Penguin *Aptenodytes forsteri* Chicks by Helicopters." *Polar Biology* 22:366-71.

The authors of Article 6.1.5.4 discuss the results of research into the behaviours of Emperor penguin chicks, as the result of overhead helicopter flights. The relevant research was aimed specifically at establishing whether or not existing guidelines for helicopter flights were adequate. Such purposes for research are endemic to sattva guna, affiliated with the sattvic characteristics of *morality*; *knowledge that advances human behaviour in learning how to restrict the material senses* and *action that is responsible to both material and non-material needs of others*. The authors give numerous detailed descriptions (predominantly qualitative) of how penguin chicks respond to disturbances by helicopters.

Another important feature of this article is that whilst the relevant research is aimed at alleviating stress caused to penguins, the authors also report handling birds (neighbouring chicks not included in the main study) prior to the research itself (e.g. weighing and counting chicks). Such behaviour is typical of mixed rajas and tamas gunas and is not uncommon within environmental science research. It represents rajas guna due to the characteristic of *knowledge derived through the material senses* (empirical knowledge) and other rajasic characteristics affiliated with empiricism. It represents tamas guna due to the disturbance and stress caused for penguins affiliated with the tamasic characteristics of *amoral practices* and *violence towards others/causing others harm*.

The authors conclude the article by stating that (page 371):

> lower overflights are likely to elicit even stronger reactions amongst emperor penguin chicks since other Antarctic penguins apparently show more dramatic responses the lower a helicopter flies over them (Sladen and LeResche 1970). Based on our data and adopting a cautionary approach, conservative guidelines for helicopter operations around emperor penguin chicks should therefore see minimum overflight altitudes for twin-engine helicopters lifted to at least 1500 m (5000 ft).

This statement is affiliated with the sattvic characteristics of *morality*; *showing compassion towards others* and *the distaste of harming any living being, or witnessing the harming of any living being*. The authors suggest that researchers, as well as tourist operators adopt recommended flight guidelines. Article 6.1.5.4 predominates within sattva guna, followed fairly evenly by both rajas and tamas gunas.

6.1.5.5: Creuwels, Jeroen C.S., Stark, Jonathan S., Woehler, Eric J., van Franeker, Jan A., and Ribic, Christine A. 2005. "Monitoring of a Southern Giant Petrel *Macronectes giganteus* Population on the Frazier Islands, Wilkes Land, Antarctica." *Polar Biology* 28:483-93.

Article 6.1.5.5 describes results from different studies into the disturbances caused for Southern Giant Petrel and other Antarctic bird species by human visitation. Both sattva and rajas gunas prevail throughout the article, although it appears that overall, rajas guna is more frequently represented.

The authors discuss the issue of harmful effects on nesting from human visitation at bird nesting sights. They specifically mention handling of birds for tagging, banding, weighing, monitoring egg incubation, as well as counting birds and observing them in general. The overall mood of the article is that of the importance of minimising disturbances to birds as much as is possible, endemic to sattva guna. The authors state that "the banding of Southern Giant Petrels has been discontinued, and

only non-invasive observations from outside colony boundaries are currently permitted (Woehler et al., 2003)" (page 483). They also state that:

> on the Frazier Islands, until the mid-1980s the main purpose of many visits was to band chicks for the study of dispersal and longevity. Since then, the interest has shifted towards population monitoring for conservation purposes. (2005, 484)

Whilst such factors appear a number of times in the article, the bulk of information is knowledge typifying in rajas guna. Much quantitative data is given on numbers of birds, geographical locations of their colonies, population trends and breeding trends. The authors state that the purpose of the article was to "review and re-examine all available census data, checking both published and unpublished information sources in order to select reliable time series based on comparable methods, locations and accuracy" (page 484). In other words, the purpose of the article was to establish mundane data in the form of census data, affiliated with the rajasic characteristic of *acquiring scientific knowledge on the material body/material world* and other rajasic characteristics affiliated with empiricism.

Although sattva guna is relatively prominent within the article's exclusive features, as well as within List 6.1.5.1, the article is predominated by rajasic characteristics. Sattvic characteristics follow, with tamas guna being the least represented.

6.1.6 Summary of Results from the Examination of Science Literature Features, According to the Triguna

The Antarctic Animal Ethics Committee's Animal Experimentation Guidelines

TABLE 6.1.6.1: Results from Analysis of the AAEC's *Animal Experimentation Guidelines* (2006) According to the Triguna

AAEC ANIMAL EXPERIMEN-TATION GUIDELINES	Section 1	Section 2	Section 3	Section 4	Section 5	Section 6
TRIGUNA CHARAC-TERISTICS	SATTVA	TAMAS	SATTVA/ RAJAS	RAJAS	SATTVA/ RAJAS/ TAMAS	SATTVA/ RAJAS/ TAMAS

The above results indicate that both sattva and rajas gunas predominate within the entire AAEC guidelines. The presence of several sattva guna characteristics is due to the idealistic nature of the guidelines, which aim to inspire ideal behaviour on behalf of researchers. Other guides for Australian Antarctic scientists, such as the AAD's official mission-statement, science goals and research objectives also maintain a highly idealistic focus, meaning that sattva guna characteristics would most certainly be represented significantly within relevant contents. Such a high representation of sattvic characteristics within an organisation's guidelines, mission-statements, objectives, goals etc. typify within organisations in general, as most organisations aim at ideal behaviours on behalf of staff.

Interview Series Question No. 7
The results from scientists' responses to Interview Series Question No. 7 revealed that scientists predominate within the mode of ignorance, tamas guna, in their treatment of the issue of peer-review. This situatedness was primarily determined from interviewees' insistence with using the peer-review system, even though most of them agreed that the system is faulty, does not ensure rigour in scientific research and is maintained only due to the lack of a seemingly better alternative.

Such behaviour was identified in section 6.1.2 as being affiliated with the tamasic characteristics of *speaking (publicising) without scriptural authority*; *false expectations/indulgence in false hopes*; *foolishness*; *dishonesty/deception*; and *action performed in illusion, in disregard of scriptural injunctions, and without concern for future bondage or for violence or distress caused to others*. Scientists' treatment of peer-review also maintained a number of rajasic qualities affiliated with their pursuit of empirical knowledge and their attachment to specific material conceptions. The sattvic characteristic of *honesty* was also relevant.

Peer-reviewed Literature
In order to quantify the results from the overall appraisals of peer-reviewed science publications, the same method was used as for the processing of overall appraisals of interviews. Predominating guna/s within each journal article were given a value of 2, with the guna/s showing the second-highest representation being given a value of 1. If any guna/s were considered as not being significantly represented within an article's exclusive features, they were still taken into account within the article's overall appraisal, as all gunas were represented to some degree within features inclusive to all three text-categories. Furthermore, as stated in section 2.2.3, all three gunas are always manifest within every material circumstances, even if they are undetectable.

It must be mentioned at this point that scores representing the second placing of gunas within each article (i.e. the guna/s that showed the second-highest representation within each article) represent approximate estimations only, for reasons outlined under section 3.1.2. The following table contains results from overall appraisals of peer-reviewed journal articles:

TABLE 6.1.6.2: Quantification of Overall Appraisals of Peer-Reviewed Science Publications Using the Triguna

Values of guna representation are written in **bold**. Values of frequencies of guna representation have been left un-bolded. Scores have been rounded off to their nearest whole value.

	SATTVA	SATTVA/ RAJAS	RAJAS	RAJAS/ TAMAS	TAMAS	SATTVA/ TAMAS	SATTVA/ RAJAS/ TAMAS
TEXT CATEGORY 1	1 x **1** = 1	1 x **2** = 2	1 x **1** + 2 x **2** = 5	1 x **2** = 2	3 x **1** + 1 x **2** = 5	-	-
TEXT CATEGORY 2	2 x **1** = 2	-	2 x **2** = 4	2 x **2** = 4	2 x **1** = 2	-	1 x **2**= 2
TEXT CATEGORY 3	2 x **1** + 3 x **2** = 8	-	1 x **1** + 2 x **2** = 5	2 x **1** = 2	-	-	-
TOTAL	11 = 25 %	2 = 5 %	14 = 32 %	8 = 18 %	7 = 16 %	-	2 = 5 %

The above results show that unmixed rajas guna predominates within peer-reviewed journal articles produced by the Australian Antarctic scientific community, receiving almost one third of scientist's support. Unmixed sattva guna follows fairly closely, with the mixed rajas and tamas gunas following sattva guna. The relatively high representation of sattva guna (25%) is to its prevalence within human impact studies articles.

Results from all three literature-sources (the AAEC's *Animal Experimentation Guidelines* (2006), responses to Interview Series Question 7 and peer-reviewed journal articles) indicate that overall, Australian Antarctic science literature predominates within rajas guna, followed by sattva guna. This finding takes into consideration both mixed and unmixed gunas. Whilst it may be argued that peer-reviewed literature, representing the final product of all science activity, should be allotted extra importance amongst literature items, this view is not maintained by the thesis researcher. As scientists' treatment of the topic of peer-review (which underpins all peer-reviewed literature) is considered vitally important to the overall quality of consciousness underpinning such literature, scientists' responses to Interview Series Question No. 7 have been given equal value to peer-reviewed publications themselves. As both Vedic and Buddhist philosophy considers the individual's treatment of animals as axiomatic in the evaluation of his/her entire qualities of consciousness, the AAEC's guidelines have also been given equal importance amongst all science literature items. The following table shows which guna characteristics appeared the most often within science literature data collection items:

TABLE 6.1.6.3: Guna Characteristics Represented the Most Frequently Within All Australian Antarctic Science Literature

Chronological listing of characteristics for each science literature item represents the *approximate* order of frequency of appearance only, beginning with characteristics appearing most frequently.

SCIENCE LITERATURE DATA-COLLECTION ITEM ↓	*GUNA CHARACTERISTICS REPRESENTED THE MOST OFTEN WITHIN AUSTRALIAN ANTARCTIC SCIENCE LITERATURE*		
	SATTVA	RAJAS	TAMAS
AAEC'S *ANIMAL EXPERIMENTATION GUIDELINES*	1. SHOWING COMPASSION TOWARDS OTHERS 2. MORALITY 3. THE DISTASTE FOR HARMING ANY LIVING BEING, OR WITNESSING THE HARMING OF ANY LIVING BEING 4. THE DISTASTE FOR KILLING ANY LIVING BEING, OR WITNESSING THE KILLING OF ANY LIVING BEING	1. KNOWLEDGE GATHERED THROUGH THE MATERIAL SENSES (EMPIRICAL KNOWLEDGE) 2. ACQUIRING SCIENTIFIC KNOWLEDGE ON THE MATERIAL BODY/MATERIAL WORLD 3. KNOWLEDGE PRODUCING MANY THEORIES AND DOCTRINES BY DINT OF MUNDANE SPECULATION 4. ADHERENCE TO MUNDANE KNOWLEDGE	1. VIOLENCE TOWARDS OTHERS/CAUSING OTHERS HARM (HARM IS NOT EXCLUSIVE TO PHYSICAL DAMAGE, IT INCLUDES PSYCHOLOGICAL, EMOTIONAL AND SOCIAL HARM) 2. AMORAL PRACTICES 3. THE TAKING OF LIFE WITHOUT A HIGHER ETHICAL AND SPIRITUAL REASON 4. BEING UNINTERESTED IN AND UNCONCERNED ABOUT SPIRITUAL MATTERS

INTERVIEW QUESTION NO. 7	1. HONESTY	1. KNOWLEDGE GATHERED THROUGH THE MATERIAL SENSES (EMPIRICAL KNOWLEDGE) 2. ACQUIRING SCIENTIFIC KNOWLEDGE ON THE MATERIAL BODY/MATERIAL WORLD 3. KNOWLEDGE PRODUCING MANY THEORIES AND DOCTRINES BY DINT OF MUNDANE SPECULATION 4. ADHERENCE TO MUNDANE KNOWLEDGE 5. ATTACHMENT TO SPECIFIC MATERIAL CONCEPTIONS	1. FOOLISHNESS 2. IGNORANCE/NESCIENCE 3. SPEAKING (PUBLICISING) WITHOUT SCRIPTURAL AUTHORITY 4. FALSE EXPECTATIONS/INDULGING IN FALSE HOPES 5. DISHONESTY/DECEPTION 6. ACTION PERFORMED IN ILLUSION, IN DISREGARD OF SCRIPTURAL INJUNCTIONS, AND WITHOUT CONCERN FOR FUTURE BONDAGE OR FOR VIOLENCE OR DISTRESS CAUSED TO OTHERS

OVERALL APPRAISAL OF PEER-REVIEWED JOURNAL ARTICLES	TEXT CAT. 1 (physical science)	1. THE PURSUIT OF GREATER AND REAL KNOWLEDGE 2. A SENSE OF ADVANCEMENT IN MATERIAL KNOWLEDGE 3. CAREFUL STUDY OF THE PAST AND FUTURE 4. ALERTNESS/WAKEFULNESS 5. HONESTY 6. MORALITY	1. KNOWLEDGE GATHERED THROUGH THE MATERIAL SENSES (EMPIRICAL KNOWLEDGE) 2. ACQUIRING SCIENTIFIC KNOWLEDGE ON THE MATERIAL BODY/MATERIAL WORLD 3. KNOWLEDGE PRODUCING MANY THEORIES AND DOCTRINES BY DINT OF MUNDANE SPECULATION 4. ADHERENCE TO MUNDANE KNOWLEDGE 5. THE UTILISING OF MATERIAL RESOURCES FOR MATERIAL PURPOSES/SPENDING EXCESSIVE AMOUNTS OF MONEY FOR MATERIAL PURPOSES/EXCESSIVE USAGE OF MATERIAL RESOURCES 6. INTENSE ENDEAVOUR	1. LACK OF AWARENESS OF, OR INTEREST IN, HIGHER ETHICAL AND SPIRITUAL PURPOSES OF WORK 2. BEING UNINTERESTED IN AND UNCONCERNED ABOUT SPIRITUAL MATTERS 3. SPEAKING (PUBLICISING) WITHOUT SCRIPTURAL AUTHORITY 4. ACQUISITION OF KNOWLEDGE WITHOUT ANY HIGHER PURPOSE 5. THE FAILING OF AWARENESS OF GREATER/HIGHER (MATERIAL OR NON-MATERIAL) INCENTIVES FOR ACTION

	TEXT CAT. 2 (bio-logical science)	1. THE PURSUIT OF GREATER AND REAL KNOWLEDGE 2. A SENSE OF ADVANCEMENT IN MATERIAL KNOWLEDGE 3. SHOWING COMPASSION TOWARDS OTHERS 4. MORALITY	1. KNOWLEDGE GATHERED THROUGH THE MATERIAL SENSES (EMPIRICAL KNOWLEDGE) 2. ACQUIRING SCIENTIFIC KNOWLEDGE ON THE MATERIAL BODY/MATERIAL WORLD 3. KNOWLEDGE PRODUCING MANY THEORIES AND DOCTRINES BY DINT OF MUNDANE SPECULATION 4. ADHERENCE TO MUNDANE KNOWLEDGE	1. LACK OF AWARENESS OF, OR INTEREST IN, HIGHER ETHICAL AND SPIRITUAL PURPOSES OF WORK 2. BEING UNINTERESTED IN AND UNCONCERNED ABOUT SPIRITUAL MATTERS 3. SPEAKING (PUBLICISING) WITHOUT SCRIPTURAL AUTHORITY 4. THE FAILING OF AWARENESS OF GREATER/HIGHER (MATERIAL OR NON-MATERIAL) INCENTIVES FOR ACTION 5. VIOLENCE TOWARDS OTHERS/CAUSING OTHERS HARM (HARM IS NOT EXCLUSIVE TO PHYSICAL DAMAGE, IT INCLUDES PSYCHOLOGICAL, EMOTIONAL AND SOCIAL HARM)

	TEXT CAT. 3 (human impact studies)	1. SHOWING COMPASSION TOWARDS OTHERS 2. MORALITY 3. CLEANLINESS/TIDINESS 4. ACTION THAT IS RESPONSIBLE TO THE MATERIAL AND NON-MATERIAL NEEDS OF OTHERS 5. KNOWLEDGE THAT ADVANCES HUMAN BEHAVIOUR IN LEARNING HOW TO RESTRICT THE MATERIAL SENSES 6. THE DESIRE TO MAINTAIN/ SUSTAIN/ PRESERVE	1. KNOWLEDGE GATHERED THROUGH THE MATERIAL SENSES (EMPIRICAL KNOWLEDGE) 2. ACQUIRING SCIENTIFIC KNOWLEDGE ON THE MATERIAL BODY/MATERIAL WORLD 3. KNOWLEDGE PRODUCING MANY THEORIES AND DOCTRINES BY DINT OF MUNDANE SPECULATION 4. ADHERENCE TO MUNDANE KNOWLEDGE 5. INTENSE ENDEAVOUR	1. BEING UNINTERESTED IN AND UNCONCERNED ABOUT SPIRITUAL MATTERS 2. SPEAKING (PUBLICISING) WITHOUT SCRIPTURAL AUTHORITY 3. VIOLENCE TOWARDS OTHERS/CAUSING OTHERS HARM (HARM IS NOT EXCLUSIVE TO PHYSICAL DAMAGE, IT INCLUDES PSYCHOLOGICAL, EMOTIONAL AND SOCIAL HARM) 4. THE TAKING OF LIFE WITHOUT A HIGHER ETHICAL AND SPIRITUAL REASON

6.2 Processing Using the Buddhist Theravada Abhidharma

6.2.1 Analysis of the Contents of the Antarctic Animals Ethics Committee Animal Experimentation Guidelines

As with the processing of the AAEC's *Animal Experimentation Guidelines* (2006) using triguna characteristics, processing of the guidelines using Abhidharma factors did not present any specific challenges. In section 6.1.1 it was demonstrated how scientific experimentation using animals is in itself situated within rajas and tamas gunas. It is also represented by specific Abhidharma factors, namely the Negative Mental Events of *lack of sense of propriety/inconsideration for others*; *malice/cruelty*; and *shamelessness*.

