

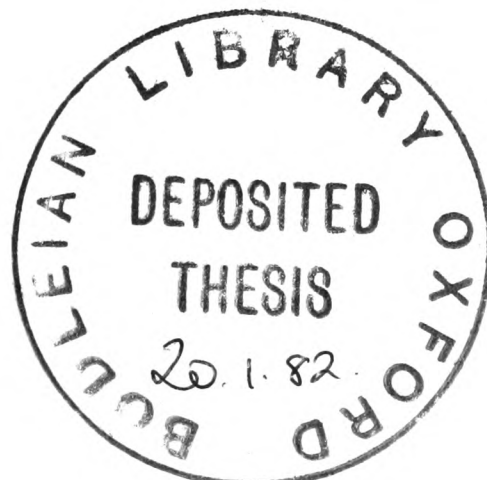
SOME ASPECTS OF ANTHROPOMORPHISM IN THE TERMINOLOGY AND
PHILOSOPHY UNDERLYING WESTERN AND JAPANESE STUDIES OF
THE SOCIAL BEHAVIOUR OF NON-HUMAN PRIMATES

A thesis submitted for the degree of
Doctor of Philosophy in the
University of Oxford

Pamela J. Asquith

Linacre College

Trinity 1981 ^{MY}



Prefatory Note

Japanese names are given in this thesis in the Japanese order: that is, family name first, followed by the personal name. Thus in the name Yoshida Mitsukuni, Yoshida is the family name, Mitsukuni the personal name. Although writers of the Chu Hsi Neo-Confucian school are usually referred to by their personal name only, I give both names for ease of reference and place the surname first. Where English translations of Japanese articles depart from this convention, as in the journal, Japanese Studies in the History of Science, I have retained the Japanese order.

Following G. Sansom (1950) English plurals are used, such as daimyos (territorial lords) and shoguns (commanders-in-chief) where the singular form appears in English dictionaries. Daimyo appears in the Concise Oxford Dictionary (sixth edition) as daimio. I follow the former spelling as that appears most commonly in the literature.

Reference to Japanese dictionaries in the bibliography is made under the publisher's name and not that of the editor. Thus in Shincho Kokugo-Jiten (Shincho Japanese Dictionary), Shincho is the name of the publisher. This follows Japanese convention.

'The West' refers to northern Europe, North America (and Australia) after Morsbach (1977).

The abbreviations of journal titles in the references follows those found in the World List of Scientific Periodicals.

ACKNOWLEDGEMENTS

I am indebted to my supervisors, Mr. Rom Harré and Dr. Vernon Reynolds, for their competent and interested academic guidance and for their advice and encouragement at all stages of the thesis. I am also grateful to my college tutor and Head of Department, Professor Geoffrey Harrison, for his many kindnesses and for making every facility of the department available to me.

I have benefited from discussion of various aspects of the work with Dr. E. Ardener (Oxford), Dr. R.D. Attenborough (Oxford), Mr. R.E. Castillo (Oxford), Dr. J. Clarke (Oxford), Dr. J. Hattiangadi (York, Canada), Dr. J. Kingdom (Oxford), Dr. J.E. Kitahara-Frisch (Sophia, Tokyo), Mr. T. Koyama (Osaka), Professor G.R. Lowther (York, Canada), Dr. D. Morris (Oxford), Dr. N. Nagashima (Hitotsubashi, Tokyo), Mr. R. Storry (Oxford), Dr. H.N. Sunwoo (Seoul), Professor W.H. Thorpe (Cambridge), Professor N. Tinbergen (Oxford) and Professor J. Yolton (Rutgers, New Jersey).

I am grateful to Professor Stuart A. Altmann (Chicago) for providing a personal document regarding private publication of the book, Japanese Monkeys (1965), and to Dr. John R. Durant (Swansea), Dr. Helmut Morsbach (Glasgow) and Dr. William M.S. Russell (Reading) for drawing my attention to useful sources. I am also very grateful to Dr. Mary Midgley (Newcastle) and Drs. Durant and Mersbach for generously making some of their own unpublished material available to me.

I thank Dr. Frans de Waal and his wife Catherine for making my visit to the chimpanzee colony at Arnhem, Netherlands so pleasant and rewarding. I gained much useful insight into both chimpanzee and chimpanzee-watchers' behaviour as a result of Dr. de Waal's and his research students' willing co-operation.

For assistance with the Japanese sections, I am indebted to Dr. I.J. McMullen (Oriental Institute, Oxford) who critically read the chapter on Neo-Confucianism and who graciously turned his attention from Confucianism to Japanese monkeys to help complete a translation. I am also grateful to Mrs. Yumiko Ishikawa Brush for translating material into English. I am especially grateful to Mr. Heita Kawakatsu (Oxford and Waseda, Tokyo) for all his help and time given to translation of material into English and for critical reading of all the chapters on Japan which resulted in many enlightening and enjoyable discussions. His scholarly attention has resulted in that portion of the thesis containing far fewer errors than may now remain.

Responsibility for remaining errors and omissions in the thesis rests entirely with the author.

I am grateful to the following for financial aid: The Canada Council for a Doctoral Fellowship, the Shute fund of Linacre College and Oxford University for grants, and The British Council and Netherlands Ministry of Education for financing my research in Arnhem.

I dedicate this thesis to my parents, Dr. and Mrs. Raymond Asquith, with affection and gratitude for their loving support, both moral and financial.

P.J. Asquith

ABSTRACT

A thesis submitted for the degree
of Doctor of Philosophy

Pamela J. Asquith
Linacre College
Trinity 1981

SOME ASPECTS OF ANTHROPOMORPHISM IN THE TERMINOLOGY AND PHILOSOPHY UNDERLYING WESTERN AND JAPANESE STUDIES OF THE SOCIAL BEHAVIOUR OF NON-HUMAN PRIMATES

This study investigates how anthropomorphism arises in Western and Japanese reports of non-human primate behaviour. Chapter 1 introduces the study and notes that differences in recording styles and incidence of anthropomorphism in Western and Japanese reports led to the thesis that the basis for anthropomorphism differed between the two groups. In Western studies it was found necessary to inquire into philosophical aspects of language use. In Japanese studies the inquiry centred on evidence for the retention of traditional attitudes to nature.

Part One focuses on the basis for anthropomorphism in Western studies. Chapter 2 discusses the intellectual basis for the deeply ingrained belief in the West in the separateness of man and animals. The more immediate intellectual background to Western primate studies is traced in chapter 3 through the development of comparative psychology and ethology and then of primatology itself. A more precise formulation of the Western inquiry is developed in chapter 4 through discussion of ordinary language, distinction between categories of anthropomorphism and between the notions of a subjective approach to study and the ascription of human subjective experiences to animals. Cognitive ethology is briefly described. Chapter 5 identifies the characteristic of language use that gives rise to anthropomorphism as metaphor.

Part Two focuses on Japanese studies. Japan had no tradition of objective science and Western science was imported to Japan. This section develops the argument that Western science was adapted to existing Japanese thought and that a traditional intuitive approach to nature and feeling of unity with animals was retained.

The development of Japanese primate studies and evidence for the acceptability of anthropomorphism to Japanese primatologists are presented in chapter 6. Certain basic ideas of traditional Japanese views are outlined in chapter 7. The effects of the first small-scale importation of Western science on the Neo-Confucian precepts of Tokugawa Japan are traced in chapter 8. The way in which especially biology was understood in the subsequent major importation of science to Meiji Japan is examined in chapter 9. The methodology of the Japanese primatologists is examined in chapter 10 and newly translated material showing the application of traditional Japanese thought to primatology is presented. Other new material on the origins of the focus on personality and culture in monkey groups is given. The application of traditional Japanese ideas of nature to their methodology and the use of a socioanthropological framework for explanation of observed behaviour is seen to be compatible with anthropomorphism in the Japanese studies.

Chapter 11 summarizes the course of the study and discusses what conclusions may be drawn.

CONTENTS

	page
Prefatory Note	i
Acknowledgements	ii
Abstract	iii
 1. GENERAL INTRODUCTION	 1
Part One: ANTHROPOMORPHISM IN WESTERN PRIMATE STUDIES	
 2. THE WESTERN INTELLECTUAL HERITAGE	 13
2.1 Introduction: Relations Between Man and Animals	13
2.2 The Seventeenth Century: Scientific Deism and Theriophily	16
2.3 The Eighteenth Century: Introduction	19
2.3.1 The Animal Soul	20
2.3.2 Eighteenth Century Concepts of Evolution	24
2.3.3 Apes and Man	28
2.4 The Nineteenth Century: Natural Theology	31
2.4.1 Darwinian Evolution	33
2.5 Summary	36
 3. BACKGROUND TO WESTERN PRIMATE STUDIES	 38
3.1 Introduction	38
3.2 Development of Comparative Psychology	40
3.3 Early Development of Ethology	45
3.4 Formative Phase in Britain	53
3.5 Formative Phase in America	57
3.6 Formative Phase in Europe	62
3.7 Classical Phase in Europe	66
3.8 Summary	71
3.9 Development of Primate Ethology: Introduction	74
3.10 Knowledge of Primates to the Nineteenth Century	76
3.11 Modern Primate Studies	79
3.11.1 Psychobiological Studies	79
3.11.2 Studies of Language in Apes	82
3.11.3 Criticisms of Ape Language Studies	87
3.11.4 Origin of Primate Field Studies: Anecdotal Reports	90
3.11.5 Robert Mearns Yerkes	92
3.11.6 Rise of Primate Field Studies	95
3.11.7 Applications of Primate Field Studies	97
3.12 Summary	100
 4. ANTHROPOMORPHISM IN WESTERN BEHAVIOUR STUDIES	 103
4.1 Introduction	103
4.2 Problems of Terminology	112
4.3 Categories of Anthropomorphic Terminology	125
4.4 Arguments About Anthropomorphism	128
4.5 Anthropomorphism in Ethology	141
4.6 Cognitive Ethology	145
4.7 Anthropomorphism in Primate Ethology	147