According to the CAFG-GACTA, *lack of sense of propriety/inconsideration for others* occurs through the lack of respect for others (including individuals belonging to non-human species) or "taking others as the norm" (Appendix B, 10). *Malice/cruelty* means a "lack of pity and compassion" (Appendix B, 9). *Shamelessness* is relevant through scientists' lack of embarrassment at their treatment of animals. The AAEC's guidelines themselves, define such treatment (a procedure which removes samples of any body tissue including blood, skin, fat, and stomach contents from a vertebrate animal, or which requires the administration of an anaesthetic) as being "invasive" (Appendix R, 15). The contents of each section of the guidelines are examined within the context of Abhidharma factors:

Section 1: Capture of Seals and Birds
Section 1 is predominated by positive Abhidharma factors (Factor Contrast Group 1). Statements such as "physical restraint should only be used when a minor procedure is to be carried out, and it should be for as short a duration as possible" (Appendix R, 3) indicate the presence of *decorum/consideration for others* and *non-violence*, both Positive Mental Events. Such statements are also indicative of the presence of the Positive Perfection of *morality/virtue*, in terms of the welfare of animals being considered.

Statements such as "Southern phocid pups and weaners can be physically restrained by sitting astride the animal's shoulders and lifting the fore-flippers off the ground. If necessary a second operator can put pressure on the animal's pelvis" (Appendix R, 4) although they are few, suggests the presence of Negative Mental Events of *malice/cruelty*; *lack of sense of propriety/inconsideration for others*; and *gloominess/dullness*. *Gloominess/dullness* is defined by the CAFG-GACTA as causing one's mind to become "insensitive, meaning it can not comprehend matters properly" (Appendix B, 10). Even so, Section 1 is represented by more positive than negative Abhidharma factors.

Section 2: Killing Seals and Birds
Killing is in itself affiliated with the Negative Mental Events of *malice/cruelty*; *lack of sense of propriety/inconsideration for others*; *unconcern/unconscientiousness*; and *shamelessness*. The CAFG-GACTA states that *malice/cruelty* "lacks loving-kindness, pity and affection and has the function of treating others abusively" (Appendix B, 9). It may be argued that if scientists were to embrace such qualities then they would not embark on research projects that would potentially create circumstances in which the killing of animals is necessary. As scientists' concern is primarily aimed at populations of animals and not at individuals (as confirmed by Ramm in Appendix M,

94) the lack of such qualities may be understood. *Shamelessness* is described by the CAFG-GACTA as that which "fails to avoid the unwholesome " (Appendix B, 10).

The clause "the carcass should be disposed of in a fashion that prevents the intoxication of scavenging birds by ingestion of the drug contaminated carcass" (Appendix R, 7) represents the Positive Mental Events of *decorum/consideration for others*; *non-hatred*; *concern/conscientiousness* and *non-violence*. *Non-violence* is described as "an attitude of loving-kindness" (Appendix B, 6). The above statement, however, is the only representation of positive factors within Section 2. The rest of the section addresses different ways in which animals should or could be killed, strengthening the presence of the above-discussed Negative Mental Events of *malice/cruelty*; *lack of sense of propriety/inconsideration for others*; *unconcern/ unconscientiousness*; and *shamelessness*. Overall, Section 2 is affiliated with more negative (Factor Contrast Group 2) than positive Abhidharma factors (Factor Contrast Group 1) specifically with Negative Mental Events.

Section 3: Transport and Restraint

Section 3 is affiliated with more positive than negative factors. Contents address the care of transporting animals, as well as the logistics of transportation. Whilst much discussion is centred around practical considerations, within which neither positive nor negative factors predominate, a number of clauses indicate the presence of Positive Mental Events and Positive Perfections.

The clause "ensure pilots and/or drivers operate vehicles slowly and carefully at all times, and that noise is kept to an absolute minimum" (Appendix R, 8) and "do not hold the bird in the bag with your hands, instead allow the bird to settle and sit in the bag on its own" (Appendix R, 8) show the presence of the Positive Mental Events of *decorum/consideration for others*; *non-hatred*; *concern/conscientiousness*; and *non-violence*. The Positive Perfections of *morality/virtue* and *loving-kindness* are also relevant due to thought given to animals' potential suffering, or even just discomfort. Overall, Section 3 is represented by positive Abhidharma factors (Factor Contrast Group 1).

Section 4.1: Sedation and/or Anaesthesia of Seals and *Section 4.2: Guidelines for seal anaesthesia*

The two sub-sections of Section 4 show very little affiliation with any Abhidharma factors, outside their overall representation of animal experimentation, which is itself represented by Negative Mental Events as discussed above. Whilst the section is quite lengthy, it contains practical instructions for how scientists should use different chemical compounds to anaesthetise animals, which in itself does not represent any specific Abhidharma factor.

The clause "the operator must reduce, to a negligible level, the chance that the animal will return to the sea in a sedated or disoriented state" (Appendix R, 10) is the only statement that indicates the presence of Abhidharma factors. The Positive Mental Events of *decorum/consideration for others* and *concern/conscientiousness*, as well as the Positive Perfections of *morality/virtue* and *loving-kindness* are relevant. *Loving-kindness* is described by the CAFG-GACTA as "placing others before oneself" (Appendix B, 23). Overall, Sections 4.1 and 4.2 show only a weak representation of positive factors, with most of the section not representing any factors.

Section 5: Specific Procedures
Section 5 is predominated by negative Abhidharma factors. Whilst a small number of positive factors are represented, these are considerably fewer than negative factors. Clauses representing positive factors include "the welfare of the animal must take priority" (Appendix R, 15) and the opening statement of the section "the apparent tameness of wildlife is a superficial impression and studies have shown that birds and seals may be under stress even when they show no obvious reactions" (Appendix R, 11). Both these clauses are affiliated with the Positive Mental Events of *decorum/ consideration for others* and *concern/conscientiousness* and with the Positive Perfections of *morality/virtue* and *loving-kindness*.

The Negative Mental Events of *lack of sense of propriety/inconsideration for others*; *gloominess/dullness*; and *unconcern/unconscientiousness*, however, are present throughout almost the entire section. This is due to scientists' practices of collecting body tissues and samples, removing stomach contents from seals and birds, radiotelemetry and identification by artificial means requiring attachment of artificial devices to animals. In other words, this section represents several negative factors through the research practices that it addresses. All relevant procedures are affiliated in some way with the Negative Mental Events of *lack of sense of propriety/ inconsideration of others*; *malice/cruelty*; *shamelessness*; *gloominess/dullness*; and *unconcern/unconscientiousness*. Therefore, Section 5 is predominated by negative Abhidharma factors (Factor Contrast Group 2), specifically with Negative Mental Events.

Section 6: What Constitutes an 'Invasive' and 'Non-invasive' Procedure
Definitions of what constitutes invasive and non-invasive research procedures are affiliated predominantly with negative Abhidharma factors. This is due to researchers' interference in animals' lives regardless of the severity of procedures. Invasive procedures, in which body tissue and stomach contents are removed from animals, are especially representative of Negative Mental Events of *lack of asense of propriety/ inconsideration for others*; *unconcern/unconscientiousness*; *shamelessness*; and *gloominess/dullness*. The remainder of Section 6 addresses requirements for application forms for animal research. Such instructions do not represent positive or negative factors. Overall, Section 6 is represented by negative Abhidharma factors (Factor Contrast Group 2).

A fairly even balance exists between positive and negative Abhidharma factors within Sections 1 to 6 of the AAEC's *Animal Experimentation Guidelines* (2006). However, due to the very weak representation of positive factors within Section 4, negative representation is slightly stronger.

6.2.2 Results from Interview Series Question No. 7, Regarding Peer-review: Discussion

Identifying Abhidharma factors within scientists' responses to Interview Series Question 7 did not present significant challenges outside determining scientists' general mood or opinions within responses. As most scientists interviewed were of the opinion that the current peer-review system can not guarantee rigor in science, their continued use of the system falls within the Negative Mental Events of *slyness-concealment*; *deceit/pretension*; *dishonesty*; *shamelessness*; *lack of sense of propriety/inconsideration for others* and *unconcern/unconscientiousness*. Due to

scientists' insistence on perpetuating the peer-review system in order to publish the results of their own work as well as those of others, whilst being aware of the system's flaws, these affiliations can not be overlooked.

The CAFG-GACTA describes *slyness-concealment* as to "perpetuate a state of unresolvedness" (Appendix B, 7) as well as denying one's own shortcomings and the shortcomings of others. *Deceit/pretension* is described as "a display of what is not a real quality" (Appendix B, 8) resulting when one is attached to respect and material accrual. The Positive perfection of *truthfulness/does not deceive* is also relevant, however, as both Morgan (Appendix S, 12) and Riddle (Appendix S, 14) admit to the limitations of scientists' own abilities and effectiveness in using the peer-review system.

According to Rabten, one type of *opinionatedness/afflicted* views is "mistaken views" which are described as "an afflicted state of intelligence that denies the existence of something which in fact exists" (1992, 148). A parallel is also made with ascribing existence to that which does in fact not exist. By supporting peer-review and depending on it to draw conclusions as to the needs of the material environment, scientists are in fact pardoning their potentially mistaken views. They are subscribing to a system only due to their own unawareness of a better system.

Overall responses to Interview Series Question 7 predominate within Factor Contrast Group 2 (negative Abhidharma factors).

6.2.3 Peer-reviewed Journal Articles: Text-category 1: Physical Science

In identifying Abhidharma factors within physical science publications, the entire contents of the CAFG-GACTA were consulted. Specific challenges in this examination included identifying Abhidharma factors within often-multifaceted features within texts. The parameters of clauses representing factors were often indefinable. The following list contains Abhidharma factors that have been recognised as being present within the research reported on by Australian Antarctic scientists in physical science journal articles:

List 6.2.3.1: Abhidharma Factors Inclusive to All Physical Sciences Articles

1. diligence/enthusiasm (Positive Mental Event)
2. alertness/supplessness (Positive Mental Event)
3. concern/conscientiousness (Positive Mental Event)
4. attachment (Negative Emotion)
5. lack of intrinsic awareness/ignorance (Negative Emotion)
6. energy (Positive Perfection)
7. determination/resolution (Positive Perfection)

The above list shows a predominance of positive Abhidharma factors, although negative factors are also prevalent. The Positive Mental Events of *diligence/ enthusiasm* and *alertness/supplessness* were relevant through scientists' extensive research efforts and ongoing commitments to learn about the physical Antarctic environment. Descriptions of research efforts such as the following are an indication of *diligence/enthusiasm* and *alertness/supplessness*:

> Air-temperature and humidity data were measured using a probe extending from a helicopter undercarriage. Flights were made over the most vigorously ice-producing part of the polynya, within 20 km of the coast in southeast Buchanan Bay, both in very strong

> katabatic winds (20 ms-1) and during calmer conditions (5 ms-1). (Roberts, Allison and Lytle 2001, 377)

The Positive Perfection of *energy* (described by the CAFG-GACTA as "striving" and being "indefatigable" [Appendix B, 21]) is relevant for similar reasons, with statements such as the following describing the great enadeavours physical scientists undertake in order to collect data on the Antarctic environment:

> To investigate present-day plate boundary processes and the neotectonic development of the MRC, we interpreted and integrated side scan, bathymetric, and seismic reflection data …. Because of the sparse sediment covering the MRC region, we first defined basement blocks and faults using side scan imagery and swath bathymetric data (Figure 5 and Plate 2), and then we employed seismic reflection data (Figure 6) to document relative offset and morphology of basement blocks adjacent to the MRC. (Massell et al. 2000, 13,461-6)

The Positive Perfection of *determination/resolution* was present for similar reasons, due to scientists' perseverance with securing accurate data. The following example is given:

> To see if it is possible in practice to overdetermine the system in this way, we carried out experiments with 99 layers…. If the 99-layer inversion is made error-free by assuming that the interfacial fluxes and all sources of error are known, then a perfect solution for the reference level velocities is obtained for both boxes! (McIntosh and Rintoul 1997, 301-2)

Further representation of Abhidharma factors included the Positive Mental Event of *concern/conscientiousness*, represented by scientists' efforts "to realise all worldly and transworldly excellences" (in this case worldly phenomena) and their concern with regards to things in the past, present and future (Appendix B, 5). The Negative Emotion of *attachment* was present due to scientists' attachment to developing scientific commodities, and through their attachment to the social positions that pursuance of such development offers. The Negative Emotion of the *lack of intrinsic awareness/ignorance* was present due to scientists' failing to acknowledge the intrinsic nature of the natural Antarctic environment. This is elucidated through the authors' lack of discussion on non-material aspects of natural Antarctic phenomena.

Negative Mental Events are not represented within the article. Overall, physical science articles predominate within Factor Contrast Group 1 (positive Abhidharma factors) with Positive Mental Events and Positive Perfections showing an equal presence within articles.

6.2.4 Peer-reviewed Journal Articles: Text-category 2: Biological Science

In identifying Abhidharma factors within biological science publications, all contents of the CAFG-GACTA were consulted. As with the examination of physical science articles, examination of biological science articles using the Abhidharma was met with literature features that were often obscure in terms of identifying Abhidharma factors. List 6.2.3.1, containing Abhidharma factors present within all physical science articles, is also applicable to all biological science articles. In addition to the six items within List 6.2.3.1, biological science articles also contained the following factors:

List 6.2.4.1: Additional Abhidharma Factors within Certain (but not all) Biological Science Articles

1. decorum/consideration for others (Positive Mental Event)
2. non-hatred (Positive Mental Event)
3. non-violence (Positive Mental Event)
4. lack of sense of propriety/inconsideration for others (Negative Mental Event)
5. shamelessness (Negative Mental Event)
6. unconcern/unconscientiousness (Negative Mental Event)
7. arrogance/self-importance (Negative Emotion)
8. morality/virtue (Positive Perfection)
9. loving-kindness (Positive Perfection)

The above list shows a slight predominance of positive over negative Abhidharma factors. The Positive Mental Events of *decorum/consideration for others*; *non-hatred*; *concern/conscientiousness*; and *nonviolence* are manifest within scientists' treatment of the Little Penguin in research undertaken by Chiaradia and Kerry (1999). The authors report that "burrows were checked each day using a hand-held reader which could read tags through the wall of the burrow or nest box without disturbing the birds…. No attempt was made to determine time of laying of the second egg to avoid undue interference" (1999, 15). Such approaches to research indicate that scientists are making efforts to avoid unnecessary harm or disturbance for birds. The Positive Perfections of *morality/virtue* and *loving-kindness* are relevant for the same reasons. *Loving-kindness* is described as "kindliness" and as "promoting the welfare of living beings" (Appendix B, 23), both which are relevant in the article by Chiaradia and Kerry (1999).

The Negative Mental Events of *a lack of sense of propriety/inconsideration for others* and *unconcern/unconscientiousness* are manifest through scientists' treatment of animals. Albatross chicks were forced to vomit immediately after being fed by parents, as well as being weighed twice per week by researchers (Arata et al. 2004, 266). 69 individual *lampris immaculatus* fish were killed for research purposes (Jackson, Buxton and George 2000, 261) and identification tags were injected between the shoulder blades of 55 Little Penguins (Chiaradia and Kerry 1999, 13). Such behaviours are described by the CAFG-GACTA as "obscuring virtue" (*unconcern/unconscientiousness*) (Appendix B, 13) through the prioritisation of material considerations over the welfare and peacefulness of individual animals. The Negative Mental Event of *shamelessness* is relevant due to scientists' lack of shame or embarrassment at such behaviour towards animals. As regret for such action is not reported within journal articles, such lacking must be assumed.

The Negative Emotion of *arrogance/self-importance* is described by the CAFG-GACTA as "an inflated mind as to what is perishable, and its function is to serve as the basis for disrespect and frustration" (Appendix B, 17). It is also described as lacking humbleness and being affiliated with pride and self-importance. Scientists' treatment of albatross chicks, *lampris immaculatus* fish and the Little Penguin suggests a lack of humbleness and a lack of respect for these animals. This assertion is supported by the CAFG-GACTA's description of the Positive Perfection of *loving-kindness*, which states that "genuine care for sentient beings brings about their well-being" and that such care is underpinned by "placing others before oneself" (Appendix B, 23). Scientists' lack of response to animal's own desires and

sensitivities can therefore be interpreted as being underpinned by a lack of humbleness and respect for them.

Overall, Factor Contrast Group 1 (positive Abhidharma factors) predominates within biological science articles, with Positive Mental Events being represented more often than Positive Perfections. Negative Emotions and Negative Mental Events show an equal presence within biological science articles.