	page
5. QUALITATIVE DESCRIPTION IN WESTERN PRIMATE STUDIES	151
5.1 Introduction	151
5.2 Levels of Terminology	154
5.3 Behaviour and Action	162
5.4 Definition	165
5.4.1 Methods of Word-Thing Definition	170
5.5 A Definition of 'Threat'	173
5.6 Metaphor: Introduction	179
5.6.1 Concepts of Metaphor	182
5.7 The Metaphorical Basis for Anthropomorphism	191
5.7.1 Metaphor and Theory Construction in Primate Studies	197
5.8 Quantitative Description	200
5.9 Conclusion	205
Part Two: ANTHROPOMORPHISM IN JAPANESE PRIMATE STUDIES	
6. BACKGROUND TO JAPANESE PRIMATE STUDIES	207
6.1 Introduction	207
6.2 Development of Japanese Primate Studies	208
6.3 Differences Between Japanese and Western Studies	214
6.4 Anthropomorphism in Japanese Studies	221
7. THE JAPANESE INTELLECTUAL HERITAGE	232
7.1 Historical Periods	232
7.2 Japanese Language and Its Relation to the Japanese Mode of Thought	239
7.3 Japanese View of Nature	246
7.4 The Philosophy of Nishida Kitarō	252
8. JAPANESE NATURAL SCIENCE AND THE INTELLECTUAL BASIS FOR THE ASSIMILATION OF WESTERN SCIENCE	260
8.1 The Formative Years: Tokugawa Japan	260
8.2 Traditional Japanese Study of Nature	262
8.3 Chu Hsi Neo-Confucianism and Its Moral Evolution	263
8.4 Chu Hsi Neo-Confucianism and Japanese 'Science'	272
8.5 Western Science and Confucian Philosophy: The Division of <u>Ri</u>	275
8.6 Intellectual Setting for the Major Importation of Western Science	282
9. MODERN JAPAN AND THE IMPORTATION OF WESTERN SCIENCE	287
9.1 Introduction	287
9.2 Reasons for the Re-Opening of Japan	288
9.3 Importation of Western Science	291
9.4 Development of Scientific Institutions in Japan	297
9.5 Introduction of Evolutionary Theory to Japan	307

10.	THE PHILOSOPHICAL BASIS FOR ANTHROPOMORPHISM IN JAPANESE PRIMATE STUDIES	318
10.1	Introduction	318
10.2	The Japanese Primatologist's Viewpoint	319
10.3	Features of the Japanese Methodology	322
10.4	The Natural Philosophy of Imanishi Kinji	331
10.5	Imanishi and the 'Society' of Monkeys	334
10.6	The <u>Kyokan</u> Method	340
10.7	Basis for Anthropomorphism in Japanese Studies	348
11.	SUMMARY AND CONCLUSIONS	356
	REFERENCES	364

CHAPTER ONE

GENERAL INTRODUCTION

Anthropomorphism is a concept that many animal behaviourists consider but mention only in passing when discussing terminology or methodology. Its use is occasionally defended, but more often warned against by ethologists (for example, Tinbergen, 1951; Marler & Hamilton, 1966; Morris, 1967, and Reynolds, 1967). Yet anthropomorphism, or the ascription of human mental experiences to animals,¹ occurs throughout professional reports of animal behaviour. It is present in the use of qualitative or ordinary language description which includes terms used to describe everyday human action, such as 'threaten', 'appease', 'chase', 'greet', 'submission', and so on. These terms already carry meanings associated with human action (that is, purposeful behaviour). Their stipulated definitions in terms of relatively semantically neutral behaviour units, such as 'bare teeth', 'raise tail', do not entirely avoid the purposeful connotations of the sentence, 'Animal A threatened animal B'. Why this should be so is explained in the body of the thesis.

The question to which this study is addressed is: 'How does anthropomorphism arise in description of natural behaviour of non-human primates?'. Defence as well as criticism of anthropomorphism reveals a self-consciousness about its use and as both anthropomorphism and brief comments about it are so

1 One can be anthropomorphic about anything, but in this study its application is restricted to animals.

pervasive throughout the literature, it warrants a systematic investigation. Although there is a substantial literature on the justification or otherwise of attributing mental experiences (whether rational or emotional) like those of man to animals, there has been, to my knowledge, no detailed study of how that attribution occurs through the nature of language use with the exception of Purton's (1970) study. A section of his M. Phil. thesis on 'Philosophical aspects of explanation in ethology' is in close agreement with the present observation that the purposeful connotations of ordinary language terms are retained when used to describe animal behaviour and this may give rise to anthropomorphism. He does not, however, offer a mechanism by which this occurs. It is part of the purpose of the present study to suggest that the mechanism is 'metaphor' which allows, indeed necessitates, the semantic link between human action and animal behaviour.

Out of the ethological literature, it was decided to focus on primate ethology for three reasons. Firstly, non-human primates display a rich variety of behaviour, especially in the wild or in semi-captivity, and that has necessitated a large ordinary language vocabulary to describe it. Secondly, the problem of anthropomorphism is most keenly felt by scientists who study the Order of animals most closely related to man and most likely to give rise to homologous and analogous comparison with human behaviour. A third reason was the revelation of differences in approach between Japanese and Western scientists to primate studies. It will be clear that in studying the language of recording behaviour, it is the habits of primatologists rather than of non-human primates that is studied. Nonetheless, this has a profound bearing on our knowledge of the latter as our access to them is through primatologists' descriptions, including our own if we make them.

During my review of primate field studies it became apparent that there were differences, with regard to the incidence of anthropomorphism, between Western and Japanese scientists' reports. The differences are of three kinds. One is that terms describing the animals' personality, emotions and motives appear with a much greater frequency in Japanese than in Western reports. A second is that anthropomorphic terminology is used less self-consciously (for example, without enclosing the anthropomorphic term or phrase in quotation marks) by the Japanese. It does not appear to be used as a shorthand description of events, nor as a metaphor, but as something to be understood literally and that is employed intentionally. A third difference is that anthropomorphism appears to be more integral to the Japanese reports in that it is used not only in descriptions of the monkeys' behaviour, but also in explanations for behaviour. Examples are found in Miyadi's (1961, p.81) suggestion of a 'secret plot' among members of a group of Japanese monkeys (Macaca fuscata) that split off from a larger group, or Sugiyama's (1965c, p.409) suggestion that an all-male group of langurs (Presbytis entellus) attacks only large, well-established troops as they may 'know' the leader male of such a troop is less active than the male of a smaller troop which has been leader for only one or two years. At times the emotional reaction of the scientist to the observed behaviour is incorporated into the description of the behaviour, such as Kawai's (1965b, p.94) account of 'swaggering female monkeys' that 'took advantage of' their dependent rank. He wrote elsewhere (Kawai, 1969, p.293) that he could not understand female monkey behaviour as well as that of male monkeys and that he "... was aggravated by such things as females taking advantage of their dependent rank".

This use of anthropomorphism in Japanese reports gave the strong impression that it reflected differences at a deeper level between Western

and Japanese primate studies. This can perhaps best be explained through the following report. At a meeting of the American Association for the Advancement of Science held in December, 1963, seventeen Japanese scientists were invited to report on work in different areas of science in Japan. Their reports gave some idea of how recent scientific progress there was shaped by aspects of Japanese culture. Campbell (1964), who attended the meeting, noted that the Japanese scientists defined a milieu "at once familiar and oddly unfamiliar to American workers" (p.776). This is an apt characterization of Japanese primate field studies. Many aspects of the purposes and procedures of their studies are familiar to a Western primatologist. However, there is simultaneously a different 'flavour' to the Japanese reports. Notwithstanding difficulties of translation from Japanese into English (and this has become increasingly fluent), the Japanese reports have a tone or character which can best be described as anthropomorphic.

Cultural differences in the performance of science have been noted before. Bertrand Russell (1961a) found them in animal psychology of the nineteen twenties. He wrote:

"... I thought that the methods adopted in interpreting animal behaviour have much more scope than is usually admitted in interpreting what in human beings would be regarded as 'thought' or 'knowledge' or 'inference'. This preconception led me to read a great deal of animal psychology. I found, somewhat to my amusement, that there were two schools in this field, of whom the most important representatives were Thorndike, in America, and Köhler in Germany. It seemed that animals always behave in a manner showing the rightness of the philosophy entertained by the man who observes them. ... What concerned me were the observations on how animals learn. Animals observed by Americans rush about frantically until they hit upon the solution by chance. Animals observed by Germans sit still and scratch their heads until they evolve the solution out of their inner consciousness. I believe both sets of observations to be entirely reliable, and what an animal will do depends upon the kind of problem that you set before it" (pp.225-226).

In contrast to the Western studies, anthropomorphism in Japanese reports appears to be a literal (or intentional) rather than a metaphorical use of language. Thus, a basis for the use of anthropomorphic terminology can be sought in the underlying beliefs of the Japanese primatologists as to why such terms are acceptable or suitable for describing primate behaviour. This presents a different kind of problem from that of analyzing language use as in the Western studies. Although it is quite likely that the ordinary language terminology used by Japanese primatologists gives rise to similar purposeful implications as it does in English, language use in Japanese reports is not analyzed in this study for two reasons. One is that the writer is not a native speaker of Japanese and is therefore not in a position to do so. Another, and more interesting, reason is that there is evidence that many Japanese primatologists appear not to be concerned, in the way that many Western scientists are, about attributing human characteristics to animals. Hence, a basis for their anthropomorphic description of animals can be sought in the relevant cultural and philosophical presuppositions that they may bring to the study of primates.