6.2.5 Peer-reviewed Journal Articles: Text-category 3: Human Impact Studies

In identifying Abhidharma factors within human impact studies publications, all contents of the CAFG-GACTA were consulted. The examination was met by challenges such as distinguishing ethical from near-ethical research practices on behalf of scientists. All Abhidharma factors presented in List 6.2.3.1 are relevant to all human impact studies, with one exception: the Negative Emotion of the *lack of intrinsic awareness/ignorance*. This factor is irrelevant to human impact studies articles, as most authors *do* show some form of intrinsic awareness within most articles:

> The general response of chicks to helicopters was to: (1) become more vigilant, (2) flap their flippers while stationary, (3) walk < 10m, often while flipper-flapping, and (4) run, usually < 10m. Overall, the tendency was for chicks to shuffle together, rather than to scatter…. The running observed in some chicks during our study may therefore be equivalent to tobogganing described for adults (Kooyman and Mullins 1990) and is indicative of a high level stress response. (Giese and Riddle 1999, 369-70)

Observations such as the one reported on above indicate that scientists maintain a certain degree of awareness of the intrinsic nature of animals, in this case the intrinsic nature of penguins.

In addition to the contents of List 6.2.3.1, all human impact studies articles contained all Abhidharma factors presented in List 6.2.4.1. It should be noted, however, that the severity of influence of certain negative Abhidharma factors, such as the Negative Mental Event of *shamelessness* and the Negative Emotion of *arrogance/self-importance* (present within List 6.2.4.1 due to biologists' treatment of animals) is weakened within human impact studies.

Scientists are reported as handling animals in preparation for research. The AAEC's *Animal Experimentation Guidelines* (2006) states that 'invasive' procedures includes removing "samples of any body tissue including blood, skin, fat, and stomach contents from a vertebrate animal, or which requires the administration of an anaesthetic." 'Non-invasive' procedures include external interaction with animals such as picking them up. As human impact studies articles report on scientists handling animals, even though they do not take samples of blood, skin, fat, and stomach contents, animals are being disturbed and interrupted in their daily activities by researchers. Whilst scientists' interactions with animals may in the case of human impact studies be best described as 'non-invasive,' the Negative Mental Events of *lack of sense of propriety/inconsideration for others* and *unconcern/ unconscientiousness* still apply to a certain degree.

Overall, human impact studies articles predominate within Factor Contrast Group 1 (positive factors) with Positive Mental Events being represented more frequently than Positive Perfections. Negative Emotions showed a slightly higher representation than Negative Mental Events.

6.2.6 Summary of Results from the Examination of Science Literature Features, According to the Abhidharma

Antarctic Animal Ethics Committee's Animal Experimentation Guidelines

TABLE 6.2.6.1: Results from Analysis of the AAEC's *Animal Experimentation Guidelines* (2006) According to the Abhidharma

AAEC ANIMAL EXPERIMENTATION GUIDELINES SECTIONS	PREDOMINANT FACTOR CONTRAST GROUP	FACTOR GROUPS REPRESENTED
SECTION 1	1	+ MENTAL EVENTS + PERFECTIONS - MENTAL EVENTS
SECTION 2	2	+ MENTAL EVENTS - MENTAL EVENTS
SECTION 3	1	+ MENTAL EVENTS + PERFECTIONS
SECTION 4	1 (weak)	+ MENTAL EVENTS + PERFECTIONS - MENTAL EVENTS
SECTION 5	2	+ MENTAL EVENTS + PERFECTIONS - MENTAL EVENTS
SECTION 6	2	- MENTAL EVENTS

Although the above results suggest a balance of Factor Contrast Groups 1 and 2, the weak representation of positive factors within Section 4 indicate that Factor Contrast Group 2 marginally predominates. The prevalence of positive Abhidharma factors throughout the guidelines show the efforts taken by the AAEC to inspire what may be described as 'ideal behaviour' on behalf of scientists, in terms of ethical, pragmatic and legal considerations. The presence of negative factors is significantly influenced by the "root affliction" of *lack of intrinsic awareness/ignorance* (Rabten (1992, 137-8) as this Negative Emotion causes confusion and bewilderment about what constitutes the material realm, including which behaviours lead to which consequences within that realm (Appendix B, 18).

Interview Series Question No. 7
Scientists' treatment of the topic of peer-review was predominated by Negative Mental Events and Negative Emotions (Factor Contrast Group 2). This was primarily due to scientists' adherence to the system whilst knowing that it is faulty. Abhidharma Negative Mental Events of *slyness-concealment*; *deceit/pretension*; *dishonesty* (described by the CAFG-GACTA as "the intent to conceal one's shortcomings from others" [Appendix B, 9]); *shamelessness*; *lack of sense of propriety/inconsideration for others* and *unconcern/unconscientiousness* were all identified. The Negative Emotion of *attachment* was also identified within responses.

Peer-reviewed Literature
According to the Abhidharma, Factor Contrast Group 1 (positive factors) predominates within peer-reviewed journal articles. The following table shows which Abhidharma factors represented Factor Groups within different research areas:

TABLE 6.2.6.2: Summary of Abhidharma Factors Present within Peer-Reviewed Journal Articles

X indicates the presence of a factor within a text-category

FACTOR GROUP	FACTOR	JOURNAL ARTICLE TEXT-CATEGORIES		
		PHYSICAL SCIENCE	BIOLOGICAL SCIENCE	HUMAN IMPACT STUDIES
POSITIVE MENTAL EVENTS	DILIGENCE/ ENTHUSIASM	x	x	x
	ALERTNESS/ SUPPLESSNESS	x	x	x
	DECORUM/ CONSIDERATION FOR OTHERS		x	x
	NON-HATRED		x	x
	CONCERN/ CONSCIENTIOUSNESS	x	x	x
	NON-VIOLENCE		x	x
POSITIVE PERFECTIONS	ENERGY	x	x	x
	DETERMINATION/ RESOLUTION	x	x	x
	MORALITY/VIRTUE		x	x
	LOVING-KINDNESS		x	x
NEGATIVE MENTAL EVENTS	LACK OF SENSE OF PROPRIETY/ INCONSIDERATION FOR OTHERS		x	x
	SHAMELESSNESS		x	x
	UNCONCERN/ UNCONSCIEN-TIOUSNESS		x	x
NEGATIVE EMOTIONS	ATTACHMENT	x	x	x
	LACK OF INTRINSIC AWARENESS/ IGNORANCE	x	x	
	ARROGANCE/ SELF-IMPORTANCE		x	x

The above table reveals that biological science articles contain the largest range of Abhidharma factors. This may be explained by the breadth of research areas covered within this research field, which includes research into a broad variety of geo-physical processes of the natural environment, in relation to biological process of living organisms.

It is noteworthy that human impact studies articles are predominated by positive Abhidharma factors, as the study area is in itself a 'wholesome' activity, according to the Abhidharma. It derives its overarching wholesomeness or positive contrast from the Positive Mental Events of *decorum/consideration for others* and *concern/ conscientiousness*, as well as from the Positive Perfection of *morality/virtue*. These affiliations are made due to the aim of human impact studies to understand and

resolve the harmful effects (and potential harmful effects) of human activity on the natural environment, on which both human and non-human living beings depend.

Overall results showed that both the AAEC's *Animal Experimentation Guidelines* (2006) and interviewees' responses to Interview Series Question 7 predominate within Factor Contrast Group 2, negative factors. Peer-reviewed journal articles predominate within Factor Contrast Group 1. Factor Contrast Group 2 therefore predominates within literature features in their entirety. This estimation is made, by giving equal weight to each of the three science literature items analysed in this thesis.

The following table shows which Abhidharma factors were most prominent within all science literature data-collection items:

TABLE 6.2.6.3: Abhidharma Factors Appearing Most Frequently within All Science Literature Features

Sequential listing of factors for each literature item retains no meaning as to their frequency of representation.

	POSITIVE MENTAL EVENTS	POSITIVE PERFECTIONS	NEGATIVE MENTAL EVENTS	NEGATIVE EMOTIONS
AAEC *Animal Experimentation Guidelines*	DECORUM/ CONSIDERATION FOR OTHERS CONCERN/ CONSCIEN-TIOUSNESS NON-HATRED	MORALITY/ VIRTUE LOVING-KINDNESS	LACK OF SENSE OF PROPRIETY/ INCONSIDERATION FOR OTHERS UNCONCERN/ UNCONSCIEN-TIOUSNESS MALICE/CRUELTY SHAMELESSNESS	-
Interview Series Question 7	-	TRUTHFULNESS/ DOES NOT DECEIVE	SLYNESS-CONCEALMENT SHAMELESSNESS UNCONCERN/ UNCONSCIEN-TIOUSNESS LACK OF SENSE OF PROPRIETY/ INCONSIDERATION FOR OTHERS DISHONESTY DECEIT/ PRETENSION	OPINIONATEDNESS/ AFFLICTED VIEWS
Peer-reviewed Journal Articles	DILIGENCE/ ENTHUSIASM ALERTNESS/ SUPPLESSNESS CONCERN/ CONSCIEN-TIOUSNESS DECORUM/ CONSIDERATION FOR OTHERS	ENERGY DETERMINATION/ RESOLUTION	LACK OF SENSE OF PROPRIETY/ INCONSIDERATION FOR OTHERS UNCONCERN/ UNCONSCIEN-TIOUSNESS SHAMELESSNESS	ATTACHMENT LACK OF INTRINSIC AWARENESS/ IGNORANCE

6.3 Chapter Conclusion

Results from the analysis of Australian Antarctic science literature are highly congruous with results derived from the processing of others data-collection items, namely the AASI and scientists' responses to Interview Series questions. Rajas guna is followed by sattva guna in their overall representation, whilst negative Abhidharma factors predominated over positive factors.

Using triguna characteristics and Abhidharma factors to analyse scientists' qualities of consciousness underpinning Australian Antarctic science literature revealed that very different qualities can be represented within literature items that appear to represent a unified approach to science. In other words, what the analysis in this chapter has exposed, is that whilst scientific approaches and methods reported on by scientists may to the naked eye appear to be consistent in terms of their aims, purposes and general application, qualities of consciousness underpinning relevant science behaviours are variegated. As the triguna argues that action performed within different gunas produces different results, scientists desiring to streamline outcomes of research may benefit from studying the methodology and results of this research project.

Scientists may be inspired to dovetail research practices to embrace wholesome qualities of consciousness, rather than unwholesome qualities. Buddhist conclusions state that quality of consciousness and quality of mind directly determine the qualities of human experiences, including the outcomes of experiences (Rabten 1992, 12). As such, the diversity of qualities of consciousness divulged through guna characteristics and Abhidharma factors represented within Australian Antarctic science literature, draws attention to the lack of solidarity within environmental scientists' qualities of consciousness.

Whilst it may be argued by scientists that such variegatedness serves the purpose of maintaining diversity within science research projects, divided intentions and motivations on behalf of scientists are highly likely to result in fractured outcomes of relevant research, according to Vedic and Buddhist conclusions. In the words of Bhaktivedanta (1989, 14:16) "the result of pious action is pure and is said to be in the mode of goodness. But action done in the mode of passion results in misery, and action performed in the mode of ignorance results in foolishness."

As Campion and Palmer (1996, 391) also state, corporate consciousness generated through agents such as social responsibility, business ethics, culture and corporate values directly impact on corporation members' decision-making and general corporate activities. Thus if vast diversities exist within scientists' social, ethical and cultural norms, underpinned by relevant qualities of consciousness, outcomes of their scientific enadeavours will also manifest such diversities.

Chapter Seven synthesizes the findings from all data collection items by further analysis of results.

CHAPTER SEVEN

ANALYSIS OF ALL THESIS DATA

The vast majority of environmentalists are fighting material problems but missing nonmaterialist dimensions of the solutions. Indeed, considerable effort goes to waste as environmentalists argue among themselves because of subtle differences in the materialist philosophies they embrace.

Richard B. Norgaard in "Beyond Materialism: A Coevolutionary Reinterpretation of the Environmental Crisis" (1995, 477)

Chapter Outline
Chapter Seven analyses all data collected and processed. A profile of the quality of consciousness of the Australian Antarctic scientific community is constructed from data results. Findings are discussed in relation to the results of the IGSQ, the thesis proposition and the thesis objective, with a focus on the extent to which the thesis proposition is supported by findings and the extent to which the thesis objective has been satisfied by the research conducted. A correlation analysis is carried out between the results of the AASI and results from other triguna research using VPIs, undertaken by other researchers. Anticipated ramifications of the predominance of different Abhidharma factors for environmental conservation, argued by a selection of authors, are discussed against results produced by examining thesis data against the Abhidharma.

7.1 Overall Findings: The AASQCP

7.1.1 Findings from Results of All Data Collection Items: Construction of the Australian Antarctic Scientist Quality of Consciousness Profile (AASQCP)

In order to construct a realistic and fair profile of the quality of consciousness of Australian Antarctic scientists, the GPCG and the APCG were both consulted. Profile peculiarities were identified according to all points of both guides:

The GPCG (appearing in section 3.3.1):

vi) Rajas guna was supported the most often within overall data results, meaning Australian Antarctic scientists affiliate most with rajasic characteristics i.e. rajasic qualities of consciousness;

vii) Overall, sattva guna received the second highest support from scientists. Tamas guna, in third place, received moderate to low support;

viii) Characteristics within each guna receiving the most support from scientists were as follows (approximate placings). Sattva guna: *honesty*; *showing compassion towards others*; *careful study of the past and future*; and *the pursuit of greater and real knowledge*. Rajas guna: *knowledge gathered through the material senses* (empirical knowledge) (and other characteristics affiliated with empiricism); *sense gratification*; and *intense endeavour*. Tamas guna: *being*

uninterested and unconcerned about spiritual matters; *speaking* (publicising) *without scriptural authority*; and *the acquisition of knowledge without any higher ethical and spiritual purpose*;

ix) One aspect of overall results considered specifically significant is the high support for tamas guna within scientists' responses to Interview Series Question 7, which addressed the issue of peer-review. Relevant tamasic characterised included *speaking* (publicising) *without scriptural authority*; *false expectations/ indulgence in false hopes*; *dishonesty/deception*; *foolishness*; and *action performed in illusion, in disregard of scriptural injunctions and without concern for future bondage or for violence or distress caused to others*. The results from this evaluation are considered significant due to the important role that peer-review plays in the dissemination of the outcomes of most scientific research; and

v) As scientists predominated within rajas guna within overall results, they are considered as currently experiencing a poor quality of consciousness.

The APCG (appearing in section 3.4.1):

vi) Factor Contrast Group 2 (negative factors) was given more support than Factor Contrast Group 1 (positive factors) by scientists, according to all relevant data sources;

vii) Support for the two Factor Contrast Groups varied significantly within scientists' responses to interviews, with a number of interviews also showing an equal balance between positive and negative factors. Within science literature features, predominance within Factor Contrast Group 2 was less obvious, in that Factor Contrast Group 1 was also significantly represented.

Out of all four Factor Groups, the group of Negative Mental Events was the Factor Group that was given the most support within the entire Abhidharma data pool. Even though this is so, the Negative Emotion of *attachment* was the single Abhidharma factor that received the most support within the entire data pool;

viii) Abhidharma factors that received the highest support within each Factor Group, according to all Abhidharma data items, were for Positive Mental Events: *decorum/consideration for others* and *concern/conscientiousness*; for Positive Perfections: *determination/resolution* and *energy*; for Negative Mental Events: *unconcern/unconscientiousness* and *a lack of sense of propriety/ inconsideration for others*; and for Negative Emotions: *attachment* and *lack of intrinsic awareness/ignorance*.

Factors within each Factor Contrast Group that received the most support were: *concern/conscientiousness* (Positive Mental Event) for Factor Contrast Group 1; and *attachment* (Negative Emotion) for Factor Contrast Group 2;

ix) Whilst the Negative Emotion of *attachment* did not feature at all within the AAEC's *Animal Experimentation Guidelines* (2006) it was the most represented Abhidharma factor within the data-pool in its entirety. Without its high overall representation, Factor Contrast Group

2 would not have predominated over Factor Contrast Group 1 within the entire data-pool. The difference in scores between the two Factor Contrast Groups was greater within results from the Interview Series, than what it was within results from the examination of science literature features; and

x) As Factor Contrast Group 2 (negative factors) predominated over Factor Contrast Group 1 (positive factors) within overall results, Australian Antarctic scientists are considered as currently experiencing a poor quality of consciousness.

That rajas guna is the overall predominating guna within Australian Antarctic science confirms the prediction that was made at the outset of this thesis in section 2.2.5, namely that scientists' current quality of consciousness corresponds most closely with the qualities of rajas guna. This prediction was made due to the empirical nature of contemporary scientific research methods, as well as due to a predominance of rajas guna characteristics such as *sense enjoyment/sense gratification* within contemporary Western societies. Overall, results showed that negative Abhidharma factors predominate over positive factors amongst Australian Antarctic scientists. As shown throughout the CAFG-GACTA, negative Abhidharma factors most closely correspond with rajas and tamas guna characteristics.

To further furnish the AASQCP, a closer look at rajasic characteristics (as the predominating guna in overall results) is necessary. For this purpose, the five rajasic AASI statements that received the most support from scientists will be examined:

Statement numbers represent AASI numbering of statements

20. I tend to seek out scientific projects that are satisfying to my sense of curiosity and stimulating for my mind (SA + BA = 89 %)
1. I am passionate about my work (SA + BA = 88 %)
14. I do/would enjoy seeing my name appear in scientific publications, or even just mentioned within science-circles (SA + BA = 82 %)
36. Two of the main reasons for me becoming an Antarctic scientist have been that the science is interesting and the setting (the Antarctic environment) is stimulating (SA + BA = 82 %)
3. I like to engage my senses to experience things "Antarctic" (seeing pictures of Antarctica, hearing about expeditions etc.) (SA + BA = 77 %)

The outstanding aspect of this collection of statements is that three out of the five statements (Statements 20, 36 and 3) are underpinned by the rajasic characteristic of *sense enjoyment/sense gratification*. These results suggest that scientists are highly motivated by enjoyment derived from engaging their senses in the science they carry out and/or the outcomes of their scientific activities. According to the CGCG, happiness in rajas guna is *happiness which is derived from contact of the senses with their objects and which appears like nectar at first* (due to the senses being stimulated) *but poison at the end* (due to such stimulation expiring, leading to disappointment and consequently unhappiness). Scientists' engagement in scientific activities for purposes of stimulating their senses (including the mind as the sixth sense) is thereby seen as not only producing stunted knowledge (due to the *distortion of the intellect because of too much activity*) but also as perpetuating their own suffering within the material realm.