Thus, the basis for anthropomorphism in Japanese primate studies is suggested to lie partly in the application of traditional Japanese ideas of nature to their methodology. Japanese primatologists themselves have remarked that their study of primates is done in a different spirit from that of the West. As modern science was literally imported to Japan from the West, evidence that the Japanese have retained their own outlook derived from their traditional beliefs is important to the point of the study. It is pointed out by several writers that imported theories that could be made to comply with existing Japanese thought were more acceptable than those that could not during the major importation of Western science in the Meiji period (1868-1912). An example of this is found in the course of

the introduction of evolutionary theory to Japan. Its story is particularly relevant to a Western understanding of Japanese primatology.

Whereas evolutionary theory is the lodestone of Western natural science, it is not used regularly in the explanatory framework of Japanese researchers' interpretations of primate behaviour. A clue to the basis for the 'anthropomorphic approach' in Japanese primatology is given by Kawai (1969) as something called the kyokan ('feel-one', 'feel-together') method in which the observer strongly empathizes with the animals and so understands their feelings.

A theme that runs parallel to these different bases for anthropomorphism in Western and Japanese studies are the different kinds of anthropomorphism that arise from them. Briefly stated, the purposefulness implied by the ordinary language terminology in Western reports gives rise to a general or generic anthropomorphism in which purposefulness is ascribed to animals, but there need be no implication that this is psychologically identical with human purposefulness. In contrast to this, the anthropomorphism in Japanese reports is of a specific kind in which feelings and thoughts are attributed to the animals. Generic anthropomorphism can and sometimes does give rise to specific anthropomorphism in Western reports. This distinction between generic and specific anthropomorphism recurs throughout the inquiry into the bases for anthropomorphism.

Thus, the original question of how does anthropomorphism arise in descriptions of primate behaviour is further refined into two questions, namely: 'What is the basis for anthropomorphism in Western primate studies?' and 'What is the basis for anthropomorphism in Japanese primate studies?'. As the first question entails the analysis of language use and the second entails gathering evidence for a cultural and philosophical predilection for anthropomorphic description, the inquiry falls naturally into two parts.

Justification, if it is needed, for subsuming these parts under one study head is that both are addressed to the same phenomenon; that is, the basis for the presence of anthropomorphism in primate behaviour reports. Further, data gathered by both groups of scientists have long since been part of one body of knowledge about primate behaviour.

Before outlining the course of the study, a few points and restrictions on the scope of the study will be made. Firstly, the thesis does not enter into debate about whether or not we should ascribe purposefulness to other animals. Thus, the experiments for evidence of 'insight', 'expectation' or 'purposive behaviour' in primates are not considered germane to the main inquiry. Secondly, quantitative description may be considered to be at least of equal importance as qualitative description in an analysis of how primate behaviour is represented. However, an analysis of quantitative methods is beyond the scope of the present endeavour. As a separate project, however, it is to be highly recommended. The suggestion that is sometimes made that quantitative description can be used in lieu of qualitative terms and so avoid the 'problem of anthropomorphism' is argued against in chapter 5 (section 5.8). Thirdly, no claim is intended by the study that the attitudes to anthropomorphism attributed to primatologists are true for all primatologists. In other words, not all Western primatologists by any means eschew anthropomorphism, nor are all Japanese primatologists likely to be followers of the approach of Imanishi and Kawai that is presented in the thesis. It is, rather, a study of what appear to be 'central tendencies' in the respective groups of scientists. Fourthly, the study of the basis for anthropomorphism in behaviour reports has incidentally provided a route by which to identify some sources of the special character of Japanese primate studies. Although the data of the Japanese scientists is part of a single body of data that also includes Western studies, Japanese primate studies also constitute a discipline in their own right, with an initial history quite separate from that of Western primatology. Thus, Japanese

and Western primate field studies provide a good 'test case' for a study of the effects of radically different social, philosophical and linguistic backgrounds on the performance of science. In the present study some aspects for comparison between the Japanese and Western approaches inevitably present themselves. Comparisons are drawn where they advance the main line of the argument. However, a thorough comparison between the two, interesting as that would be, is patently beyond the limits of the present thesis. Further, anything approaching a thorough analysis of the effects of traditional Western and Japanese thought on a modern branch of science would be a vast undertaking in itself. This thesis highlights relevant parts of those traditions to clarify and support the observations contained herein.

With these limitations in mind, the study proceeds as follows: Part One addresses the question of how anthropomorphism arises in Western primate studies. Chapter two presents evidence for the emphasis in Western thought on the distinction between man and other animals. It highlights some of the seventeenth, eighteenth and nineteenth century arguments between theologians, philosophers and scientists about the status of animals and man's role with regard to them. Eighteenth century debates about whether apes are a kind of man are presented and the philosophical basis of eighteenth and nineteenth century concepts of evolution are contrasted. Generally, the chapter reveals the profound influence of Christian beliefs on modern (post-Baconian) science. It is suggested that the Christian tradition which emphasizes man's separateness from other animals and the inheritance of Descartes's (1637) mechanistic philosophy and insistence that man only possesses a 'soul' are a basis for the assumption of many Western scientists that one should eschew anthropomorphism in science.

Chapter three gives the more immediate background to Western primatology. Modern (post-1930) primate studies arose out of American comparative psycho-

logy and employ many of the methodological features of ethology. Thus, the development of the founder disciplines, comparative psychology and ethology, is traced to obtain a full picture of the intellectual background to primatology and the origin of the problems of description discussed in the thesis. Pre-nineteenth century knowledge of primates and studies of primates in private homes and enclosures are briefly reviewed. The development of psychobiological and ethological primate studies is then presented.

As very little systematic work on anthropomorphism has been done, chapter four sets out various considerations thought to be important to the question of anthropomorphism in animal behaviour studies. A definition is given of 'ordinary language terms' which make up the bulk of the descriptive vocabulary of ethological studies. Problems of terminology that have been discussed by primatologists are reviewed. Categories of anthropomorphic terminology are distinguished to give a precise formulation of the nature of the problem tackled herein. Specific arguments that have been given for and against the use of anthropomorphism in animal behaviour studies are presented. The idea that early and classical ethological studies (especially of birds) were specifically anthropomorphic is shown to be a confusion of a subjective approach to the studies with the ascription of human subjective experiences to the animals. It is shown that some primate ethologists felt they should avoid this kind of anthropomorphism in primate studies. The new subdiscipline of cognitive ethology which proposes studies of mental experiences in animals is briefly described and some concepts of subjective awareness in animals and man are reviewed.

Chapter five discusses the characteristics of language use that give rise to anthropomorphism in qualitative (ordinary language) description of behaviour. Four levels of terminology are distinguished and the first two, behaviour units and behaviour categories, are discussed in detail.

Anthropomorphism is identified as occurring at the level of behaviour categories. The notions of 'behaviour' (movement) and 'action' (meaningful or purposeful movement) are distinguished with a view to characterizing anthropomorphism as the description of animal action. As the definition of terms is fundamental to a primatologist's field study, philosophical aspects of definition are considered in order to identify the kind and methods of definition that are employed. An example is given of a definition of the term 'threat' in a field study. It is shown that definition does not control the meanings that are attributed to ordinary language terms in behaviour reports. The concept of metaphor is introduced and it is shown how metaphor provides a means by which generic anthropomorphism is introduced into the description of behaviour. It is noted that quantitative description does not provide a means by which to avoid anthropomorphism as it cannot serve as a replacement for qualitative description. It is indeed a kind of qualitative description, the quality emphasized being that of number, or mathematical relationship.

Part Two addresses the question of how anthropomorphism arises in Japanese primate studies. The intellectual history of the Japanese is important to the study as it is maintained that aspects of traditional Japanese thought affect their approach to primatology. Chapter six outlines the physical and geographical characteristics of the Japanese macaque (Macaca fuscata), the background to Japanese primate ethology and the early methodological and theoretical differences that were noted between Japanese and Western studies. Evidence for the acceptability of anthropomorphic terminology to Japanese primatologists is introduced and comments by Westerners on anthropomorphism in Japanese studies are given. The case for the influence of elements of traditional Japanese philosophy on anthropomorphic description is introduced.

Chapter seven introduces the Japanese intellectual heritage by giving an historical perspective to intellectual events relevant to this study. The development of the Japanese written language is traced. It is shown how the language reflects an emotional and intuitive view of the world and has steered the development of analytical thought in Japan. Aspects of the traditional Japanese view of nature as recorded in Shintō, Buddhist and Confucian writings are presented. The introduction of Western philosophy after Japan's period of isolation (after the 1850's) is briefly outlined. Some of the ideas of Nishida Kitarō (1870-1945) are related and in particular the effect of the traditional absence of the mind/body dichotomy in Japanese thinking is discussed.

Chapter eight presents the intellectual trends of Tokugawa Japan (1603-1867) in which the beginnings of a formalized Japanese natural science are embodied. Natural science developed within the philosophical framework of Chu Hsi Neo-Confucianism, imported from China. Chu Hsi Neo-Confucianism was adopted as state orthodoxy by the Tokugawa government and its moral precepts were the ethical foundation of that regime. The chapter reveals both the evolution of the moral concept of a natural order, to which the Japanese looked as the embodiment of the 'Japanese spirit' and discusses how Western science was understood by the Japanese within the Neo-Confucian framework. The stage is then set for the large-scale importation of Western science in the subsequent Meiji period.