Bhaktivedanta (1987-8, 2:7:18) affirms that gratification or stimulation of the bodily senses is extremely prevalent within contemporary society. Material life within all traditions and cultures is explained as being comprised of different varieties of gratification of the senses, with most people being absorbed in devising different ways in which the senses can be further stimulated by manipulating material nature. As discussed in section 1.1.1, such a view of modern society was shared by Sorokin, who argued that our current global society is a *sensate* society, with its arts, sciences, philosophy, pseudo-religion, ethics and law all being based on the principle that "the true reality and value is sensory" (1942, 20-1).

According to both Vedic and Buddhist conclusions, attachment to material pleasure eludes the individual as to his/her real circumstances within the material world. Buddhists argue that attachment to sensual pleasure keeps the individual in ignorance about the validity of the Four Noble Truths and their ability to lead the materially embodied individual towards spiritual enlightenment. The Vedas also argue that sensual pleasure keeps the individual in ignorance, but that such ignorance disables the individual's abilities to recognise his/her real spiritual identity and thereby take steps to regain his/her original situatedness as an eternal spiritual personality.

The results produced by the AASI, the Interview series and science literature features show a high degree of consistence, according to the triguna. The processing of data collected through all three data items found that after their support for rajas guna, scientists are inclined towards sattva guna. No data-collection items found that scientists affiliate significantly with tamas guna, with the exception of one component of science literature features, namely interviewees' responses to Interview Series Question 7, which addressed the issue of peer-review. From scientists' responses it was discovered that their approach to the issue of peer-review was strongly affiliated with tamas guna, primarily due to their pursuance of the system of peer-review in the knowledge that it is faulty. As most Australian Antarctic science progresses according to scientists' support for each other's activities through the system of peer-review, this one aspect of data results is considered noteworthy.

Added together, overall scores for the AASI Likert-scale options of Strongly Agree and Basically Agree equalled 62 % for rajas guna, followed by 47 % for sattva guna. The gap (15 %) between overall scores for sattva and rajas gunas within AASI results is considered moderate, in that differences in support for the two gunas is not excessive. The gap between rajas and sattva gunas within results from the quantification of Interview Series Questions 1, 2, 3 and 9 (45 %) and the gap between rajas and sattva gunas within overall appraisals of interviews (29 %) (both exceeding the gap between sattva and rajas gunas in AASI scores) is certainly noteworthy. According to Bhaktivedanta (1987-8, 4:9:29, 11:28:3) such gaps manifest due to scientists' excessive desire to advance the material paradigm (rajas guna) even though they may also be attempting to maintain ethical standards and desires to attain greater knowledge (sattva guna).

An interesting aspect of results is that as the predominating guna within AASI scores and as the intermediate qualitative guna between sattva and tamas gunas, rajas guna represented both highest and lowest extremes within overall support from AASI participants. The Likert-scale option that received the greatest support within any of the three gunas was Basically Agree for rajas guna (38 %), with the Likert-scale option that received the very least support within any of the three gunas being Strongly Disagree for rajas guna (4 %). What this suggests is that whilst rajas guna is scientists' overall predominating or commonly experienced guna, it is also the guna

that accommodates their most extreme perspectives. Perhaps it can be argued that scientists' familiarity with rajas guna gives them the confidence to express their extreme perspectives on its characteristics, whereas sattvic and tamasic characteristics, being unfamiliar to them, may not instil such confidence.

Another interesting feature of overall results concerns the predominance of sattva guna within the interview responses of Miller and Riddle. These were the only two interviewees who predominated within sattva guna, with Miller being one of only four interviewees predominated by positive Abhidharma factors. Riddle was one of six interviewees who were equally predominated by positive and negative Abhidharma factors, whilst the remaining eleven were predominated by negative factors. As sattvic characteristics correlate with positive Abhidharma factors, results from Miller's and Riddle's interviews showed a high degree of consistency within the context of the two systems of evaluation, especially considering the exclusivity of their predominance within sattva guna amongst other interviewees.

In Riddle's case, this consistency is strengthened by the fact that he is the program leader for the Australian Antarctic Division's Human Impacts program, which is in itself predominated by sattvic characteristics and positive Abhidharma factors. In Miller's case, his high representation of sattvic characteristics and positive Abhidharma factors may be best appreciated as being almost prerequisite for an individual in Miller's professional position. As the Executive Secretary of CCCAMLR, Miller would undoubtedly need to adhere to sattvic behaviours such as *speaking words that are truthful, pleasing, beneficial, and not agitating to others*; *calmness*; *enthusiasm*; *tolerance*; and having *steady, focused intellect* etc. in communicating with professionals from many different countries and from many different professions. Results of Miller's and Riddle's interviews add weight to both the triguna and the Abhidharma as reliable categorisation schemes of psychological evaluation.

To complete the AASQCP, a closer look at negative Abhidharma factors, forming the dominant Factor Contrast Group within results, is also necessary. For this purpose, the Negative Emotion of *attachment*, as the predominant Abhidharma factor within the entire data-pool, is discussed as follows. According to the CAFG-GACTA, *attachment* is a major cause in keeping the individual ensnared within the wheel of *samsara* (the wheel of repeated birth and death) which causes suffering. As a "root affliction" (Rabten 1992, 139-40) the Abhidharma sees *attachment* to material life as a major stumbling block for the individual desiring to develop and maintain positive or wholesome qualities of consciousness. The CAFG-GACTA states that *attachment* "interferes with the attainment of higher qualities" as the mind "becomes attracted to materially contaminated phenomena (Appendix B, 16)."

The significance of its high representation is that *attachment* represents scientists' hankering after material exploits and the fruits of those exploits, such as wealth, power and influence over others, as well as social status. According to Rabten, although *attachment* "may superficially take on the aspect of wanting to benefit others, it is essentially selfish-only striving to satiate one's own desires" (1992, 140). This assertion corresponds with Bhaktivedanta's claim that contemporary philanthropic activities are often grounded in selfishness, due to philanthropists' attachments to material sense gratification. Their altruistic activities, performed for purposes of stimulating their own material senses, dos not truly benefit others (Bhaktivedanta 1972b; 1987-8, 1:2:10). As *attachment* always results in suffering, according to the CAFG-GACTA, scientists' susceptibility to this factor suggests that

the outcomes of scientists' activities have a negative or unwholesome impact on recipients

The predominance of negative Abhidharma factors was relatively consistent within interview responses and science literature features. Had variegatedness within factor contrast representation been greater, results would have suggested that factor contrast plays a minor role within scientists quality of consciousness, as its manifestation would be less conspicuous. As this was not the case, Abhidharma factor contrast has been revealed as a prominent variable within Australian Antarctic scientists' qualities of consciousness. If negative Abhidharma factors do in fact outweigh positive factors within the Australian Antarctic scientific community, as results suggest, then Buddhist Theravada philosophy underpinning the Abhidharma would be supported. As the Four Noble Truths (see section 2.3.1) state that material embodiment means suffering, a predominance of positive factors would run contrary to this premise. The Four Noble Truths also state that the origin of all suffering is *attachment*, adding further weight to the above-discussed prevalence of the Negative Emotion of *attachment* within overall results.

7.1.2 The AASQCP In Relation to the Findings from IGSQ Results

IGSQ results revealed that professional groups consisting of conservation psychologists, Vedic scholars and Australian Antarctic scientists themselves are all of the opinion that environmental scientists are best situated within sattva guna in order to achieve environmental science goals. This proved to be the case, even when groups were presented with environmental science goals that contained rajasic characteristics (IGSQ Goals One and Four). In other words, members of all three professional groups agreed that in order to be successful at achieving science goals that were themselves not characterised by ideal factors, sattva guna characteristics should be maintained (see Appendix L).

Thus Australian Antarctic scientists, as participants in the IGSQ, have inadvertently pointed out their own deficiencies by identifying rajas guna (the guna they themselves currently predominate within) as being less-than-ideal for purposes of achieving environmental science goals. Such a determination on behalf of scientists was made without scientists being provided with any information as to the categorisation scheme used in either the AASI or the IGSQ (namely the triguna). As the Abhidharma showed that negatively contrasted factors (which correspond with the lower modes of material nature) predominate over positively contrasted factors within the Australian Antarctic scientific community, IGSQ findings within the context of ideal behaviour on behalf of scientists are compounded.

That scientists' approach to the issue of peer-review was predominated by the lowest mode of material nature, considered the least ideal by scientists themselves, may give scientists particular cause for concern. Whilst the results of scientific research do not always pass through the medium of peer-review before being applied to environmental management, the bulk of scientific findings are disseminated to the broader international scientific community and to society at large, via peer-review. As scientists support their own scientific agendas by supporting other like-minded scientists' agendas, they are unlikely to receive criticism from other scientists for maintaining qualities of consciousness that underpin such agendas. Scientists' adherence to the rajasic *knowledge gathered through the material senses* (empiricism) and to the tamasic *speaking* (publicising) *without scriptural authority*, for example, is thereby unlikely to be questioned by other scientists. It is also surmised that scientists will not be criticised by other scientists for being *attached* (a Negative Emotion) to

the outcomes of their scientific pursuits such as monetary income, social status and mental stimulation that their careers provide.

As to scientists' ideal situatedness within the triguna, an examination of Interview Series results against the results from the IGSQ can give scientists detailed information about how to most effectively achieve the best qualities of consciousness in order to achieve specific environmental science goals. Scientists may find that they can manage without, or may even prosper without, certain rajasic and/or tamasic behavioural characteristics that they themselves currently maintain, whilst not wanting to part with others. They may also find that certain sattvic characteristics are more easily maintained or developed than other sattvic characteristics. In this way, scientists can apply IGSQ results and other thesis results to change existing attitudinal and behavioural patterns and learn about their own potential ideal qualities of consciousness, in relation to their current qualities of consciousness.

> Within the context of ideal scientific research practices, it appears that interviewees intentionally operate within the social and cultural parameters of their organisations, regardless of the degree of idealism maintained by those organisations. This may be true of all Australian Antarctic scientists, if their aims are not specifically to change existing research standards maintained by their organisations, but rather to function within an already-established milieu of continuous theoretical pursuit. Such prioritisation would undoubtedly limit scientists' attention to their own needs to adopt more ideal qualities of consciousness (as well as their attention to similar needs of work colleagues) meaning that qualities of consciousness underpinning research practices would be ignored.

Whilst scientists can no doubt carry out fundamental research tasks set before them on a daily basis (assuming that they would already be discharged from their duties if they could not) they nevertheless do not, according to IGSQ results, carry out work tasks within ideal behavioural parameters. As discussed in section 4.2.3, although tamas guna was the lowest scoring guna within AASI scores, indicating that scientists are not greatly influenced by its characteristics, due to the severity of its symptoms when they do manifest, ongoing monitoring of their prevalence amongst scientists is supported by triguna theory itself.

7.1.3 The AASQCP in Relation to the Thesis Proposition and Thesis Objective

In Chapter One, the thesis proposition was formulated as a basis for reasoning that global environmental management problems must have their source somewhere in human behaviour. As most of today's global society agrees that environmental problems such as global warming, ozone depletion and the general deterioration of arable lands have resulted from human activity, human behaviour must be investigated. As environmental scientists play a vital role in determining the direction of environmental policy and management, qualities of consciousness underpinning their professional behaviour and research procedures became the focus of the supposition made by the thesis proposition.

The thesis objective, namely to investigate if there exists a need for environmental scientists to raise the qualitative level of their consciousness, for the purpose of enhancing outcomes of environmental conservation activities, was satisfied by the research conducted in this thesis. Whilst all aspects of scientists' qualitative characteristics of consciousness could not be investigated, foundational characteristics described by the Vedic triguna and the Buddhist Theravada Abhidharma have been examined. Whilst the thesis objective may have been approached from theoretical standpoints other than Vedic and Buddhist literature,

such approaches, as discussed in Chapter Two, did not satisfy the research criteria of securing appropriate systems of psychological evaluation of the study sample. Systems necessarily needed to include some type of methodological foundation for collecting data on individuals' qualities of consciousness. Together, the triguna and the Abhidharma have provided methodologies that have accommodated collection and processing of such data, which has satisfied the thesis objective.

The thesis proposition that the quality of consciousness of environmental scientists is currently poor, and that this poorness of quality is impacting adversely on the outcomes of environmental conservation activities, was supported by the AASQCP. This claim is made on the strength of the DCPF evaluation guides, specifically on the strength of point v of both the GPCG and the APCG.

That scientists' poor quality of consciousness is impacting adversely on the outcomes of environmental conservation activities, as suggested by the thesis proposition, is supported through the theoretical premises of the triguna and the Abhidharma. When the Vedic triguna states that consciousness in rajas guna results in *distortion of the intelligence because of too much activity,* for example, it also implies that results of activities conducted under such consciousness become *distorted* or blemished. Environmental science activities carried out in the mode of passion, therefore, unavoidably result in flawed environmental management policies. Consequently, recipients of environmental management policies and programs suffer (Bhaktivedanta 1987-8, 1:13:46, 11:25:17).

Similarly, positive Abhidharma factors, affiliated with sattvic characteristics in the CAFG-GACTA, are explained as eventuating in wholesome effects, as opposed to unwholesome effects produced by negative factors (Guenther and Kawamura 1975, 38-42, 58-61). Within the context of environmental management, such differences could mean disparities between sustainable and unsustainable environmental management practices. As the AASQCP has revealed that rajasic characteristic, as well as negative Abhidharma factors currently predominate within Australian Antarctic science, both approaches maintain that the outcomes of Australian Antarctic science are currently having a greater unfavourable than favourable impact on environmental management practices.

7.1.4 Correlation Analysis: AASQCP, Research Results from Other Triguna Research and Anticipated Consequences of AASQCP According to a Selection of Buddhist Readings

In order to broaden the AASQCP, a rudimentary correlation analysis was carried out of overall thesis results and the findings from other similar research. AASI results, as well as broader findings of the AASQCP were analysed against a selection of reports on findings from other research that has applied Vedic Personality Inventories. As no previous research has been located in which guna characteristics have been identified within interview responses, nor within literature features, correlation with such previous research can not be established. Whilst no research was located in which Abhidharma factors had been applied to collecting and processing data for purposes of analysing qualities of consciousness, a number of publications discussing Buddhist concepts of mental and behavioural tendencies in relation to environmental conservation behaviours were found. These will also be examined against the outcomes of the research conducted in this thesis.

To begin with, research conducted by Kaur and Sinha (1992) and Mohan and Sandhu (1986) showed that sattva guna was considered the 'ideal' guna to attain by individuals desiring to be successful within professional organisations (Kaur and

Sinha 1992, 31) as well as by college students (Mohan and Sandhu 1986, 50-1). This conclusion, also maintained by the three professional groups who participated in the IGSQ, is supported by triguna methodology itself, which states that activity performed within sattva guna produces "elevated material consciousness" (Bhaktivedanta 1992, chap.5).

In other words, the findings of Kaur and Sinha (1992) and Mohan and Sandhu (1986) and results from the IGSQ were congruent with triguna methodology in regards to the following point. Predominance within sattva guna gives an individual greater psychological capacity to produce desirable outcomes of activity, than what rajas or tamas gunas do. This premise is sustained by the Vedic perspective that goals pursued within the two lower material modes will inevitably, whether in the immediate or far future, result in stress, anxiety, misery or at the very least, in disappointment (Bhaktivedanta 1987-8, 11:25:14; 1989, 14:16). By the very nature of the lower modes, such outcomes are unavoidable.

In discussing his research into the psychometric properties of the triguna, Wolf (1999, 1388) commented that according to J.C. Nunnally and I.H. Bernstein (1994) "Cronbach alpha should be at least .80 for an inventory to produce interpretable research outcomes." Whereas reliability tests of the revised guna scales conducted for this thesis suggest that the scales may be multifaceted (indicating the presence of sub-scales within each guna that are *positively* but not *perfectly* related [sattva: .75; rajas: .70; and tamas: .62]), Wolf (1999, 1384) found a greater degree of *positive* correlation for items within his research (sattva: .85; rajas: .92; and tamas: .90). Wolf's subject sample consisted of people of varying ages and occupations from Southeastern USA and subscribers to an Eastern-style magazine on spirituality.

Stempel et al. (2006, 272) used two types of reliability evaluations to administer their Vedic Personality Inventory (VPI) to a subject sample predominantly consisting of older well-educated women from various backgrounds. The first reliability test resulted in sattva: .73; rajas: .78; and tamas: .85; and the second, taken from research conducted over a period of sixty days: sattva: .73; rajas: .89; and tamas: .88. Das (1991) administered his VPI twice to different groups of university students over a two-week period. Results showed that 'the coefficient of correlation of .60 between the test and the retest scores, being significant at .01 level of confidence indicates that the Inventory has a high degree of reliability' (Das 1991, 49).

Thus it appears that overall, Vedic Personality Inventories (VPIs) demonstrate a relatively high incidence of reliability using Cronbach's alpha coefficients, regardless of demographic peculiarities of study samples. Findings such as these suggest a lesser role of demographic variables such as 'Australian' and 'Antarctic' within the study sample of this research thesis, although the variable of 'scientists' may not be so easily dismissed. This supposition is made due to the exclusivity of scientific activities carried out by environmental scientists (conducting fieldwork, laboratory work, educating, publishing etc.) that are not typically carried out by non-environmental-scientists within the general population. As this is the case, it may be realistic to resolve that most environmental science study samples would produce similar research results as to what Australian Antarctic scientists have in this thesis. It is thereby determined that as the thesis proposition addressed environmental scientists in general, and not Australian Antarctic scientists in particular, the fact that the study sample of environmental scientists was Australian and Antarctic has not impeded on the integrity of the thesis proposition or the thesis objective.

Whilst the above findings enhance the reliability and generalisability of VPIs as constituting credible categorisation schemes for assessing qualities of consciousness,

certain restrictions to such a status were made by other triguna researchers. Wolf commented that although every item in his inventory correlated well with its intended guna, some sattvic and tamasic items showed strong negative correlation, suggesting that triguna theory can be considered a ""weak" theory for psychometric purposes" (Wolf 1999, 1387-8). Stempel et al. (2006, 272) stated that their data "provide additional support for the conclusion that the Vedic Personality Inventory had adequate psychometric properties."

Additional research by Stempel et al. (2006, 270) found that scores for sattva guna were highly *positively* correlated with scores for the Daily Spiritual Experiences Scale (DSES) ($r = .41$, $p < .01$). This scale (see Underwood and Teresi 2002) aimed at measuring everyday ordinary spiritual experiences rather than specific beliefs or extraordinary behaviours. Results were accompanied by a *negative* correlation between rajas guna and the DSES ($r = -.41$, $p < .05$) as well as a *negative* correlation between tamas guna and the DSES ($r = -.46$, $p < .01$). Scores derived from additional data collection, using the Brief Symptom Inventory Global Severity Index (a brief psychological self-report symptom scale designed to measure overall psychological distress) and selected Brief Symptom Inventory subscales, showed that a moderately high *positive* correlation existed between the Index and rajas guna ($r = .33$, $p < .05$) and tamas guna ($r = .51$, $p < .01$). From findings such as these, the authors concluded that their data "included statistically significant correlations among scores on the Vedic Personality Inventory, Daily Spiritual Experiences Scale, and the Brief Symptom Inventory" (Stempel at al. 2006, 272).

These findings are further supported by earlier research conducted by Mohan and Sandhu (1988). Their research, in which a comparison was made between Eysenck's Dimensions of Personality and the triguna, found a high degree of correlation between certain factors of the two models. The authors sought to determine correlation between Eysenck's model of the extrovert personality (described as *sociable, impulsive, aggressive* and *craving excitement*) and the personality predominated by rajas guna. They also sought to determine correlation between Eysenck's model of the introvert personality (described as *introspective, reserved, studious, trustworthy* and *well organised*) and the personality predominated by sattva guna. Findings included that:

> the co-efficient of correlation between Sattavic Guna and Extraversion for the total sample –0.16 (Significant at .05 level), for the males –0.39 (Significant at .01 level) and for the females –0.001. The significant relationship between the two, upholds the hypothesis framed earlier i.e. Extraversion and Sattva are negatively related. (Mohan and Sandhu 1988, 34-5)

These findings were further supported in that:

> the co-efficients of correlation between Rajasic-Guna and Extraversion, for the total sample, and for the male and female samples are respectively, +0.19, +0.29 and –0.14. Both Rajasic and Extraverted personality types refer to individuals who manifest outgoing and activity seeking temperaments. It was hypothesised that the two would show positive relations which has been duly confirmed. (Mohan and Sandhu 1988, 35)

The authors also found that "both Tamasic-Guna and Psychoticism manifest themselves in personality traits like lethargic, egoistic, sadistic, crude, asocial, aggressive and foolhardy (Eysenck, 1970; Gupta, 1977)" (Mohan and Sandhu 1988, 36). Thus their search for correlation between Eysenck's models of the introvert and

the sattvic personality, the extrovert and the rajasic personality, and the psychotic and the tamasic personality, was notably supported.

Furthermore, Kaur and Sinha (1992) found that "the construct of the guna holds some promise for being used in organisational behaviour research and practice" in testing the triguna against organisationally-relevant constructs including least-preferred co-worker, leadership, work ethic, personal effectiveness, self-actualising behaviour and organisational effectiveness (1992, 32). Their research concluded that in terms of desirability of different guna characteristics for organisation members from 13 different professional organisations (n = 310), sattva guna correlated *significantly* and *positively* with five of the above-listed constructs, and rajas guna correlated *positively* with three constructs. Thus their findings are congruous with those of the IGSQ, which also sought the opinions of different professional groups (including Australian Antarctic scientists themselves) as to ideal situatedness of different guna characteristics in relation to professional work tasks.

In terms of environmental conservation, it may be accurate to say that as the predominant Abhidharma Factor Group amongst Australian Antarctic scientists, Negative Mental Events represent qualities of consciousness similar to what Buddhism refers to as separatist and aggressive behaviours. In "Early Buddhist Views on Nature" (1996) Chatsumarn Kabilsingh states that behaviours such as disrespect for nature and wildlife, destruction of uncultivated lands, violence in the form of killing, dread and hatred, all run contrary to Buddhist views of "mutual relation and interdependence" between all species of life (1996, 149). Negative Mental Events such as *unconcern/unconscientiousness*; *indignation/wrath*; *malice/cruelty*; and *a lack of sense of propriety/inconsideration for others* correspond with such behaviours.

Qualities such as compassion, respect and gratitude towards nature (Kabilsingh 1996, 148-50) correspond with Positive Mental Events such as *decorum/consideration for others*; *non-hatred*; *concern/ conscientiousness*; and *non-violence*. It is these qualities, according to Kabilsingh, that are essential for creating peaceful and harmonious circumstances for all species of life. Whilst such qualities are congruous to a certain degree with behaviours asked of employees by the APS (see section 1.1.2) whether or not Australian Antarctic scientists acknowledge the relevance of such qualities to the outcomes of their own scientific activities may vary for individual scientists. Further research would be required to determine the absence or presence of such acknowledgement.

According to the Dalai Lama "destruction of nature and natural resources results from ignorance, greed and a lack of respect for the Earth's living things" (Dalai Lama). Such qualities correspond directly with Abhidharma factors of *lack of intrinsic awareness/ignorance* (a Negative Emotion), *avarice* (a Negative Mental Event) and, perhaps indirectly, with *arrogance/self importance* (a Negative Emotion), respectively. In other words, as the head of the global Buddhist movement, the Dalai Lama considers qualities of consciousness akin to Negative Emotions and Negative Mental Events as root causes of destruction of the Earth's natural resources and environment in general.

According to Bhaktivedanta (1973; 1987-8, 1:14:3) the tamasic quality of *ignorance*, akin to the Abhidharma factor of *lack of intrinsic awareness/ignorance*, is highly relevant to the current global environmental crisis. In addition to being responsible for keeping the individual in illusion about his/her actual spiritual situatedness (see section 7.1.1) the quality of *ignorance* or *nescience* causes the individual to behave destructively towards others, including non-human individuals. Through their common qualities or quintessence, tamasic characteristics endorse each

other within the individual's consciousness, causing him/her to progressively engage in harmful behaviours towards other living beings, including the Earth herself (Bhaktivedanta 1987-8, 1:13:46; 1989, 14:8, 18:25-8).

Commenting on the Buddhist tradition, Kenneth Kraft (1996, 485-7) stresses that behaviours such as meditation, chanting and maintaining awareness of humankind's interconnectedness with all other beings are essential for individuals desiring to effectively care for the natural environment. Such behaviours are affiliated with sattvic characteristics of *awareness of one's own spiritual identity and the spiritual identities of others* and *determination which is … sustained with steadfastness by yoga practice*. They are also affiliated with Abhidharma positive factors of *decorum/consideration for others*; *non-deludedness/non-bewilderment*; *alertness/supplessness*; *concern/ conscientiousness*; *non-violence*; and *loving-kindness*. Kraft describes the effects of meditation as:

> advancing several ends priced by environmentalists: it is supposed to reduce egoism, deepen appreciation of one's surroundings, foster empathy with other beings, clarify intention, prevent what is now called burnout, and ultimately lead to a profound sense of oneness with the entire universe. (Kraft 1996, 485)

In other words, conclusions drawn by Kraft, as with conclusions drawn by Kaur and Sinha (1992), support IGSQ findings that qualities akin to sattvic qualities are ideal for effectively caring for the natural environment. Specifically, the behaviour of maintaining awareness of the interconnectedness of all living beings, corresponds primarily with the Positive Mental Event of *non-deludedness/non-bewilderment*, described by the CAFG-GACTA as:

> distinct discriminatory awareness to counteract the deludedness that has its cause in either what one has been born into or what one has acquired. It acts as a remedy for ignorance and accompanies the form intelligence that thoroughly analyses the true nature of objects. (Appendix B, 3)

This affiliation is supported through the CAFG-GACTA's description of the Negative Emotion of *lack of intrinsic awareness/ignorance* as "the lack of awareness of the intrinsic nature of others as well as of oneself" (Appendix B, 18). In other words, humankind's awareness of the interconnectedness of all living beings is made unavailable to the individual through his/her affiliation with the Negative Emotion of *lack of intrinsic awareness/ignorance*. These findings are particularly interesting as the single Abhidharma factor that received the highest overall support from scientists was also a Negative Emotion: *attachment*.

As Negative Emotions are categorised by Guenther and Kawamura (1975, *vi*) and by Varela, Thompson and Rosch (1991, 257) as "basic" emotions (whereas Negative Mental Events are described by Guenther and Kawamura [1975, *vi*] as "proximate" and by Varela, Thompson and Rosch [1991, 258] as "derivative") they should ideally be acknowledge as needing attention by scientists, as they constitute their primary or fundamental qualities of consciousness. Rabten (1992, 137-8) describes Negative Emotions as "root afflictions" and Negative Mental Events as "proximate afflictions."

7.2 Chapter Conclusion

As discussed in section 3.1.2, highly abstract aspects of human consciousness earmarked the investigation conducted in this thesis. Determining the quality of consciousness of a community of scientists presented many complex theoretical and

methodological challenges. In view of such challenges, findings may best be appreciated as representing an attempt to clarify as-yet little understood phenomena of human nature. Whilst the AASQCP has given a rudimentary portrait of Australian Antarctic scientists' qualities of consciousness, many aspects of such a portrait remain uninvestigated.

The much-contested issue of empirical validation of the functioning and role of consciousness within psychological research is in itself an enigmatic phenomenon, on which contemporary theorists have barely scratched the surface. Such an assertion can be made by observing the extent to which contemporary theories on the functioning of consciousness have fluctuated within the past few decades. Ontological and epistemological premises on the role of consciousness have evolved significantly, what to speak of finer theoretical and methodological details of data collection and processing. In introducing two ancient systems of assessment of qualities of consciousness, such fluctuations have been superseded, as both the triguna and the Abhidharma have remained unchanged for millenia.

If Australian Antarctic scientists did not maintain that rigor within scientific research is necessarily dependent on scientists' abilities to delineate deterministic functioning of material nature, then consciousness studies such as those embraced by Vedic and Buddhist teachings may be accepted without reservations by academic communities. Phenomenological studies such as the self-reporting of conscious experiences could, under such conditions, open the door for copious amounts of information about the relationships shared by inert matter, mental and intellectual phenomena and spiritual encounters in relation to quality of consciousness. That such studies are generally not pursued within scientific and psychological research is further testimony to the high degree of classical determinism present within contemporary epistemological research approaches.

Assessing a scientific community's calibre of knowledge, dedication to ethics, attachment to material pursuits and interest in spiritual matters must necessarily adhere to some predetermined standard. Without some type of gauge by which to evaluate qualitative levels of consciousness, the significance of the findings from such an investigation would not manifest, rendering relevant data meaningless and valueless. The ancient Vedic triguna and Buddhist Abhidharma have provided a standard against which the quality of consciousness of the current Australian Antarctic scientific community has been evaluated. In doing so, scientists' own standards in relation to their own qualities of consciousness have been assessed against systems of evaluation that have survived for hundreds of generations of practitioners and theorists.

In view of such evaluation, qualities of consciousness maintained by scientists' contemporary societies should ideally be taken into consideration when perusing data results. Although neither the triguna nor the Abhidharma claim that their theoretical foundations are dependent upon any specific cultural milieu, social norms of current Australian society would most certainly have played an important role in determining the research outcomes of this thesis. As such, Australian Antarctic scientists' current situatedness within the triguna and within the Abhidharma may find more meaning upon examination of the situatedness of current broader Australian society.

Chapter Eight discusses the meaning of overall findings within the context of their significance and implications for further research.

CHAPTER EIGHT

CLOSING DISCUSSION AND FURTHER RESEARCH

In the consciousness realm, it is possible for individual people to change their consciousness in healthy directions, and therefore, consciousness movements can build gradually.

Jay Earley in "The Social Evolution of Consciousness" (2002, 124)

Chapter Outline
Chapter Eight concludes the thesis. It discusses the significance of overall results and examines their anticipated implications for environmental science and management. Discussion then focuses on potential strengths and weaknesses of further possible research in areas of Australian Antarctic science, the Vedic triguna and the Buddhist Theravada Abhidharma. The chapter closes the thesis by drawing the attention of the reader to the most meaningful discovery made by the thesis investigation.

8.1 Thesis Closing Discussion

8.1.1 Significance and Implications of Overall Findings

Statistics tell us that more than one billion people currently breathe unhealthy air and that three million people die each year from air pollution. More than one billion people are without safe drinking water and two billion people lack adequate sanitation (more than three million people die each year from unsafe water). Land degradation affects up to two-thirds of the world's total agricultural lands. Biodiversity is declining at the rate of 1,000 times what it would be without the impact of human activity and half of the Earth's tropical rainforests and mangroves are already destroyed (Annan 2002, 13). In view of such statistics it is reasonable to assume that current environmental management regimes are lacking in knowledge on how to care for the environment, within the boundaries of currently available resources. It may also be assumed that ethical standards maintained by environmental management regimes, particularly standards of environmental ethics, are less-than-ideal. That research results have shown that Australian Antarctic scientists predominate within rajas guna and are predominantly afflicted with negative Abhidharma factors, adds validity to such assumptions.

According to the table SIGS, immediate implications of predominance of rajasic characteristics include environmental policies earmarked by "*greed*; *economic prioritisation*; and *understanding which cannot distinguish between ethical and unethical behaviour"* (SIGS, Table 3.3.1.1). Long-term implications are stated as being "ongoing and increasing deterioration of the natural environment, as it is managed under sub-standard policies, with ethical standards being increasingly compromised in order to meet rajasic *economic* goals" (SIGS, Table 3.3.1.1). In other words, a prevalence of rajasic qualities of consciousness amongst environmental conservationists manifest as less-than-ideal or sub-standard management practices, with a gradual decline in the environment's overall health being consequential.

As symptoms of predominance within rajas guna include *the inability to maintain/sustain* (anything, including environmental care) and *distortion of the intellect due to too much activity*, it is easy to see how activities performed within rajas guna would impact adversely on the outcomes of environmental science. Scientist can hardly be expected to conduct effective scientific research encumbered by the above-discussed qualities, or by others such as *unsteady perplexity of the mind*; being *blinded by personal desire*; and *greed and unlimited hankering for sense enjoyment* (rajas guna). Nor can they be expected to contribute towards environmental sustainability whilst impeded by characteristics such as *nescience*; *inertia*; *foolishness*; and *indulgence in false hopes* (tamas guna) (Bhaktivedanta 1987-8, 11:chap.25; 1989, chap.14; 1992, chap.5).

Likewise, as negative Abhidharma factors are described as "negative plans and thoughts and plans of action" (through the Negative Mental of *slyness-concealment*) and as having "the potential to destroy good qualities" (through the Negative Emotion of *anger*) it would be unreasonable to expect individuals predominated by negative Abhidharma factors to achieve a high level of concern or effectiveness in caring for the natural environment. Scientists can not be expected to maintain good research practices whilst afflicted by *dishonesty*; *mental inflation*; *unconcern/ unconscientiousness*; and *inattentiveness* (Negative Mental Events), nor by *arrogance/self-importance*; *indecision*; *deceit/pretension* and *lack of intrinsic awareness/ignorance* (Negative Emotions) (Guenther and Kawamura 1975, 38-98; Rabten 1992, 125-62).

The above-discussed consequences of scientists' predominance within rajas guna are primarily associated with the moral deterioration of human conduct and humankind's lack of accurate knowledge about the spiritual nature of living beings. Within rajas guna, the individual can not see that all living beings are essentially of the same spiritual nature and can not therefore extend his/her compassion to them, to a degree that would result in their material and spiritual welfare being seriously considered (Bhaktivedanta 1989, 18:21).

By prioritising his/her own material desires over the material and non-material needs of others, the rajasic individual may thereby unintentionally cause others harm. Adhering to knowledge and ethical principles that do not interfere with his/her own material sense enjoyment, the rajasic individual avoids higher ethical principles and scriptural knowledge, as adherence to these would lead to a decline in his/her own material indulgences. Within tamas guna the individual is concerned only with his/her bodily comforts and will intentionally exploit others for his/her own selfish purposes. The tamasic individual thus chooses to engage in destructive behaviours, ignoring the suffering they cause others. For these reasons, Vedic teachings maintain that immoral and ignorant choices made by human beings are largely responsible for the deterioration of global natural environments.