Chapter nine presents evidence for the argument that many Japanese scientists retained their own philosophy or outlook on nature in spite of the acquisition of Western science and technology. The circumstances surrounding the decision to import Western science, the course of its assimilation, how it was understood after the Meiji Restoration and the

consequent development of scientific institutions in Japan are presented. The introduction and progress of evolutionary theory in Japan is discussed.

Chapter ten is an analysis of the methodology and philosophy of the Japanese approach to primate ethology. The origins and development of this approach are examined with respect to the features of provisionization, individual identification and long-term observation. The place of experimental method in Japanese studies is discussed, as well as the origins of the study of 'personality' and 'culture'. The development of Imanishi Kinji's natural philosophy is outlined and information about the study of monkey culture is derived from a paper written by him (Imanishi, 1957c), here translated for the first time from the Japanese. The existence of a fourth aspect of the Japanese methodology, the kyokan or 'feel-one' method, is introduced to Western readership for the first time in a translation from Kawai Masao's (1969) Nihonzaru no Seitai (Life of Japanese Monkeys). The basis for anthropomorphic description in the study of culture and personality in monkeys and in the traditional Japanese view of nature as expressed in the kyokan method is discussed.

Chapter eleven summarizes the course of the study and discusses what conclusions may be drawn.

PART ONE

ANTHROPOMORPHISM IN WESTERN PRIMATE STUDIES

CHAPTER TWO

THE WESTERN INTELLECTUAL HERITAGE

2.1 Introduction: Relations Between Man and Animals

The Western conception of animals is ultimately bound up with the Christian heritage which posits a qualitative separation between man and animals. The distinction was fundamental to the moral foundation of Christian dogma in which man, unlike animals, must live according to certain rules to ensure salvation of his soul. Contemporary animal behaviourists are not so concerned as were their predecessors to make their observations accord with religious dogma. However, a continuing effect of the assumption of the uniqueness of man in the possession of various qualities is revealed in the self-consciousness about implying the existence of 'human' characteristics in animals in a serious (scientific) discussion of them.

This chapter presents a very brief sketch of prevailing attitudes of educated people to animals from the seventeenth to the nineteenth century to illustrate the profound effect of Christian dogma on arguments for the separateness of man and animals. To choose the seventeenth century as a starting point is not to say that ideas of thinkers prior to that time have had less influence on contemporary attitudes to animals. However, it marks the time of a rebirth of confidence in the study of nature. Francis Bacon (1561-1626) was important to the movement in scientific deism in which nature was no longer associated with Satan, but with God's

wondrous works (Willey, 1934).

Attitudes to animals during the seventeenth to nineteenth centuries are revealed in scientific, literary and political writings or social commentaries. A characteristic of those writings is discussion that centred around the question of the nature of man: Was man uniquely blessed with an immortal soul and reason? Should man be humane to animals by virtue of being in a superior position to them as vicegerents or stewards of God (Hartley, 1749) or should he be kind for the sake of his own morality? Could, on the other hand, no account be taken of animals except as they are useful to man? Allied to questions about the uniqueness of man was whether certain aspects of him were unnatural or rather supernatural. By virtue of his intellect, man was able to change what nature had done and to do things that nature could not do. However, David Hume (1711-1776) and others after him (for example, T.H. Huxley (1894)) showed that the apparent supernaturalness of man's power of reason was in fact very much part of the rest of nature and subject to its laws.

Arguments for the equality of animals and man were considered a threat to the moral foundations of society. For man to undergo the tribulations of a moral life that was so different from the lives of all other living creatures he saw, man must think himself different, preferably exalted. As long as man was the only creature in possession of a soul and hence a chance for immortality, he had reason to obey the ascetic dictates of religion. In the seventeenth century, the theriophiles (admirers of animals) (Boas, 1933) argued for the equality and in some cases superiority of animals over man. The most important attack on theriophily was made by René Descartes (1596-1650). The preoccupation with religious and philosophical problems continued into the eighteenth century, but what

lay behind the writings on animal souls and reason was comment on man. Through philosophical discussion ostensibly of animals, some writers found a means of attacking the doctrines of Church and government and the smugness and vanity of mankind. The conception of the general scheme of things described as the 'Chain of Being', originating in Plato (Lovejoy, 1936), profoundly affected eighteenth century ideas of evolution, especially through the ideas of 'continuity' (i.e., in natural history, the idea that all organisms can be arranged in one ascending sequence of forms) and 'plenitude' (i.e., in the universe, the range of conceivable diversity of kinds of living things is exhaustively exemplified and no genuine potentiality of being can remain unfulfilled) (Lovejoy, 1936, pp. 56 & 52). The principle of plenitude gave rise to a completely static view of evolution. The principle of continuity (for those who considered 'species' as real and not pseudo-entities) led to a search for the apparently missing links in the Chain, especially near the bottom of the scale, between vegetable and mineral matter, and nearer the top, between man and the 'higher' apes.

The first half of the nineteenth century witnessed a rebirth of scientific deism in the form of natural theology. Paley's (1802) Natural Theology and the Bridgewater Treatises (1833-40) were two of the greatest monuments to natural theology. In the middle of the century, however, publication of Darwin's (1859) Origin of Species re-opened the old debates between theologians and scientists. Darwin presented a radically different concept of evolution from that of the eighteenth century. Replacing the divine Originator by a materialistic mechanism, natural selection, to explain the formation of species was offensive to some, though Darwinian evolution could be reconciled with the existence of God. The real problem with Darwin's theory so far as theologians were concerned, was that

it made man part of the evolutionary stream of all organisms; he became just another animal. These trends in Western thought of the seventeenth to nineteenth centuries are expanded below.

2.2 The Seventeenth Century: Scientific Deism and Theriophily

The idea that study of nature was not at odds with Christian dogma, but instead provided evidence for the Creator's wisdom, was called scientific deism. Thus, for instance, Topsell's (1607) collection of animal descriptions in The History of Four-Footed Beasts and Serpents was described as relating "...the true and lively figure of every beast", or the study of things as they are in nature, and as revealing "the wonderful work of God in their creation, preservation and destruction". The book is basically an encyclopedia of what was known about mammals and reptiles in Topsell's day, including Conrad Gesner's writings and additional items from Aristotle, Pliny, Ovid and various other authors. The theme is that nature is not vulgar, but admirable - a work of God. Another example was Swammerdam's (1737-38)¹ The Book of Nature or the History of Insects, which concluded that the instinctive behaviour of ants and social insects gave the appearance of wisdom and that this constituted proof of the existence of God. Probably the best known 'physico-theologian' is John Ray (1627-1705), often considered founder of modern botany and zoology (Willey, 1940). In his Wisdom of God in the Creation (1691) nature was to be contemplated as the product of divine wisdom and benevolence.

Much of the earlier, particularly fanciful, descriptions of animals such as are found in Topsell's collection, made a moral point about human conduct. In another vein, a group called the primitivists looked to pre-civilized man as exemplars of human conduct. Savages were thought to be

1 First published in 1737-38, but written before 1680 (Boas, 1933).

more natural and hence superior to civilized man. As Passmore (1974) has pointed out, the idea that as nature exists only for the sake of man, man is free to deal with it as he pleases stemmed from Greek influence which led some people to think of nature as nothing but a system of resources and man's relationship to it as not subject to moral censure. This does not constitute the entire Western tradition, however, as shown by Genesis which says that the world was good before man was created and it exists to glorify God rather than to serve man. A group within the primitivists espoused the idea that animals, like savages, are more natural than man and hence man's superior. That idea was called theriophily (Boas, 1933) and it challenged the assumptions of the superiority of man over animals. The objection advanced against using animals as models for human conduct was that beasts lack reason. The theriophiles countered this in two ways. Some took the anti-intellectualist view that reason was a curse, not a blessing, and thus animals were better off than humans anyway. Others claimed that beasts do have reason and their arguments took one of three forms: (i) the reason of animals is different from and inferior to that of man, (ii) animals' reason is as good as that of man, and (iii) animals' reason is superior to that of man. Species such as bees and ants loomed large as exemplars of rationality. J. Wilde (1615), for instance, wrote that man derived statesmanship from the ants. The main preoccupation of most theriophiles, however, was to show that the intrinsic greatness of animals lay in their closeness to nature, not in their reason. Pierre Charron (1541-1603), who was the most prominent theriophilist in the early seventeenth century, equated the ways of nature with the ways of God (Boas, 1933). Charron was a disciple of Montaigne (1580) who had used theriophily in his literary essays as a satirical tool by which to attack the prevailing

smug opinion about mankind. Theriophily provided a means for putting man in his place. It was not a serious philosophy for him, though his contemporaries and followers apparently did not realize this (Boas, 1933; Hastings, 1936).

The Church, on the other hand, taught that beasts are inferior to man. They lack an immortal soul, reason, language, sentiment and an appreciation of beauty. They deserve neither reward nor punishment. The challenge presented by theriophily was taken seriously by the churchmen and it was feared in both England and France that if the distinction between man and animals was not maintained, the foundations of morality would be weakened (Boas, 1933; Hastings, 1936).

The most important attack on the theriophiles was made by Descartes (1637). Descartes treated human behaviour so far as is possible in purely mechanistic terms and insisted that except for the power of reason, everything which the body does could be explained as the action of a machine. Thus, if he could show that animals do not reason, he could reduce them to the mechanical level. Descartes revealed why he went to the trouble to make a distinction between man and animals:

"... after the error of those who deny the existence of God ... there is none that is more powerful in leading feeble minds astray ... than the supposition that the soul of brutes is of the same nature with our own; and consequently that after this life, we have nothing to hope for or fear, more than flies or ants; in place of which, when we know how far they differ we much better comprehend the reasons which establish that the soul is of a nature wholly independent of the body, and that consequently it is not liable to die with the latter, and finally, because no other causes are observed capable of destroying it, we are naturally led thence to judge that it is immortal" (Concl. paragraph of Method, Pt. V, quoted in Boas, 1933, pp.84-5).

Two points raised by Descartes were that (i) rational beings must be able to communicate their thoughts and (ii) a rational soul must be

immortal. The second point made the Cartesian position seem so important a support to Christianity, and Cartesianism gained support, though Descartes's theory of animal mechanism received a host of objections. The theriophiles debated especially the first point, attempting to show that animals can and do communicate their thoughts.

Thus, the seventeenth century presented two views of animals. One placed man above the beasts, saying only man possessed a soul and reason. The other considered animals equal or superior to man, though this was often used as literary satire. Hastings (1936) considers that on the whole, the seventeenth century was theological in its thinking and considered the supremacy of man over the rest of Creation an important fact (p.14). In the eighteenth century, a new attitude was adopted toward theriophily. It became no longer so much a matter of literary satire as of biological theory, becoming fused with the question of whether or not animals have souls.

2.3 The Eighteenth Century: Introduction

During the eighteenth century, several aspects of the relation of man to animals became defined for discussion. At the beginning of the century, the stage was still being prepared for unself-conscious study of nature. Bacon's partial reconciliation of religion and science was urged through the Stoics' 'natural religion' and their appeal to nature as the watchword of morality (Benn, 1908, vol.1). Writers such as Green (1712) essayed to show that science was worthy of rational man to study, but he did not want to interfere with religious teachings.

There was general recognition that the point of the man/animal comparison was to increase our understanding of man, not of animals. At least four areas of discussion are apparent. Hastings (1936) outlined three of them as being, (i) the question of the animal soul and its immortality, and the effect of that thinking on theology, (ii) to gauge

how great is the superiority of man over other creatures, and (iii) the rise of a humanitarian attitude to animals. The last was not necessarily for the benefit of animals, however, for it was believed that cruelty to animals was ignoble and a menace to the morality of civilization. A fourth area of discussion that was to bring religion and science into sharp conflict in the next century was evolution. The eighteenth century concept of evolution, however, was very different from the modern concept, being essentially a static notion of a discernible progression from relatively simple forms to more complex forms culminating in man. This was epitomized in the idea of the Great Chain of Being (Lovejoy, 1936). The Chain of Being and the principles of plenitude, continuity and gradation (i.e., rank, or scala naturae according to degree of 'perfection') which underlay this conception attained their widest diffusion and acceptance in the eighteenth century (Lovejoy, 1936). Arising from this was a materialistic view of man as a mere creature in an unbroken progression of increasingly perfect beings. There was less stress on the divine essence in man; instead, his superiority was ascribed to his more perfect physical endowments (Hastings, 1936). It tended generally to make man more sensible of his littleness in the scheme of things (Lovejoy, 1936). The careful scrutiny of apes as being closest to man in the Chain again brought out debate about the essential difference of man.

2.3.1 The Animal Soul

The debate over the presence of a soul or spirit in animals led to comparison of human and animal intellectual and emotional capabilities. Hartley (1749) maintained that the whole brute creation is inferior to man and gave several reasons why. Animals, he said, have proportionately smaller brains than man; the matter of their brains is imperfect in that it is less fitted for retaining a large number of miniatures or impressions

from the senses and combining them by association; animals lack words and such symbols, their powers are instinctive, not learned, and animals are acquainted with far fewer objects than man because external impressions affect man and animals differently.¹

Hartley said that animals have perception, but their motions are conducted by mere mechanism. Because of their lack of symbols, animals have no self-consciousness. Hartley concluded that animals' brains bear a general resemblance to ours, and that their reasonings and affections resemble ours in kind;² however, they differ considerably in particulars and are far less complex.³ This basis for a resemblance of thought foreshadows Priestley's (1777) later argument that due to the similar physical equipment of animals, their thoughts and emotions are similar in kind to those of man. As to man's superiority, Hartley leaves us in no doubt. Man, he said, seems to be in the place of God to animals, to be His vicegerent, and as such we are obliged to be their guardians and benefactors.⁴

Ferguson (1767) sought to show that the superior progression of man over animals is based on the circumstance that man progresses through civilization and builds on others' achievements, whereas animals must work independently. Each animal achieves its own perfection but neither benefits from nor helps other animals. He implied that animals are devoid of human-like emotions, certainly in the sphere of the family in which, he said, there is no parental affection among the beasts (p.24).

Priestley (1777) wrote about the similarity of the spirit in beasts and man. His starting point was that matter and spirit are virtually the

1. D. Hartley (1749) Vol. 1, Sec. VII. 'Of the Intellectual Faculties of Brutes', p.404.

2. David Hume (1739) had concluded that higher animals use the same principles of intelligence that man uses.

3. Hartley (1749), p.414.

4. Hartley (1749), p.415.

same thing. He removed from matter its supposed sluggishness and solidity so that the distinction between matter and spirit was not important. He claimed that matter is not inert or impenetrable but something held together by the forces of attraction and repulsion (p.347). He denied the existence of a separate immaterial soul. Thought and sensation for Priestley were found only in connection with an organized system of matter, and the brain is the seat of thought. Priestley's argument was that animals have the same inlets to ideas as man; that is, the same external senses of eyes, ears, nose and mouth, and although they lack the same quantity of brain, they must have in kind every faculty that man possesses. Thus, for Priestley animals possessed memory, passions, will, judgement and abstraction. He claimed abstraction as it is only a species of the association of ideas (which in general animals possess) (p.238). He gave as an example of an animal's ability for abstraction, the dog's ability to generalize in distinguishing all hares from all partridges (p.239). (Though how we know the dog can do this is not explained by Priestley).

As in the previous century, the discussion found its way into satirical writings and was used as a means of criticizing government, human vanity or various social ills. La Mettrie (1748) wrote ironically putting beasts on an equal footing with man. He argued that Descartes's (1637) theory of animal mechanism must include man as he is physically similar to some animals. He gave a cynical account in which satyrs and orang-utans are referred to as wild men (hommes sauvages). Ultimately, La Mettrie does not seriously put beasts on the same level as man, though his contemporaries apparently did not realize that he was being ironical (as was the case with Montaigne in the sixteenth century). La Mettrie was actually trying to separate theology from science and prod at human vanity to clear the way for discussion of the possibility of a relationship between man and the apes (Hastings, 1936).

In 1792, T. Taylor's A Vindication of the Rights of Brutes was published in reply to Mary Wollstonecraft's (1790) A Vindication of the Rights of Men and (1792) A Vindication of the Rights of Woman and to Thomas Paine's (1791) Rights of Man. Although Taylor's book is explicitly ironical and written tongue-in-cheek, he nevertheless presented an interesting thesis as to the basis for equality between man and animals. Wollstonecraft and Paine argued that all men are equal. Taylor thought their works to be an oversimplification of the nature of man. His starting point was the assumption that animals also have reason. It is imperfect in most, but not entirely absent in any. He thus accepted reason as higher in man than in animals, but made an equation of the whole man and the whole animal. Thus, man's strength is less than that of the lion, his eye is inferior to that of the fly and he lacks the bird's art of flying. However, the sum total of man's reason minus those gifts is equal to the sum total of the beasts' gifts plus their lesser reason. He argued basically for the equality of the intrinsic worth of all created things. On the matter of animals' souls, he said that fables indicate that their souls are like that of man:

"... Fables indicate that brute animals accord with mankind in the nature of soul, when they affirm that through the indignation of the gods, human souls pass into the bodies of brutes; and that, when thus transmigrated, they excite the pity of the divinities, thus signifying ... that all animals are endued with reason, which, though imperfect in most of the brutal kind, is not entirely wanting in any" (pp.28-29).

Taylor's reductio ad absurdum came when he suggested the demonstration of the equality of vegetable and mineral matter and of even the soil to man. After their equality was accepted, he said, government could be abolished and all things everywhere and in every respect would be common to all. On behalf of humanitarian treatment of animals, Taylor said that if animals have reason and communicate among themselves, man could learn their language. If he established a relationship with the animals,

his attitude toward them would change and he would not eat them.

There were several pleas against eating animals during the eighteenth century and one already mentioned was Hartley's (1749) view that man should be a benefactor to animals by virtue of his superiority to them. The opposing view, of animals' equality with man, gave rise to the same sentiment. This change of attitude to animals culminated in France in 1804 with the organization of a society for the prevention of cruelty to animals (Hastings, 1936).

2.3.2 Eighteenth Century Concepts of Evolution

Leibniz (1646-1716) had written in 1693, it is "worthy of belief that ... even the species of animals have many times been transformed" (quoted in Lovejoy, 1936, p.256). The years after 1745 saw the birth of evolutionism. The idea that all present species are derived from a small number, or perhaps a single pair, of original ancestors was stated more and more boldly by various eighteenth century writers such as Maupertuis, Robinet, Diderot, Bonnet and Erasmus Darwin (Lovejoy, 1936). Most of the authors were philosophers, however, and there was little effort, nor the required knowledge, to substantiate the idea. Buffon (1707-1788), however, one of the foremost naturalists of his day, did have empirical data to bring to his theories about evolution. He showed the unity of type and homology of structure in diverse species. Although some authors have considered him a founder of the theory of evolution (for example, Guy  not, 1941), others think that Buffon's statements in his Histoire naturelle should be treated with caution (Lovejoy, 1936, 1959; Mayr, 1976). He was, for instance, an adherent of the principle of plenitude according to which any type of organism that is conceivable must exist and organisms must form a complete continuum without borders or gaps. Nature reveals many gaps between species and higher taxa, but this had to be overlooked or ignored by Buffon.