A contributing factor to the above-discussed problem is that qualities of consciousness associated with immorality and ignorance are often covert or mixed with qualities of consciousness associated with morality and knowledge. For example, the preservation of Antarctic and Southern Ocean ecosystems is currently receiving much attention from Australian Antarctic scientists. Such preservation, although aimed at sustainability (sattva guna) does not exclude the exploitation (tamas guna) of the inhabitants of those ecosystems, whilst they are being managed. CCAMLR came into force in 1982 for purposes of protecting the Southern Ocean ecosystems from being ruined by over-fishing and other abusive behaviours on behalf of humans (De Poorter 2000, 163-4). However, one of the primary goals of CCAMLR is to preserve

Southern Ocean ecosystems for the purpose of maintaining fish-stocks, so that human beings can keep exploiting them in the near and far future. As discussed in section 6.1.4, this type if benevolence is supported by the rajasic characteristic of *charity performed with the expectation of some return, or with a desire for fruitive results* (Bhaktivedanta 1989, 17:21) as well as by the tamasic characteristic of *living as a parasite* (exploitation).

The table SIAF states that a predominance of negative Abhidharma factors means that scientists are producing science, whilst they are encumbered by unwholesome qualities of consciousness. Qualities such as *unconcern/unconscientiousness*; *a lack of a sense of propriety/inconsideration for others*; *mental inflation*; and *shamelessness* about less-than-ideal conservation behaviours are anticipated to eventuate in "activities aimed only at self-adulation on behalf of scientists and the Australian government" and "may include immediate deterioration of the Antarctic and global environments" (SIAF, Table 3.4.1.1). Long-term ramifications are described as potentially being "a general neglect of the needs of all species of life, as scientists increasingly succumb to ignorance and selfishness" (SIAF, Table 3.4.1.1). Encumbered by qualities such as *jealousy/envy* and *deceit/pretension*, scientists would remain incapable of sustaining a high level of *concern*, *conscientiousness* and focus on ethical principles for the welfare of all sentient beings.

Rabten (1992, 71) describes a predominance of negative Abhidharma factors as "cognition that is not fresh and infallible." Unwholesome (negative) factors are described as being "responsible for every form of suffering and discontent we experience" (Rabten 1992, 139). They are further described as causing disturbance and unrest. Rabten specifically mentions the Negative Emotion of *attachment*, stating that its (attachment's) disturbing nature is "quite evident" but adds that other afflictions such as *laziness* also disturb the mind, although their disturbing natures may be more covert (1992, 139).

Perhaps the most pertinent question with regards to scientists' raising the qualitative levels of their own consciousness, is whether or not scientists themselves desire to do so. Will they, at some point in the immediate or far future, be inspired to take substantive steps to raise their own qualitative levels of consciousness? Would they be willing to instigate changes to their own professional behaviours for the benefits of the Earth and all her inhabitants, including themselves? If so, would they be willing to accept the triguna and the Abhidharma in instigating such changes? Would they be more willing to adopt other consciousness-based methodologies that may not, for example, be recognised as religious doctrines, or that may receive greater support through contemporary empirical research approaches?

Perhaps the answers to these questions rest in whether or not scientists acknowledge the need for such changes to occur. If scientists do acknowledge such needs and if they are determined to bring about desired changes, then according to Bhaktivedanta (1989, 14:10) they can, by practice, come to predominate within the mode of goodness, even though Western society's current status quo of quality of consciousness is predominantly rajasic. As the theoretical and methodological premises of both the triguna and the Abhidharma have been accepted without criticism in this thesis, however, scientists may feel the need to critically evaluate both systems according to their own research methods, before acknowledging their theoretical foundations.

Within the context of potential behavioural changes on behalf of scientists, behavioural restrictions imposed on them by workplace policies must be kept in mind. Adoption of the sattvic characteristics of *knowledge by which one undivided spiritual*

nature is seen in all living entities, though they are divided into innumerable forms, for example, and rejection of the rajasic characteristics of *knowledge by which one sees that in every different body there is a different type of living entity*, may prove challenging for scientists such as biologists, whose professional duties include treatment of fauna and flora according to their physical peculiarities.

Adoption of other sattvic characteristics, such as *adherence to scriptural knowledge*, in place of the rajasic *adherence to mundane knowledge*, may also prove challenging, if not impossible, for scientists employed by mainstream scientific organisations. On the other hand, behavioural changes aimed at enhancing current predominating qualities of consciousness within science organisations, such as *knowledge producing many theories and doctrines by dint of mundane logic and mental speculation* and *hard work to acquire prestige and fortune*, would certainly be met with very little opposition.

As the VMMES and the PNJ both assert, the needs of the non-material jiva are the essential needs of the entire individual. It is extremely difficult for scientists to acknowledge such needs, however, unless they are predominated by sattvic qualities of consciousness, according to triguna methodology. As Australian Antarctic scientists showed a moderate affiliation with sattva guna, they are in a favourable position for nurturing and developing sattvic qualities that would accommodate their vision of such needs, should they desire to do so. Sattvic qualities affiliated with the attainment of such a vision include *knowledge by which one undivided spiritual nature is seen in all living entities, though they are divided into innumerable (material) forms*; *the beginning of spiritual knowledge/rudimentary spiritual knowledge*; and *adherence to scriptural knowledge*.

As depicted by the SHPS model, environmental sustainability is achieved by the individual who is predominated by sattvic qualities of consciousness, and still more easily achieved by the individual who is situated on the suddha-sattva platform of consciousness. This is so, regardless of specific circumstances surrounding environmental problems. Overall research results suggest that Australian Antarctic scientists are currently not able to achieve many of their sustainability goals, yet they are being effective in preventing destructive behaviours typical of tamas guna.

8.2 Further Research

8.2.1 Further Research for Australian Antarctic Scientists

The question may be asked how existing environmental management regimes can acknowledge the need to turn their attention towards researching quality of consciousness in relation to environmental conservation behaviour. Typical scientific approaches to environmental conservation assign issues of human behaviour to organisations specialising in psychological studies, sociology and perhaps religious studies, whilst environmental science itself proceeds largely unchecked by behaviourists. According to Bhaktivedanta (1981) problems underpinning such uncoordinated efforts by contemporary scientists and other academics lies primarily in their inability to understand themselves, nor the world around them (1981, 55). Within a society that primarily defines good psychological health as being synonymous with the ability to advance materially, scientists, economists and other materially ambitious professionals are ordinarily not identified as being psychologically impaired. It is for this reason that the quality of consciousness of environmental scientists and other people who are influential in determining environmental policy, is ordinarily not investigated.

Whilst environmental management bodies such as the AAD may currently be unfamiliar with consciousness studies, contemporary research trends within the social sciences are highly likely to eventually impose such familiarity. Joseph P. Reser and Joan M. Bentrupperbaumer (2001, 40) claim that there is currently "limited understanding in the natural environment arena of what applied social science areas such as environmental psychology or environmental sociology are or what they have to offer." Particularly, the authors point at Australia in stressing the breadth of the gap that exists between the "social science assumptions and paradigms, on the one hand, and the assumptions and models of the natural and physical sciences in the environmental arena in Australia, on the other" (2001, 38). Beringer (2003) further comments on this breadth of gap by stating that:

> if psychology and conservation psychology are concerned about environmental sustainability, they can no longer exclude the science of the soul, spirituality, and the body of knowledge known as the Ageless Wisdom (Besant 1912; Hodson 2001) or perennial philosophy (e.g., Huxley 1945), for these offer know-how into human and planetary conditions not covered in the accepted, mainstream academic disciplines, yet significant to conservation psychology. Scientists may question the source as well as methods for these teachings. This does not relieve them from scrutinizing this material and from testing it for its practical value in healing the Earth. Moreover, psychology can no longer ignore that modern science, including itself, is implicated in the ecological crisis (e.g., Bateson and Bateson 1987; Nasr 1993). (Beringer 2003, 152)

In discussing the role of corporate consciousness within corporate culture and vice versa (the role of corporate culture within corporate consciousness) Campion and Palmer (1996, 392) state that culture within organisations is "a powerful force in shaping business ethics, corporate values, and the actions of corporations." Beringer (2003) supports this by stating that "psychology has largely bypassed and left unexamined the more profound force in environmental degradation: collective consciousness, which shapes individual behaviours and social institutions (cf. Edwards, 2002)" (Beringer 2003, 151).

Campion and Palmer question, however, whether or not organisations "care about" their own corporate consciousness. They may not be interested in or willing to inaugurate or support relevant research (1996, 397-8). Whilst members of corporations or research communities such as the Australian Antarctic scientific community, comprise a collective consciousness, individual members also retain individual consciousness, meaning inevitable variations in such interest within the collective whole.

In "Restrictions to Research" (1997, 61) Reimar Lüst states that the development of scientific research, including its fundamental direction and format, largely depends on individual scientists' consciousness in relation to moral responsibility and the prioritisation of science programs within the context of the promotion of human wellbeing. He adds that the responsibility of scientists towards society belongs to the individual scientist "who must be conscious of his or her moral obligation. Those lacking this consciousness should not be in scientific work" (Lüst 1997, 65). Lüst also comments that "the starting point of the individual scientists' sense of responsibility should be his commitment to absolute truthfulness and accuracy in his scientific work" (1997, 65). As Australian Antarctic scientists strongly supported the sattvic characteristic of truthfulness/honesty, and gave moderate support to the Positive Perfection of truthfulness/does not deceive, their potential for developing their moral obligations, according to Lüst, appears promising.

One question that could be asked is how outcomes of Antarctic scientific practices are impacting on the wellbeing of scientists themselves. If scientists are already of the opinion that the outcomes of current environmental science practices benefit the Earth's many species, then they may not see any theoretical or pragmatic value in the results from this research thesis. If, however, they consider current outcomes of research conducted by themselves and by others, as less-than-ideal, they may acknowledge the potential value of the results of this research project. Such acknowledgement on behalf of scientists may lead them to inquire about potential future research into the quality of consciousness of not only themselves, but also of other environmental conservation personnel and/or personnel within science research groups.

One aspect of the thesis research results that may prove to be particularly difficult for scientists to accept, is the grouping of characteristics within each guna. For example, rajas guna places the characteristics of *ambition* and *nationalism* parallel to the characteristics of *action resulting in misery* and *the understanding which can not distinguish between ethical or unethical practices*. Such premises of VCS may be challenging for scientists who would ordinarily see *ambition* and *nationalism* as producing a sense of achievement, success and wellbeing for relevant recipients, not misery, stress and anxiety.

That certain tamasic characteristics, such as *speaking* (or publicising in general) *without scriptural authority* and *exploitation* are grouped with characteristics such as *destruction* and *violence* may also be difficult for scientists to accept. 80 % of AASI participants did not feel the need *to seek scriptural authority to present their scientific findings*, whilst *exploitation* of Antarctic biodiversity is an acceptable practice within Australian Antarctic bioprospecting (AAD 2006d). *Violence* and *destruction*, on the other hand, may be described as antitheses to the behavioural guidelines established by the APS (AAD 2002). Challenges such as these posed by triguna theory may impede scientists' decisions to further investigate Vedic psychological teachings.

Should Australian Antarctic scientists examine the results of this thesis, they may also decide to examine results from the IGSQ. As scientists themselves comprised one of the three professional groups consulted about ideal guna situatedness, IGSQ results may give extra incentive for scientists to implement training programs aimed at enhancing scientists' qualities of consciousness. Whilst minor differences appeared in the support given to different gunas by the three professional groups, all three groups supported sattva guna as the guna from which scientists can most easily achieve environmental science goals. In view of the results from the processing of interviewees' responses to Interview Series Question No. 7, namely that tamas guna plays a major role in scientists' treatment of peer-review, science managers may choose to investigate scientists' perspectives on peer-review, in consideration of its overall purpose.

Whilst the general meaning and descriptions of individual Abhidharma factors can undoubtedly be fathomed by Australian Antarctic scientists, their organisation within Factor Groups and Factor Contrast Groups may prove challenging for scientists. For example, scientists may not agree with the categorisation of the factor *indecision* as constituting an emotion. Nor may they understand or accept that their *attachment* to material circumstances such as their professional careers pertains to negative or unwholesome qualities of consciousness, leading to an increase in suffering for all. Similarly, they may not understand or agree with the designation of *renunciation* as a Positive Perfection i.e. they may not see how giving up sensual enjoyment such as social status or attachment to material luxuries, can eventuate in a decrease in

suffering for themselves and for others. As such, Australian Antarctic scientists may find the Abhidharma categorisation scheme challenging to their own professional lifestyles.

If, however, scientists can somehow accommodate the broader aspects of the Abhidharma as comprising an entire categorisation scheme, then research into its finer details may be easier to pursue. Scientists may choose to investigate the role of individual Abhidharma factors in relation to their own behaviours, without applying the entire scheme to relevant research. Individual Factor Contrast Groups, Factor Groups or factors may be examined and applied by scientists to bring about behavioural changes in themselves and others.

8.2.2 Further Research for Triguna Studies

Whilst the Vedic triguna is gradually gaining ground within Western peer-reviewed literature, academic acceptance of a psychological system that dates back 5,000 years, will at the very least challenge its contemporary analysts. As peer-reviewed research journals have increasingly been publishing the outcomes of research into the triguna over the past three decades, the overall results from this thesis may be valued within such arenas. In contrast to other previous research incorporating triguna methodology, the research design of this thesis includes four different types of data-collection items of which it is anticipated that three have not been previously employed within academic research. The application of the triguna to collecting data on opinions on ideal guna situatedness, to identify guna characteristics within interview responses and within science literature features, may open the door to similar attempts being made by other researchers in the future.

As the term *Vedic Cognitive Science* (VCS) has been coined in this thesis, it does not yet maintain a place within contemporary academic literature, nor within any other known literature. *Sankhya* philosophy, however, does maintain such a place, but is primarily discussed within religious and philosophical writings as constituting a well-defined ancient philosophy. Having introduced the concept of VCS, based on translations by Bhaktivedanta and other contemporary academics, the researcher of this thesis recommends employment of the term only within its original definitional parameters. As a cognitive science originally given by highly esteemed scholars who not only studied the science but also lived their entire lives according to its conclusions, translations of original Vedic texts by Bhaktivedanta, forming the knowledge-base of the science, should ideally not be altered. If substantive amendments are made, theoretical derivatives risk succumbing to speculation as to the finer aspects of different guna characteristics, their symptoms and their ramifications for the outcomes of behaviours. Such deviations may render methodological conclusions ineffective.

As the imports of VCS are applicable to all spheres of human behaviour, all varieties of psychologists such as clinical psychologists, developmental psychologists, health psychologists and conservation behaviour psychologists, can apply the findings from this thesis to future psychological research projects. Wolf (2001, 2002, 2003) for example, has applied triguna research and other Vedic psychological and sociological methodologies to researching the benefits of Vedic knowledge for psychosocial and other types of human health. His findings included that Vedic (specifically *Vaishnava*) sociological and psychological paradigms can "nourish and enhance" contemporary Western academic appreciation of such fields, although current Western approaches can not adequately accommodate Vedic approaches (Wolf 2002,

11). As such, Wolf recommends that Vedic *Vaishnava* social science paradigms be examined from their own epistemological and ontological standpoints.

Although future researchers are advised to minimise alterations made to the theoretical and methodological premises of VCS and other Vedic constructs, as well as to their epistemological and ontological foundations, future research into different aspects of Vedic knowledge is encouraged. Psychologists pursuing research into topics such as ethics, for example, may find that analysis of the relationships shared by different sattvic characteristics does not require investigation into other triguna characteristics, nor adjustments made to sattvic characteristics being examined. Similarly, social workers, sociologists and psychologists may investigate tamasic behaviours such as drug taking and law breaking, without needing to disturb broader underlying philosophical foundations of the triguna. Such research, if pursued within empirically based parameters, would add validity to the triguna in its entirety, whilst also benefiting case studies in their exclusivity.

8.2.3 Further Research for Abhidharma Studies

As discussed in Chapter One, consciousness studies have increased significantly in popularity in the West over the past two decades. Comprising an academic research field or a sub-field of psychology, artificial intelligence, quantum physics, sociology, religious studies and sociology, consciousness studies show all the hallmarks of maintaining their place as a prominent topic within future academic research. Whilst Buddhist concepts of psychological functioning are today fairly prevalent within academic fields such as the cognitive sciences, the Abhidharma in its entirety is not currently supported as a psychological model for analysing and treating social and behavioural maladies, by Western mainstream professionals.

It is important to note, however, that the Theravada Abhidharma and other Buddhist teachings on the workings of the mind, have been accepted as offering credible and practical health and welfare solutions for centuries within ancient Eastern cultures, such as those of India, Thailand, Bhutan, Burma and China (including Tibet). As with ongoing research into the triguna, ongoing research involving the Abhidharma is anticipated to advance in the West only as Western academic interests in ancient and/or Eastern social sciences expand.

As psychological processes embraced by the Abhidharma are estimated to require serious attention on behalf of practitioners desiring to change their qualities of consciousness, the often-immediate demands of academic empiricism may not accommodate many of the Abhidharma's potential benefits. Restrictions to lifestyle choices on behalf of subject samples may create impositions. As application of the Abhidharma in its entirety asks practitioners to adhere to numerous positive Abhidharma factors, whilst at the same time abstaining from numerous negative factors, subjects choosing to participate in relevant empirical research may be few, due to the high level of personal commitment asked of practitioners.