Others, for instance, Landrieu (1909) and Mayr (1976), are of the opinion that Lamarck (1744-1829) has a better claim as founder of the theory of evolution. Lamarck's ideas in his Philosophie zoologique (1809) (the only work of Lamarck translated into English in 1914), the 'Discours d'ouverture' (1907) and the Histoire naturelle des Animaux sans Vertèbres (1815) reveal a mixture of the eighteenth century idea of static evolutionism and a beginning of the modern idea of genuine evolutionary change (or genetic transformation in modern terms) (Mayr, 1976).

In order to understand the eighteenth century idea of evolution it is useful to discuss its philosophical basis, essentialism. Essentialism, or in Mayr's (1976) terms, typological thinking, had its roots in Plato's concept of the eidos. According to Plato's allegory, we see reality only indirectly, like shadows on a cave wall, while the real nature of things, the essence of the scholastics, can be inferred only indirectly. Because of the central importance of essence for this philosophy, Karl Popper (1945) called it essentialism (Mayr, 1976). Mayr explains typological thinking at some length as he feels that it was logically impossible for typologists to believe the modern theory of evolution in which change is gradual rather than proceeding in jumps (saltation) and constitutes a real change in the organism rather than merely an outward change in appearance while the essence of the organism remains the same. Most eighteenth century evolutionists were typologists (essentialists). Mayr (1976) wrote:

"Typological thinking no doubt had its roots in the earliest efforts of primitive man to classify the bewildering diversity of nature into categories. The eidos of Plato is the formal philosophical codification of this form of thinking. According to it, there are a limited number of fixed, unchangeable 'ideas' underlying the observed variability, with the eidos (idea) being the only thing that is fixed and real, while the observed variability has no more reality than the shadows of an object on a cave wall, as it is stated in Plato's allegory. The discontinuities between these natural 'ideas' (types), it was believed,

account for the frequency of gaps in nature. Most of the great philosophers of the 17th, 18th and 19th centuries were influenced by the idealistic philosophy of Plato, and the thinking of this school dominated the thinking of the period. Since there is no gradation between types, gradual evolution is basically a logical impossibility for the typologist. Evolution, if it occurs at all, has to proceed in steps or jumps" (p.27).

He goes on to explain the opposing view, population thinking, in which the essence of individuals is considered an abstraction, not the reality, and on the basis of which the modern idea of gradual and real evolution is founded. Mayr (1976) continued:

"The assumptions of population thinking are diametrically opposed to those of the typologist. The populationist stresses the uniqueness of everything in the organic world. What is true for the human species - that no two individuals are alike - is equally true for all other species of animals and plants. ... All organisms and organic phenomena are composed of unique features and can be described collectively only in statistical terms. ... Averages are merely statistical abstractions; only the individuals of which the population are composed have reality. ... For the typologist, the type (eidos) is real and the variation an illusion, while for the populationist the type (average) is an abstraction and only the variation is real" (pp.27-28).

This distinction is fundamental to the change in man's conception of himself that was to occur with the acceptance of Darwinian evolution.

Mayr (1976) goes as far as to say,

"The replacement of typological (essentialistic) thinking by population thinking was perhaps the most important conceptual revolution in the history of biology" (p.12).

Three ideas stemming from Plato and Aristotle combine to result in a conception of the universe designated as the Great Chain of Being: viz., "the principle of the completeness of the existing world (and of the underlying ideas), the principle of the qualitative continuity of the series of forms of natural existence, and the principle of a unilinear ascending

order of excellence" (Mayr, 1976). Lovejoy (1936) refers to these respectively as the principles of plenitude, continuity and gradation. The Chain of Being referred to the hierarchy in the organic world with the simplest organisms at the bottom and so on up the 'ladder' of increasingly complex animals culminating in man, the most perfect organism on earth. Pope (1787) referred to it in his Essay on Man as "an order and gradation in sensual and mental faculties and the subordination of creature to creature and of all creatures to man". In the eighteenth century, the Chain of Being as a scala naturae was combined with the idea that organisms do change, in outward appearance at least, becoming more perfect as they make their way up the ladder. Eighteenth century 'evolution' was virtually exclusively employed in the context of embryology, to designate the unfolding of immanent qualities. It was ordinarily applied to the embryogenesis of an individual, but came to be increasingly employed, in a somewhat metaphorical manner, to designate the 'evolution' of the type (Mayr, 1976). The original application of evolution in this context was in the sense of an unfolding of pre-existent inherent characters of a species. The development of the individual from the egg to adulthood showed that there could be an unfolding of pre-existing potentialities without any change in the essence of the type. Leibniz had written:

"...if maggots can become flies and caterpillars butterflies, why cannot one species transform into another without any change in its essence, provided it was inherent in its essence to undergo such a change?" (quoted in Mayr, 1976, p.262).

Thus, eighteenth century evolutionary change was not real change, but merely a revelation, an emergence of something 'folded in'. The problem of the gaps seen in the known organic series had troubled believers in the 'fulness' and continuity of the creation. This was solved by a temporalizing of the Chain of Being in which it was said that all that existed now did not constitute the entire inventory of nature (as the

principle of plenitude held) but only part of the whole programme which is being carried out gradually and slowly in cosmic history. Thus, "while all the possibles demand realization they are not all accorded it at once" and "it is only of the universe in its entire temporal span that the principle of plenitude holds good" (Lovejoy, 1936, p.244). The century's directionism (evolutionism) may be described as an attempt to fuse the concept of a temporalized scala naturae with the concept of the unfolding ('evolutio') of the immanent potentialities of an archetype (Mayr, 1976). This implied that the appearance of a type would change, but not its underlying essence. Lovejoy (1936) pointed out that in the 'scale of nature' there was no trace of what a modern writer would call evolutionary thinking. Rather, the Chain of Being "was a perfect example of an absolutely rigid and static scheme of things" (ibid., p.242).

2.3.3 Apes and Man

Ideas about animals took on a new complexion in the intellectual environment of the scala naturae, essentialism and evolutionism and the apes became a focus for attention. The theory of the Chain of Being, speculative though it was, had a profound effect upon natural history in this period. In the previous century, the first historian of the Royal Society, Thomas Sprat, had written that the Society's general programme was "to discover unknown facts of nature in order to range them properly in their places in the Chain of Being, and at the same time to make this knowledge useful to man" (Lovejoy, 1936, p.232). This theme is continued in Diderot (1751-65) in the Encyclopédie in which he said, "(Since) everything in nature is linked together, (since) beings are connected with one another by a chain of which we perceive some parts as continuous, though in the greater number of points the continuity escapes us, (the) art of

the philosopher consists in adding new links to the separated parts, in order to reduce the distance between them as much as possible" (quoted in Lovejoy, 1936, p.232). There was thus a search for organisms not yet observed that would fill these gaps, especially near the bottom of it, and in the interval between man and the higher apes. As Hastings (1936) has remarked, "It was not a new thing ... when writers of the eighteenth century compared the ape to man and vice versa. It was, however, a much more serious comparison than it had been before" (p.109). It became the task of science to increase the rapprochement of man and ape (Lovejoy, 1936). Writers such as Rousseau (1755) and Lord Monboddo (1774) asserted that man and the higher apes (orang-utan or chimpanzee) were of the same species. Bonnet (1781)¹, though a theologian as well as a naturalist, thought that man and ape were probably the same species.

This was not, however, the modern idea of species. The concept of species underwent a change during the eighteenth century. In the early part of the century there was a tendency to assume there were sharp divisions among natural objects, especially among living beings. To range animals and plants in well-defined species, presumably corresponding to the distinctness of the Eternal Ideas (essences) of Plato, was the first business of biologists. Though these classifications were avowedly 'artificial', there was the belief that there really are 'natural species', established by the Creator (Lovejoy, 1936). Natural species were, as has been discussed, fixed species. The principle of continuity, however, tended to the opposite conclusion. If one type of animal graded into the next in the scala naturae, any boundaries between them implied by 'species' were arbitrary and artificial. Bonnet (1769)² had concluded there are no

1 Bonnet (1764). Added to the 1781 edition.

2 Second edition of Bonnet (1764), I.

such things as species. Thus, these writers conceived of men and apes as very similar in 'plan' or 'type'. Bonnet (1781)¹ observed that when the mind or body of the orang-utan is compared with that of man, "we are astonished to see how slight and how few are the differences, and how manifold and how marked are the resemblances" (Lovejoy, 1936, p.235).

There were equally writers who objected to considering apes and monkeys as men. Their arguments bring the discussion again to the ascription of soul to man as his distinguishing characteristic, but it is now a different kind of soul. D. Home (1775) stated categorically that a monkey is not a man. J.H. Fabre (1785) maintained that the difference between man and animals is in his sense and soul. Buffon (1749-1803) claimed that something spiritual distinguishes man from beast. It was F. Cuvier (1811) who actually explained what to him was the nature of the soul or spirit that distinguished man from other animals. In his description of the orang-utan Cuvier stated that the superiority of man is explained by his brain. He said that man has a greater faculty of understanding; that one may be forced to call that more perfect understanding the 'soul' to denote the indefinable point of essential superiority in mankind. One does not need, he said, to define man's superiority with philosophical or theological blunderbuss, or the maligning of beasts. Thus, the soul is not in this sense an immortal, divine essence that can be saved or damned, but a term for an as yet undefined part of man's mental faculty.

Although the eighteenth century was willing to ascribe to animals memory, some ability to feel emotion, and the capacity to associate ideas, animals' abilities were cruder than those of man because of their simpler mentality. The century on the whole retained man's superiority over animals.

1 An edition of Bonnet (1764), III, ch. 30.

2.4 The Nineteenth Century: Natural Theology

In the nineteenth century, the acrimonious debate between theologians and scientists about the nature and destiny of man seemed to have practically disappeared until publication of Darwin's Origin of Species in 1859. The first half of the century witnessed the greatest flowering of natural theology in Great Britain (Gillispie, 1951; Mayr, 1976). Virtually all British scientists ostensibly accepted the Christian conception of a Creator responsible for the phenomena observed in nature. Symptomatic of this were William Paley's (1802) Natural Theology and the Bridgewater Treatises (1833-40). The effectuation of the latter was the responsibility of The Royal Society. Francis Henry Egerton (1756-1829), eighth Earl of Bridgewater, left eight thousand pounds at the disposal of the president of The Royal Society (then Mr. Davies Gilbert). According to the will, the money was to be paid to the author or authors who might be selected to write and publish one thousand copies of a treatise "On the Power, Wisdom and Goodness of God, as Manifested in the Creation". Eight people were selected, each to undertake a branch of this subject¹ and each to receive one thousand pounds as his reward.

1 The Bridgewater Treatises were comprised of the following works:

- i. The Adaptation of External Nature to the Moral and Intellectual Condition of Man, by Thomas Chalmers, D.D.
- ii. The Adaptation of External Nature to the Physical Condition of Man, by John Kidd, M.D.
- iii. Astronomy and General Physics considered with reference to Natural Theology, by William Whewell, D.D.
- iv. The Hand, its Mechanism and Vital Endowments as evincing Design, by Sir Charles Bell.
- v. Animal and Vegetable Physiology considered with reference to Natural Theology, by Peter Mark Roget
- vi. Geology and Mineralogy considered with reference to Natural Theology, by William Buckland, D.D.
- vii. The Habits and Instincts of Animals with reference to Natural Theology, by William Kirby.
- viii. Chemistry, Meteorology, and the Function of Digestion, considered with reference to Natural Theology, by William Prout, M.D.

Another example of the ubiquity of natural theology was the reaction to publication of R. Chamber's (1844) Vestiges of the Natural History of Creation (published anonymously). His daring to replace direct intervention of the Creator by the action of secondary causes (natural laws) was roundly condemned (Mayr, 1976). Most reviewers of the book were horrified that he had "annulled all distinction between physical and moral", and that he had degraded man by ranking him as a descendant of the apes and by interpreting the universe as "the progression and development of a rank, unbending, and degrading materialism" (Sedgwick, 1845; Gillispie, 1951; Mayr, 1976).

Natural theology pervades Lyell's (1835) Principles of Geology. For example, after discussing various instincts in breeds of dogs, such as pointing and retrieving, Lyell (1835) stated:

"When such remarkable habits appear in races of this species, we may reasonably conjecture that they were given with no other view than for the use of man and the preservation of the dog which thus obtains protection" (vol.2, p.455).

He further remarked that even though plants and animals that have since been cultivated and domesticated may have been created long before man, "... some of the qualities of particular animals and plants may have been given solely with a view to the connection which, it was foreseen, would exist between them and man" (Lyell, 1835, vol.2, p.456). The subordinate role of animals is here clearly stated.

Louis Agassiz, celebrated zoologist at Harvard University and a teacher of Edward Morse who introduced the theory of evolution to Japan, wrote of the obligations of the naturalist, "Our task is ... complete as soon as we have proved His existence" (Agassiz, 1857, p.132). As Mayr (1976) points out, Agassiz's (1857) Essay on Classification was another Bridgewater treatise in which the relationship of animal species provided an elaborate demonstration of God's existence.

2.4.1 Darwinian Evolution

Those who accepted Darwinian evolution inevitably clashed again with the theologians and those who believed in catastrophism. Darwin postulated a new (and haphazard) mechanism for evolution - natural selection. This was a purely mechanistic explanation which replaced what had been evidence for divine 'design' in nature.

The chief objections to pre-Darwinian evolutionary theories were based partly on the assumption of a short geological time span which did not allow gradual evolution time to operate, and partly on the speculative nature of explanations for how the process worked (Burrow, 1968). Lamarck (1809) had proposed that new needs of an organism somehow gave rise to new organs, which were then transmitted to offspring. Darwin's explanation rested on the occurrence of variations in the offspring. Though the explanation of these variations was a mystery without knowledge of genetics, they were at least readily observable, whereas the acquisition of new organs by mature organisms and their inheritance by the next generation were not (though Darwin did not repudiate Lamarckism entirely) (Burrow, 1968).

Various observations of early evolutionists, however, did influence Darwin's thought, as did observations in other fields. It was already known that artificial selection of domestic plants and animals revealed enormous, but largely hidden, variability within a single species. This could be manifested by selecting and breeding from particular individuals. Embryonic changes had been noted: for instance, the development of a tadpole into a frog, or a larva into a butterfly, as well as the way in which embryonic forms of widely diverse forms resembled each other in the early stages. Erasmus Darwin (1794) had noted vestigial organs which seemed to have once served a purpose but now served none, suggesting that

the modern species might be radically different from an ancestral one to which such an organ had been useful. He had also mentioned the struggle for existence and competition for females which Charles Darwin called 'sexual selection' as among the factors promoting evolution. Lastly, the fossil record provided indisputable evidence for the extinction of species.

Two further observations greatly influenced Darwin. He took with him on the H.M.S. Beagle the newly published Principles of Geology by Lyell (1835). Lyell's great achievement was to explain the past history of geological formations in terms of processes such as erosion, sedimentation and volcanic activity which can be observed at the present time. If accepted, the principle of 'uniformitarianism' greatly extended the age of the earth, making gradual evolution a plausible idea. Geological uniformitarianism also provided an example of explaining the past in terms of contemporary processes which was the way in which Darwin was to explain biological evolution (Maynard Smith, 1975).

The second great influence on the formulation of Darwin's theory was T.R. Malthus's (1798) Essay on Population. Malthus contended that population growth will always tend to outrun food supply unless the former is checked by war, famine, disease or voluntary restraint. The observation that animal and plant species, including the human species, are capable of indefinite increase in numbers under optimal conditions played a vital part in Darwin's thinking. Maynard Smith (1975) suggests that a further influence on Darwin was the social environment of competitive capitalism in which he lived. He saw some firms improving techniques and increasing in size, while others went bankrupt. Maynard Smith (1975) observed: "It is unlikely that the concepts of competition and the struggle for existence in nature would have occurred to him so readily had he lived in a more static feudal society" (p.32).

On his voyage, Darwin had wondered why closely allied animals replaced one another as they travelled southwards. The more closely different species

resembled each other in adjacent areas or in different epochs in the same area, the more likely it seemed that those species might share a common ancestor and not be products of separate creations. In 1837 he began to keep notes on the 'transmutation of species' and he had probably become convinced of the mutability of species by then (Burrow, 1968).

Darwin thought that the cause of change in species lay in reproduction, in heritable variations, rather than in spontaneous changes in the adult organism. The explanation he developed was natural selection of favourable, randomly occurring variations in offspring. Malthus had provided the idea that members of a species increase indefinitely in numbers under optimal conditions. Since animal and plant numbers do not in fact increase indefinitely in nature, it follows that, for whatever reasons, not all individuals reproduce successfully. Further, not all individuals of a species are alike. Some of the differences between them will affect their chances of survival and their fertility. In nature, those individuals best fitted to survive in a given environment will be selected as parents. This is the process of natural selection. A further observation is that offspring tend to resemble their parents. In so far as this is true, the better adapted individuals in each generation which survive and leave most offspring will tend to transmit to their progeny those characters by virtue of which they are adapted. Thus, by the combined processes of natural selection and of inheritance, the adaptation of the population to its environment is constantly perfected, or is constantly adjusted to a changing environment (Maynard Smith, 1975).

Considered in its entirety, Darwin's theory of evolution was quite different from the evolutionism of previous writers. He replaced the static world of creationism with a dynamic world of evolution. He argued against the fixity of species and presented evidence for the common descent of species, or their mutability. Instead of postulating an evolution toward

betterment or perfection (as in the Chain of Being), he merely postulated change. He reminded himself especially not to use the terms 'higher' and 'lower' when referring to species (Burrow, 1968; Mayr, 1976). The explanation for the formation of species through natural selection of favourable, randomly occurring variations in offspring replaced the role of Creator, or at least pushed His influence much further back. Another effect of Darwinian theory was that man was made part of the evolutionary stream of all organisms, thus abolishing his anthropocentrism. Although most anti-Darwinian arguments centred on returning (or maintaining) a Creator's determining role in nature, the passions that were excited are symptomatic of deep concern over man's 'degradation'. In other words, it was not readily accepted that man is just another animal.

2.5 Summary

It is evident that out of the Western Christian heritage there developed an assumption of a separateness between animals and man. The distinction between them was a moral question and Western science has clashed or compromised with Christian dogma throughout its history. Hastings (1936) has remarked that most of the philosophical problems regarding man and animals which occupied the eighteenth century mind are unsolved even today. In particular, "Men have continued observing and questioning the intelligence and the instinct of animals and indicating the analogies to human behaviour" (p.17).

Modern science has also inherited the Cartesian system that followed from Descartes and presented two parallel but independent worlds, that of mind and that of matter, each of which can be studied without reference to the other. Bertrand Russell (1961b) has remarked that the philosophy of Descartes brought to completion, or very nearly so, the dualism of mind

and matter which began with Plato and was developed, largely for religious reasons, by Christian philosophy (pp.550-51). The inheritance of the Cartesian system and the presupposition of a basic distinction between man and other animals have contributed to the West's self-consciousness about anthropomorphism in scientific studies of animal behaviour.