It may indeed be this level of commitment on behalf of practitioners in general, that defines the Abhidharma and other similar approaches to quality of consciousness, as constituting religious practices rather than psychological aids. Whilst the Abhidharma and the triguna ask the serious practitioner to consider behavioural changes to aspects such as their thoughts, attitude, philosophical outlook, intellectual activity, physical activities, spiritual practices, emotional involvement, eating habits and ethical standards, typical Western mainstream psychological treatments do not ask for such variegated, numerous and essential behavioural changes from clients. Empirically based psychological research using the triguna and the Abhidharma is

therefore destined to gain ground more slowly within Western academic education, than empirically based psychological research that is less demanding of study-subjects.

Theoretical constructs introduced by Varela, Thompson and Rosch (1991) may inspire the construction of other cognitive theories by using the Abhidharma as a foundatioal psychological component. Whilst the authors' Enactive Cognitive Science (ECS) may not in its current form extrapolate all of the Abhidharma's potential benefits for the cultivation of higher qualities of consciousness, it nevertheless frames the polarisation of wholesome and unwholesome mental events and emotions within an academic exposition. The extent to which such framing will generate broader academic acceptance of the Abhidharma will be revealed with time.

It is recommended that researchers desiring to investigate the Abhidharma begin with an analysis of different Factor Groups and Factor Contrast Groups, before investigating individual factors. This recommendation is made as groups represent overarching directions in which the individual can transform his/her qualities of consciousness. By acknowledging different types of influences on the individual's consciousness (represented by Factor Groups) as well as the contrast of different influences (represented by Factor Contrast Groups) researchers can gain insight to deliberate on the meaning of different groups for the benefit of the individual as a whole. In this way, the Abhidharma may gain ground not only as a treatment for poor qualities of consciousness, but also as offering feasible lifestyle alternatives.

8.3 Chapter Conclusion

From the theoretical premises maintained by this research thesis, it may be concluded that the Earth's future rests primarily with the human individual's concern for his/her own quality of consciousness. This is necessarily so, as group efforts to improve qualities of consciousness must begin with adequate concern on behalf of the individual. It is a firm premise of Vedic thought that in order for an individual to assist other individuals in improving their qualities of consciousness, the individual him/herself must maintain a relatively high qualitative level of consciousness, to be effective in helping others. Otherwise his/her understanding of relevant matters will not be sufficient to influence others in a constructive direction.

Bhaktivedanta gives the analogy of a group of people, all individually bound with rope (1966; 1989, 7:14). Unless one person becomes untied, how can he/she untie the others? This analogy is specifically applicable to the three modes of material nature, whose binding effects keep the individual ensnared within, and in illusion about, material life (see section 2.2.3). As this is the case, individual scientists must necessarily look at their own qualities of consciousness and enhance those qualities, before attempting to improve qualities of consciousness in others. In congruity with such conclusions made by the Vedas, Buddhism argues that when the individual's awareness is no longer afflicted with negative mental and emotional factors, then he/she can be an effective instrument in helping others. As Ronald Epstein states:

> when we naturally experience and act out of the fundamental equality of our identity with all living beings, we will have restored the ecological harmony to our minds. Our mental ecosystem will function naturally and holistically, and it will generate the wisdom of clear seeing and compassion for all life. That is the basic teaching of the Buddha. (Epstein 2004, 39)

From the research conducted in this thesis, the discovery considered to be the most meaningful, is that in their attempts to solve environmental management dilemmas, environmental scientists are using faulty instruments in the form of their own materially contaminated consciousness. Afflicted with psychological qualities considered less-than-ideal by two ancient systems of psychological evaluation, scientists go about their scientific activities, unaware of such considerations.

Such an approach to environmental care may be labelled as neglectful or irresponsible, yet if scientists are unaware of the condition of their own consciousness, they may best be appreciated as being ignorant of their own predicament. IGSQ results suggest, however, that scientists do maintain rudimentary understanding about what constitutes higher and lower qualities of consciousness, as their designation of ideal and less-than-ideal guna characteristics corresponded significantly with not only those of other professional groups, but also with triguna methodology itself.

REFERENCE LIST *

* see the following literature-sections below for relevant publications:

Antarctic Science Literature pp.379-381
English Dictionaries pp.381-382
General Environmental, Sociological and Scientific Literature pp.382-384
General Psychology and Consciousness Studies Literature pp.384-386
Literature on Contemporary Research Into the Triguna pp.386-387
Traditional and Contemporary Buddhist Literature pp.387-389
Traditional and Contemporary Vedic and Other Indian Philosophy Literature pp.389-391
Personal Communications pp.391-392

Antarctic Science Literature

AAD/ See /Australian Antarctic Division

Ables, S.T. Fraser, B.J., Olson, J.V., and Morris, R.J. 2000. "Conjugate ULF Field Line Resonance at Cusp Latitudes." *Advanced Space Research* 26 (1):125-30.

ACE CRC/ See / Antarctic and Climate Ecosystems Cooperative Research Center

Antarctic Climate and Ecosystems Cooperative Research Centre. 2006. "Our Programs." http://www.acecrc.org.au/drawpage.cgi?pid=programs (accessed 12/12/2006).

Antarctic Treaty. 1959. *Volume 402, United Nations Treaty Series*, 71.

Arata, Javier, Robertson, Graham, Valencia, Jose, Xavier, Jose C., and Moreno, Carlos A. 2004. "Diet Of Grey-Headed Albatrosses at the Diego Ramirez Islands, Chile: Ecological Implications." *Antarctic Science* 16 (3):263-75.

ATS/ See / Antarctic Treaty

Auman, H.J., Woehler, E.J., Riddle, M.J., and Burton, H. 2003. "First Evidence of Ingestion of Plastic Debris by Seabirds at Sub-Antarctic Heard Island." *Marine Ornithology* 32:105-6.

Australian Antarctic Division. 2002 (updated 25/07/2002). "APS Code of Conduct." http://www.aad.gov.au/default.asp?casid=2380 (accessed 12/12/2006).

------. 2004a (updated 13/10/2004). "Understanding Through Science." http://www.aad.gov.au/default.asp?casid=58 (accessed 12/12/2006).

------. 2004b (updated 07/ 05/2004). "Priority Programs." http://www.aad.gov.au/default.asp?casid=13954 (accessed 12/12/2006).

------. 2006a (updated 04/09/ 2006). "About Us." http://www.aad.gov.au/default.asp?casid=18 (accessed 12/12/2006).

------. 2006b (updated 10/10/2006). "Scientific Research." http://www.aad.gov.au/default.asp?casid=66 (accessed 12/12/2006).

------. 2006c (updated 28/04/2006). "The Antarctic Animals Ethics Committee's Animal Experimentation Guidelines." http://www.aad.gov.au/default.asp?casid=14440 (accessed 15/12/2006).

------. 2006d (updated 02/06/2004). "Antarctic Bioprospecting, Benefit Sharing and Cooperation in Antarctic Science." http://www-new-nettas.aad.gov.au/default.asp?casid=14689 (accessed 15/12/2006).

Bowman, John P., Gosink, John J., McCammon, Sharee A., Lewis, Tom E., Nichols, David S., Nichols, Peter D., Skerratt, Jenny H., Staley, Jim T., and McMeekin, Tom A. 1998. "*Colwellia demingiae* sp. nov., *Colwellia hornerae* sp. nov., *Colwellia rossensis* sp. nov. and *Colwellia psychrotropica* sp. nov.: psychrophilic Antarctic Species With the Ability to Synthesize Docosahexaenoic Acid (22: 6*w*3)." *International Journal of Systematic Bacteriology* 48:1171-80.

Chiaradia, Andre F., and Kerry, Knowles R. 1999. "Daily Nest Attendance and Breeding Performance in the Little Penguin Eudyptula Minor at Philip Island, Australia." *Marine Ornithology* 27:13-20.

Creuwels, Jeroen C.S., Stark, Jonathan S., Woehler, Eric J., van Franeker, Jan A., and Ribic, Christine A. 2005. "Monitoring of a Southern Giant Petrel *Macronectes giganteus* Population on the Frazier Islands, Wilkes Land, Antarctica." *Polar Biology* 28:483-93.

De Poorter, Maj. 2000. "Environmental Issues." *Antarctica*, by Jeff Rubin. Melbourne: Lonely Planet Publications.

Deprez, Patrick P., Arens, Michael, and Locher, Helen. 1999. "Identification and Assessment of Contaminated Sites at Casey Station, Wilkes Land, Antarctica." *Polar Record* 35 (195):299-316.

Dunkley, Daniel .J., Clarke, Geoffrey. L., and Harley, Simon .L. 1999. "Diffusion Metasomatism in Silica-Undersaturated Sapphirine-Bearing Granulite from *Rumdoodle Peak, Framnes Mountains, East Antarctica." Contributions to Mineral* Petrology *134:264-76.*

Gasparon, M., and Burgess, J.S. 1999. "Human Impacts in Antarctica: Trace-Element Geochemistry of Freshwater Lakes in the Larsemann Hills, East Antarctica." *Environmental Geology* 39 (9) July:963-76.

Giese, Melissa, and Riddle, Martin. 1999. "Disturbance of Emperor Penguin

Aptenodytes forsteri Chicks by Helicopters." *Polar Biology* 22:366-71.

Jackson, George D., Buxton, Nicole G., and George, Magnus J.A. 2000. "Diet of the Southern Opah *Lampris Immaculatus* on the Patagonian Shelf; the Significance of the Squid *Moroteythis Ingens* and Anthropogenic Plastic." *Marine Ecology Progress Series*, 206:261-71.

Laursen, Gary A., Treu, Roland, Seppelt, Rod D., and Stephenson, Steven L. 1997. "Mycorrhizal Assessment of Vascular Plants From Sub-Antarctic Macquarie Island." *Arctic and Alpine Research* 29 (4):483-91.

Law, Phillip. 1983. *Antarctic Odyssey*. Melbourne, Australia: Heinemann.

McIntosh, Peter C., and Rintoul, Stephen R. 1997. "Do box inverse models work?" *American Meteorological Society* Feb:291-308.

Massell, C., Coffin, M.F., Mann, P., Mosher, S., Frohlich, C., Duncan, C.S., Karner, G., Ramsay, D., and Lebrun, J. F. 2000. "Neotectonics of the Macquarie Ridge Complex, Australia-Pacific Plate Boundary." *Journal of Geophysical Research* 105 (B6):13,457-80.

Roberts, Andrew, Allison, Ian, and Lytle, Victoria I. 2001. "Sensible- and Latent-Heat-Flux Estimates over the Mertz Glacier Polynya, East Antarctica, from In-Flight Measurements." *Annals of Glaciology*, 33:377-84.

Walton, David. 2000. "Antarctic Science." In *Antarctica,* by Jeff Rubin, 174-95. Melbourne: Lonely Planet Publications.

English Dictionaries

Barnhart, Robert K., and Sol Steinmetz, eds. 1988. *Chambers Dictionary of Etymology*. New York: The Wilson Company.

Kent, Hilary, ed.1998. *The Australian Oxford Mini Dictionary*. 2d ed. Oxford: Oxford University Press.

Klein, Ernest. 1971. *A Comprehensive Etymological Dictionary of the English Language*. New York: Elsevier Publishing Company.

Simpson, J.A., and E.S.C. Weiner, eds. 1989. *The Oxford English Dictionary*, 2d ed. Oxford: Clarendon Press.

General Environmental, Sociological and Scientific Literature

Annan, Kofi A. 2002. "Toward a Sustainable Future." *Environment* 44 (7): September 2002.

Booth, Annie, L., and Jacobs, Harvey, M. 1990. "Ties that Bind: Native American Beliefs as a Foundation for Environmental Consciousness." *Environmental Ethics* 12:27-43.

Broad, William, and Wade, Nicholas. 1985. *Betrayers of the Truth*. Oxford: Oxford University Press.

Burroughs, James, E., and Rindfleisch, Aric. 2002. "Materialism and Wellbeing: A Conflicting Values Perspective." *Journal of Consumer Research* 29 (3): 348-70.

Callicott, J.Baird. 1995a. "Instrumental Value." In *Conservation and Environmentalism: An Encyclopedia*, edited by Robert Paehike, 364. London: Fitzroy Dearborn.

------. 1995b. "Intrinsic Value." In *Conservation and Environmentalism: An Encyclopedia,* edited by Robert Paehike, 370. London: Fitzroy Dearborn.

Cole, Kris. 1993. *Crystal Clear Communication: Skills for Understanding and Being Understood* (Competitive Edge Management Series [Australian Institute of Management NSW Training Centre Ltd]). Australia: Prentice Hall.

Dainton, The Lord, FRS. 1992. "Knowledge is Our Destiny." *Interdisciplinary Science Reviews* 17 (2):116-9.

Devall, Bill, and Sessions, George. 1985. *Deep Ecology*. Utah: Gibbs Smith.

De Young, Raymond. 1986. "Encouraging Environmentally Appropriate Behaviour: The role of intrinsic motivation". *Journal of Environmental Systems* 15 (4) 1985-1986:281-92.

Ewert, Alan, and Galloway, Graeme. 2004. "Expressed Environmental Attitudes and Actual Behaviour: Exploring the Concept of Environmentally Desirable Responses. Paper presented at the International Symposium on Society and Resource Management (ISSRM)" June 2-6, 2004 in Keystone, Colorado, USA.

Fox, Warwick. 1995. "A Critical Overview of Environmental Ethics." *World Futures* 46:1-21.

Haralambos, Michael, van Krieken, Robert, Smith, Philip, and Holborn, Martin. 1996. *Sociology: Themes and Perspectives/ Australian edition*. South Melbourne, Australia: Longman.

Haraway, Donna. 1988. "Situated Knowledges-The Science Question in Feminism and the Privilege of Partial Perspective" in *Feminist Studies* 14 (3): 575-99 Fall 1988.

Hartmann, Thom. 1999. *The Last Hours of Ancient Sunlight: Waking up to Personal and Global Transformation*. Australia: Bantam.

Hinde, Robert. 2002. *Why Good is Good: The Sources of Morality*. London: Routledge.

Kasser, Tim. 2002. *The High Price of Materialism*. Cambridge: MIT Press.

Kreis, Steven. 2000 (updated 28/02/2006). "Lecture 24: The age of ideologies: 2: Reflections on Karl Marx (The History Guide: Lectures on Modern European Intellectual History)." http://www.historyguide.org/intellect/lecture24a.html (accessed 10/10/2006).

Lacey, Hugh. 1999. *Is Science Value Free? Values and Scientific Understanding*. London: Routledge.

Lovelock, James. 1991. *Gaia: Practical Medicine for the Planet*. New York: Harmony Books.

Lüst, Reimar. 1997. "Restrictions to Research." *Interdisciplinary Science Reviews* 22 (1):61-66.

Miller, Seumas. 1996. *Issues in Academic Ethics*. Wagga Wagga, NSW: Keon Publications.

Mills, Jon. 2002. "Five Dangers of Materialism." *Genetic, Social and General Psychology Monographs* 128 (1):5-27.

Norgaard, Richard B. 1995. "Beyond Materialism: A Coevolutionary Reinterpretation of the Environmental Crisis." *Review of Social Economy* 53 (4) Winter, 1995:475-92.

Pall, Martin L. 2000. "The Value of Scientific Peer-Reviewed Literature in a General Education Science Course." *The American Biology Teacher* 62 (4):256-8.

Pope John Paul II. 1990 (written 18/12/1989). "Land: A Call to Stewardship/ The Ecological Crisis: A Common Responsibility." http://www.ncrlc.com/ecological_crisis.html (accessed 02/06/2003).

Reser, Joseph P., and Bentrupperbaumer, Joan, M. 2001. "'Social Science' in the Environmental Studies and Natural Science Arenas: Misconceptions, Misrepresentations and Missed Opportunities." In *Environment, Society and Natural Resource*, *Management: Theoretical Perspectives from Australasia and the Americas*, edited by Geoffrey Lawrence, Vuaghan Higgins and Stewart Lockie, 38-52. Cheltenham, UK: Edward Elgar.

Sandelowski, Margarete. 2000. "Focus on Research Methods: Combining Qualitative and Quantitative Sampling, Data Collection, and Analysis Techniques in Mixed-Method Studies." *Research in Nursing and Health* 23:246-55.

Smyth, John V. 2003. "Situatedness, Or, Why We Keep Saying Where We're Coming From." *Comparative Literature* 55 (1) Win: 91-4.

Sorokin, Pitirim A. 1942. *The Crisis of Our Age: The Social and Cultural Outlook*. New York: Dutton.

------. 1962. *Social and Cultural Dynamics*. New York: Bedminster Press.

Toropov, Brandon, and Buckles, Father Luke. 2004. *The Complete Idiot's Guide to World Religions*. 3d ed. New York: Alpha Publishers.

UNEP/ See /United Nations Environment Program

United Nations Environment Programme. 2006. "United Nations Environmental Programme: environment for development- Overview [d]." http://www.unep.org/resources/gov/overview.asp (accessed 14/12/2006).

Wood, Graham. 1990. *Taoism and the Environmental Crisis*. Thesis submitted for the degree of Graduate Diploma of Environmental Studies. Hobart, Australia: University of Tasmania.

World Wide Fund for Nature. 2006 (updated 20/12/2006). "Mission Statement." http://www.panda.org/about_wwf/who_we_are/index.cfm (accessed 14/12/2006).

WWF/ See /World Wide Fund for Nature

General Psychology and Consciousness Studies Literature

Beringer, Almut. 2003. "A Conservation Psychology with Heart". *Human Ecology Review* Vol. 10 (2):150-3.

Burger, Bruce. 1998. *Esoteric Anatomy: The Body As Consciousness*. California: North Atlantic Books.

Campion Michael, A., and Palmer, David K. 1996. "Discovering Corporate Consciousness." *Journal of Business and Psychology* 10(4) Summer, 1996:389-400.

Colman, Andrew M. 2003. *Oxford Dictionary of Psychology*. Oxford: Oxford University Press.

Earley, Jay. 2002. "The Social Evolution of Consciousness." Journal of Humanistic *Psychology* 42 (1) Winter, 2002:107-32.

Graham, Judy F. 1999. "Materialism and Consumer Behaviour: Toward a Clearer Understanding." *Journal of Social Behaviour and Personality* 14 (2):241-58.

Green, Christopher D. 1996. "Where Did the Word "Cognitive" Come From Anyway?" *Canadian Psychology* February 37 (1):31-9.

Ivey, Allen E., Bradford Ivey, Mary, and Simek-Morgan, Lynn. 1997. *Counseling and Psychotherapy: A Multicultural Perspective*. 4d ed. Massachusetts: Allyn and

Bacon.

Keats, Daphne, M. 2000. *Interviewing: A Practical Guide for Students and Professionals*. Australia: UNSW Press.

Krause, Daniel. 1993. "Environmental Consciousness: An Empirical Study." *Environment and Behaviour* 25 (1) January:126-42.

Lund, David H. 2000. "Materialism and the Subject of Consciousness." *Idealistic Studies*, 30 Winter (1):7-23.

Metzinger, Thomas. 1995. "Introduction: The Problem of Consciousness." In *Conscious Experience*, edited by Thomas Metzinger, 3-40. Thorverton: Schoningh/ Imprint Academic.

Parameswaran, E.G. 1969. "Indian Psychology-The Need for a Breakthrough, An Attempt." *Research Bulletin* 5:75-80.

Peterson, J. Vincent, and Nisenholz, Bernard. 1995. *Orientation to Counseling*. 3d ed. Massachussetts: Allyn and Bacon.

Petrakis, Emmanuel, and Xepapadeas, Anastasios. 1996. "Environmental Consciousness and Moral Hazard in International Agreements to Protect the Environment." *Journal of Public Economics* 60:95-110.

Roszak, Theodore, Gomes, Mary E., and Kanner, Allen D, eds. 1995. *Ecopsychology: Restoring the Earth Healing the Mind*. USA: Sierra Club Books.

Russell, Peter. 1989. "The Psychological Roots of the Environmental Crisis." Based on the conference Man, Health, Environment, Luxembourg, March 1988. In *Environment and Health: A Holistic Approach"*, edited by Robert Krieps, 217-27. Aldershot: Avebury.

Shear, Jonathan. 1996. "The Hard Problem: Closing the Empirical Gap." *Journal of Consciousness Studies* 3 (1):54-68.

Siewert, Charles P. 1998. *The Significance of Consciousness*. New Jersey: Princeton University Press.

Slife, Brent. 1998. "Raising the Consciousness of Researchers: Hidden Assumptions in the Behavioural Sciences." *Adapted Physical Activity Quarterly* 15:208-21.

Thompson, Richard L. 1981. *Mechanistic and Nonmechanistic Science: An Investigation into the Nature of Consciousness and Form*. Los Angeles: Bhaktivedanta Book Trust.

------. 2003. *Maya: The World as Virtual Reality*. Alachua, Florida: Govardhana Hill Publishing.

Totton, Nick, and Jacobs, Michael. 2001. *Character and Personality Types*. Buckingham: Open University Press.

Underwood, L.G., and Teresi, J.A. 2002. "The Daily Spiritual Experiences Scale: Development, Theoretical Description, Reliability, Exploratory Factor Analysis, and Preliminary Construct Validity Using Health-related Data." *Annals of Behavioural Medicine* 24:22-33.

Varela, Francisco J., Thompson, Evan, and Rosch, Eleanor. 1991. *The Embodied Mind: Cognitive Science and Human Experience*. Massachusetts: MIT Press.

Literature on Contemporary Research Into the Triguna

Das, R.C. 1987. "The Gita Typology of Personality: An Inventory." *Journal of Indian Psychology* 6 (1 & 2):7-12.

------. 1991. "Standardization of the Gita Inventory of Personality." *Journal of Indian Psychology* 9 (1 & 2):47-54.

Kaur, Parvinder, and Sinha, Arvind. 1992. "Dimensions of *Guna* in Organizational Setting." *Vikalpa* 17 (3) July-September:27-32.

Marutham, P., Balodhi, J.P., and Mishra, H. 1998. "Satva, Rajas and Tamas (SRT) Inventory." *Nimhans Journal* Jan. 1998:15-9.

Mohan, Vidhu, and Sandhu, Sadhna. 1986. "Development of Scale to Measure Sattvic, Rajasic and Tamasic Guna." *Journal of the Indian Academy of Applied Psychology* 12:46-52.

------. 1988. "Sankhyan Tri-guna and Eysenck's Dimensions of Personality." *The Vedic Path* 2 (1):23-8.

Pathak, N.S., Bhatt, I.D., and Sharma, R. 1992. "Manual for Classifying Personality on Tridimensions of Gunas-An Indian Approach." *Indian Journal of Behaviour* 16:1-14.

Rao, P.V.Krishna, and Harigopal, K. 1979. "The Three *Gunas* and ESP: An Exploratory Investigation." *Journal of Indian Psychology* 2 (1):63-8.

Singh, R. 1971. "An Inventory from Mahabharata." *Indian Journal of Psychiatry* 13:149-61.

Sitamma, M., and Rao, P.V. Krishna. 1995. "Three Gunas and Cognitive Characteristics: A Study of Memory and Extrasensory Perception." *Journal of the Indian Academy of Applied Psychology* 21 (2):185-91.

Sitamma, M., Sridevi, K., and Rao, P.V.Krishna. 1995. "Three Gunas and Cognitive Characteristics: A Study of Field Dependence-Independence and Perceptual Acuity." *Journal of Indian Psychology* 13 (2):13-20.

Stempel, Harvey S., Cheston, Sharon, E. Greer, Joanne M., and Gillespie, C. Kevin. 2006. "Further Exploration of the Vedic Personality Inventory: Validity, Reliability and Generalizability." *Psychological Reports* 98:261-73.

Uma, K., Lakshmi, Y.S., and Parameswaran, E.G. 1971. "Construction of a Personality Inventory Based on Doctrine of 3 Gunas." *Research Bulletin* 6:49-58.

Wolf, David B. 1999. "A Psychometric Analysis of the Three Gunas." *Psychological Reports* 84:1379-90.

Traditional and Contemporary Buddhist Literature

Bodhi, Bhikkhu. 2005. *In the Buddha's Words: An Anthology of Discourses from the Pali Canon*. Boston: Wisdom Publications.

Buddhaghosa, Bhadantacariya. 2004. *The Path of Purification*, transl. from Pali by Bhikkhu Nanamoli. Singapore: Singapore Buddhist Meditation Centre.

Dalai Lama, His Holiness. 1986 (updated 14/08/1996). "An Ethical Approach to Environmental Protection." The Government of Tibet in Exile. http://www.tibet.com/Eco/dleco1.html (accessed 15/12/2006).

Dhammapala, Acariya. 1996. *A Treatise on the Paramis*. Kandy, Sri Lanka: Buddhist *Publication Society*.

Epstein, Ronald. 1992. "Pollution and the Environment: Some Radically New Ancient Views." *Vajra Bodhi Sea: A Monthly Journal of Orthodox Buddhism* Pt.1, Dec. 1999:36, 12; Pt. 2, Jan. 2000:37-8; Pt. 3, Feb. 2000:36-8, 46.

------. 2004. "The Inner Ecology: Buddhist Ethics and Practice." *Vajra Bodhi Sea: A Monthly Journal of Orthodox Buddhism* March, 1999:36-9.

Guenther, Herbet V., and Kawamura, Leslie S. 1975. *Mind in Buddhist Psychology*. Emeryville, California: Dharma Publishers.

Kabilsingh, Chatsumarn. 1996. "Early Buddhist Views on Nature." In *This Sacred Earth: Religion, Nature, Environment*, edited by Roger S. Gottlieb. New York: Routledge.

Kraft, Kenneth. 1996. "The Greening of Buddhist Practice." In *This Sacred Earth: Religion, Nature, Environment*, edited by Roger S. Gottlieb. New York: Routledge.

Maturana, Humberto, and Varela, Francisco J. 1980. *Autopoiesis and Cognition: the Realization of the Living*. In *Boston Studies in the Philosophy of Scienc*e. vol. 42: D, edited by Robert S. Cohen and Marx W. Wartofsky. Dordecht: Reidel Publishing.

McCormick, Ryuei Michael. 2006. "Following the Path: The 37 Requisites to Enlightenment." http://nichirenscoffeehouse.net/Ryuei/37req.html (accessed

23/02/07).

Nyanatiloka, Maha Thera. 2004. *Buddhist Dictionary: Manual of Buddhist Terms and Doctrines,* edited by Thera Nyanaponika (3rd rev. and enl. ed.) Taipei: Corporate Body of the Buddha Educational Foundation.

Prasad, H.S. 2000. "Dreamless Sleep and Soul: A Controversy Between Vedanta and Buddhism." *Asian Philosophy* 10 (1):61-73.

Rabten, Geshe. 1992. *The Mind and its Functions*. Edition Rabten, 2d ed. Mt. Pelverin, Switzerland: Rabten Choeling.

Rosen, Steven J. 2003a. "A Critique of Impersonalism and Voidism." In *From Nothingness to Personhood: A Collection of Essays on Buddhism from a Vaishnava-Hindu Perspective,* by Steben J. Rosen, 91-102. Vrindaban, India: Rasbihari Lal & Sons.

------. 2003b. "The Harmless Diet: Buddhism and Its Vegetarian Antecedents." In *From Nothingness to Personhood: A Collection of Essays on Buddhism from a Vaishnava-Hindu Perspective,* by Steben J. Rosen, 43-62. Vrindaban, India: Rasbihari Lal & Sons.

Snelling, John. 2000. *Buddhism: An Introductory Guide to the Buddhist Tradition/* New Perspectives Series. Ringwood, Victoria: Element Books Limited.

Traditional and Contemporary Vedic and Other Indian Philosophy Literature

Bhaktivedanta Swami Prabhupada, Abhay C. 1966. "Bhagavad-gita Lectures 4:19, New York, August 5, 1966." In *The Bhaktivedanta VedaBase*. Database, version 4.11 (1998). Los Angeles: Bhaktivedanta Book Trust.

------. 1968a. "Letter to Aniruddha, Los Angeles, 14th November, 1968." In *The Bhaktivedanta VedaBase*. Database, version 4.11 (1998). Los Angeles: Bhaktivedanta Book Trust.

------. 1968b. "General Lectures, Montreal, October 26, 1968." In *The Bhaktivedanta VedaBase*. Database, version 4.11 (1998). Los Angeles: Bhaktivedanta Book Trust.

------. 1969. *Sri Isopanisad*. Los Angeles: Bhaktivedanta Book Trust.

------. 1970. *Krishna Book vols I and II*. Los Angeles: Bhaktivedanta Book Trust.

------. 1972a. "Srimad Bhagavatam Lectures 1:2:10, Bombay, December 28, 1972." In *The Bhaktivedanta VedaBase*. Database, version 4.11 (1998). Los Angeles: Bhaktivedanta Book Trust.

------. 1972b. "Srimad Bhagavatam Lectures 1:2:8, Vrndavana, October 19, 1972." In *The Bhaktivedanta VedaBase*. Database, version 4.11 (1998). Los Angeles:

Bhaktivedanta Book Trust.

------. 1973. "Letter to Sir Alistair Hardy, Bhaktivedanta Manor, 28th July, 1973." In *The Bhaktivedanta VedaBase*. Database, version 4.11 (1998). Los Angeles: Bhaktivedanta Book Trust.

------. 1974. "Srimad Bhagavatam Lectures 1:16:21, Los Angeles, July 11, 1974." In *The Bhaktivedanta VedaBase*. Database, version 4.11 (1998). Los Angeles: Bhaktivedanta Book Trust.

------. 1976. "Srimad Bhagavatam Lectures 3:22:22 and Initiations, Tehran, August 12, 1976." In *The Bhaktivedanta VedaBase*. Database, version 4.11 (1998). Los Angeles: Bhaktivedanta Book Trust.

------. 1981. *Life Comes From Life*. Los Angeles: Bhaktivedanta Book Trust.

------. 1982. *Nectar of Devotion*. Los Angeles: Bhaktivedanta Book Trust.

------. 1987-8. *Srimad Bhagavatam*. *C*antos 1-12. Los Angeles: Bhaktivedanta Book Trust.

------. 1989. *Bhagavad-gita As It Is*. Los Angeles: Bhaktivedanta Book Trust.

------. 1991. *The Laws of Nature: An Infallible Justice*. Los Angeles: Bhaktivedanta Book Trust.

------. 1992. *Renunciation Through Wisdom*. Los Angeles: Bhaktivedanta Book Trust.

------. 1996. *Sri Caitanya Caritamrita*. Adi-lila 1-17, Madhya-lila 1-25, Antya-lila 1-20. Los Angeles: Bhaktivedanta Book Trust.

------. 1997. *Light of the Bhagavata*. Los Angeles: Bhaktivedanta Book Trust.

------. 1998. "VedaBase Glossary." In *The Bhaktivedanta VedaBase*. Database, version 4.11 (1998). Los Angeles: Bhaktivedanta Book Trust.

------. 2003. *The Science of Self Realisation*. Los Angeles: Bhaktivedanta Book Trust.

------. 2004. *Bhakti: The Art of Eternal Love*. Los Angeles: Bhaktivedanta Book Trust.

Cremo, Michael, A., and Mukunda Goswami. 1995. *Divine Nature: A Spiritual Perspective on the Environmental Crisis*. Los Angeles: Bhaktivedanta Book Trust.

Flood, Gavin. 1996. *An Introduction to Hinduism*. Cambridge: Cambridge University Press.

Prime, Ranchor. 2002. *Vedic Ecology: Practical Wisdom for Surviving the 21st Century*. Novato, CA: Mandala Publishing.

Purusottama dasa. 1996. *Sri Krsna's Names in Bhagavad-gita*. Vrndavana, India:

Gopala Publications.

Rosen, Steven J. 2002. *The Hidden Glory of India*. Los Angeles: Bhaktivedanta Book Trust.

Satsvarupa dasa Goswami. 1990. *Readings in Vedic Literature: The Tradition Speaks for Itself*. Los Angeles: Bhaktivedanta Book Trust.

------. 1987. *Your Ever Well-wisher*. Los Angeles: Bhaktivedanta Book Trust.

Wolf, David B. 2001. "Effects of the Maha Mantra on Some Mental Health Indicators." *The Indian Journal of Social Work* 62 (2):151-68.

------. 2002. "Vaisnavism and the Social and Mental Health Sciences." *Journal of Indian Psychology* 20 (1) Jan:1-12.

------. 2003. Examining the Effects of Meditation Techniques on Psychosocial Functioning." *Research on Social Work Practice* 12 (6):752-67.

Personal Communications

Adams, Neil. 2004. *Personal Communication*. (Bureau of Meteorology, July, 2004).

Allison, Ian. 2004. *Personal Communication*. (Antarctic and Climate Ecosystems Cooperative Research Centre/Australian Antarctic Division, August, 2004).

Barmuta, Leon. 2004. *Personal Communication*. (University of Tasmania, August, 2004).

Bindoff, Nathan. 2004. *Personal Communication*. (CSIRO/University of Tasmania, July, 2004).

Bowman, John. 2004. *Personal Communication*. (University of Tasmania/Australian Food Safety Centre of Excellence, August, 2004).

Burns, Gary. 2004. *Personal Communication*. (Australian Antarctic Division, July, 2004).

Church, John. 2004. *Personal Communication*. (CSIRO/ Antarctic and Climate Ecosystems Cooperative Research Centre, August, 2004).

Coleman, Richard. 2004. *Personal Communication*. (Antarctic and Climate Ecosystems Cooperative Research Centre/University of Tasmania, July, 2004).

Davidson, Garry. 2004. *Personal Communication*. (University of Tasmania/Australian Antarctic Division, July, 2004).

Miller, Denzil. 2004. *Personal Communication*. (Convention on the Conservation of Antarctic and Marine Living Resources, August, 2004).

Morgan, Vin. 2004. *Personal Communication*. (Antarctic and Climate Ecosystems Cooperative Research Centre, July, 2004).

Nicol, Steve. 2004. *Personal Communication*. (Antarctic and Climate Ecosystems Cooperative Research Centre/Australian Antarctic Division, August, 2004).

Ramm, David. 2004. *Personal Communication*. (Convention on the Conservation of Antarctic and Marine Living Resources, August, 2004).

Reid, James. 2004. *Personal Communication*. (University of Tasmania, July, 2004).

Riddle, Martin. 2004. *Personal Communication*. (Australian Antarctic Division, August, 2004).

Rintoul, Steve. 2004. *Personal Communication*. (Antarctic and Climate Ecosystems Cooperative Research Centre, August, 2004).

Robertson, Graham. 2004. *Personal Communication*. (Australian Antarctic Division, July, 2004).

Southwell, Colin. 2004. *Personal Communication*. (Australian Antarctic Division, August, 2004).

Trull, Tom. 2004. *Personal Communication*. (Antarctic and Climate Ecosystems Cooperative Research Centre, July, 2004).

Woehler, Eric. 2004. *Personal Communication*. (Institute of Antarctic and Southern Ocean Studies/Australian Antarctic Division, August, 2004).

Wright, Simon. 2004. *Personal Communication*. (Australian Antarctic Division, August, 2004).