CHAPTER THREE

BACKGROUND TO WESTERN PRIMATE STUDIES

3.1 Introduction

The modern philosophical heritage of Western primate studies is a mixed one, stemming from two opposing intellectual movements. One mode of thought gave rise to comparative psychology, under which studies of primates in America were begun, and the other gave rise to ethology from which European naturalistic animal studies arose. The early development of both comparative psychology and ethology took place in Europe so that there was not, strictly speaking, an American and European 'origin' of these disciplines. Comparative psychology stresses the laboratory investigation of perception and learning in animals and man, and ethology studies the evolution of the relatively stereotyped behaviour patterns of animals in their natural environment. Scientific field study of primates was initiated in America under Robert Yerkes. Although a comparative psychologist, he saw the usefulness of carrying out field research on non-human primates. The field research rested on some of the assumptions of European ethology with stress on the study of the natural habits of animals.

Jaynes (1969) and more recently Thorpe (1979) have traced the separate intellectual heritages for comparative psychology and ethology to the nineteenth century. The two disciplines were based on very different conceptions of what could be compared among species and of how present behaviour had evolved. Jaynes (1969) sets the early beginnings of comparative psychology in Cuvier's camp with his early nineteenth century doctrine of the immutability

of species and catastrophism as an explanation for the variety of species that exist. Any morphological comparisons between species were done, not with a view to tracing how one species had developed from another, or the affinities between species, but with the assumption that organisms had remained unchanged from the forms in which they had been created. These static morphological relationships were revealed in comparative anatomy studies and hence emphasis was on laboratory investigations. Cuvier's contemporary, Etienne Geoffroy-Saint-Hilaire, saw instead the unity of plan in all animal species. His emphasis was on developmental rather than unchanging relationships, or on trends found in nature. Both approaches (which only received their respective modern labels later in the century) have kept these nineteenth century connotations of laboratory studies and emphasis on learned rather than instinctive behaviour in comparative psychology and on naturalistic study of instinctive behaviour with a view to understanding the evolutionary significance of the observed behaviour in ethology (Jaynes, 1969; Thorpe, 1979). The term 'comparative psychology' was first used in its modern sense by Flourens (1864) who coined the term in his book of that title, Psychologie Comparée. Flourens's book was intended "to combine human psychology from the mechanistic, neurological view with animal psychology in the tradition of Cuvier" (Jaynes, 1969). It was at Cuvier's request that Flourens was appointed 'perpetual secretary' to the Académie des Sciences. Flourens was perhaps the effective founder of the modern study of the physiology of the brain and was regarded as a founder of comparative psychology as a result of his brain operations on pigeons (Thorpe, 1979). The responsibility for the modern use of the term 'ethology' rests with Alfred Giard, a marine biologist, who used the term in the 1870's to refer to the study of an organism in relation to its

environment (Jaynes, 1969). The term ethology had been used in this sense earlier by Etienne Geoffroy-Saint-Hilaire and his son Isidore after him, but only with Giard did it become established as a science.

The development of comparative psychology and ethology will be surveyed below. Their general histories have been discussed in more detail in the literature (by Warden, 1927; Tinbergen, 1951; Klopfer & Hailman, 1967; Jaynes, 1969; Beloff, 1973; Thorpe, 1979 and Durant¹, in press) and there are numerous papers on specific aspects of their development.² The rise of primate studies proper will be outlined against this background.

3.2 Development of Comparative Psychology

Comparative psychology today is one of the two main disciplines (the other being ethology) that studies the whole intact organism rather than the working of its parts (Thorpe, 1979)³. Its subject matter is basically the comparison of human and animal 'intelligence' and most of its experimentation involves the testing of perceptual and learning capacities in animals. It has in the past attracted a good deal of criticism for the artificiality of its laboratory experimental situations (for example, puzzle

1 John Durant, 'Innate Characters in Animals and Man: A Perspective on the Origins of Ethology', in press. I am indebted to Dr. Durant of the University College of Swansea for kindly making his manuscript available to me.

2 Substantial studies of theory, methods and results in these disciplines are found, among others, in the following: Dethier & Stellar, 1961; Thorpe, 1963; Manning, 1967; Marler & Hamilton, 1966; Tinbergen, 1969, 1974; Hinde, 1970; P.H. Gray, 1962, 1963a, 1968; Kalikow, 1975, 1976, and Richards, 1974.

3 Thorpe (1979) usually writes simply 'psychology' because even when including studies of animals, the scientists' main task has been to investigate the behavioural capacities of man. He also feels that comparative psychology is (temporarily he hopes) on the wane.

boxes and mazes) which did not take into account either the sensory abilities or usual environment of the animals being tested (Klopfer & Hailman, 1967; Thorpe, 1979). Related to this was the tendency to ignore instinctive behaviour; the experimental animal was treated as a tabula rasa without regard for the fact that existing behavioural tendencies might influence results (Thorpe, 1979). Beach (1950) likewise pointed out that 'learning' for most comparative psychologists embodied the most important problems of human behaviour, and it was these that were tested on animals. With few exceptions, he said, most practitioners had no interest in animal behaviour per se. Comparative psychology has also been criticized for not being truly 'comparative', with most studies made on the rat (Rattus norvegicus) (Beach, 1950) and later, with interest in non-human primates, in focusing again on a single species, the rhesus macaque (Macaca mulatta) (Bramblett, 1976a). Beach (1950) felt that the science had moved from being not truly comparative to comparing animals simply for the sake of comparison and that there was no broad theoretical foundation. Thorpe (1979) too has remarked that comparative psychology seems to have "lost its identity".

In the last century, John Stuart Mill (1843) defined psychology as the science of the "elementary laws of mind". This he formulated in conjunction with ethology which he defined as the "science of building character". Wilhelm Wundt (1832-1920) is usually credited with being the first psychologist (Thorpe, 1979). His two key books were Lehrbuch der Physiologie des Menschen (1865) and Handbuch der Medicinischen Physik (1867). The idea of a comparative psychology arose with the idea of Darwinian evolution in which it was thought that if the body had evolved, so also had the mind. A mental continuum between man and animals was sought (Klopfer & Hailman, 1967; Beloff, 1973). Darwin's The Expression of the

Emotions in Man and Animals (1872) set the foundation for these studies.

The Darwinian theory of evolution gave rise to two lines of inquiry.

One was that of the description of behavioural capacities and characteristics of organisms occupying different positions along the evolutionary continuum, and the other was the laws of mental evolution and the relation between instinctive and learned behaviour. In both either the uniqueness of man or the continuity of man and other animals was emphasized, depending on the theological axe being ground (Klopfer & Hailman, 1967).

By the 1880's many psychologists had become 'comparative' or interested in the differences between the behavioural abilities of man and at least the higher animals (Thorpe, 1979). However, since many felt that their main task was to investigate man's psyche, they tended to treat man as the paradigm and to compare the performance and abilities of animals with his (Thorpe, 1979), which led to the artificiality of their experiments which has been criticized.

G.J. Romanes (1848-1894) was a noted zoologist and a close friend of Darwin. He wrote the first general treatise on comparative psychology (Beloff, 1973; Thorpe, 1979). Although Romanes did not deal directly with mental continuity between man and animals in Animal Intelligence (1882), he drew together the great mass of data on animal behaviour which prepared the ground for debate about the relation of animals to man (Boring, 1950). He also wrote Mental Evolution in Animals (1883) and made a classification of psychological traits that revealed phyletic affinities, allowing one to trace the course of mental evolution (Beloff, 1973). William James's (1890) Principles of Psychology was also important to the founding of comparative psychology (Klopfer & Hailman, 1967).

Romanes's collecting of both scientific and popular accounts of animal behaviour (known as the 'anecdotal method' (Thorpe, 1979)), so irritated

Lloyd Morgan that in 1884 he began an argument in which he raised the following questions: Was it possible to have a true science of comparative psychology? What is the definition of instinct? and What is the nature of consciousness? (Gray, 1963b). To try to avoid the biased interpretations of the anecdotal school he formulated what became known as Morgan's Canon: "In no case may we interpret an action as the outcome of the exercise of a higher psychical faculty, if it can be interpreted as the outcome of the exercise of one which stands lower in the psychological scale " (Introduction to Comparative Psychology, 1894). Lloyd Morgan was thus led into the study of animal mind and instinct and to animal experimentation. He wrote fourteen substantial books and has been considered a founding father of both comparative psychology and ethology (Thorpe, 1979).

Lloyd Morgan in turn appears to have been the stimulus for Thorndike to begin his experiments with cats in puzzle boxes (carried out between 1898 and 1911). Although criticized by Lloyd Morgan for the artificiality of his experiments, Thorndike's book, Animal Intelligence (1911) generated a theory of animal behaviour that was taken up by Watson and used in behaviorism. Another worker who (unintentionally) contributed to the extreme mechanistic interpretation of animal behaviour was the physiologist Jacob von Uexküll (1864-1944). He tried early in his career to find a means to overcome the 'anthropocentric' way of looking at animals (Thorpe, 1979). Even Darwin had described the "despair" of an ant at the destruction of its home (ibid: p.56) and von Uexküll noted that people talked not only of a "bloodthirsty polecat", but also of the "spiritual life of infusoria". He published a paper with two other German physiologists titled 'A proposal for an objective nomenclature in the physiology of the nervous system' (Beer, Bethe & von Uexküll, 1899). In it they suggested substituting, for example, 'photoreception' for 'seeing' and so on. The authors felt this

would avoid unwarranted assumptions about the sensory experience of other animals (Thorpe, 1979). Pavlov refers to this 'Proposal' in his writings on conditioned reflexes (ibid.).

Beloff (1973) has thus distinguished two phases in twentieth century comparative psychology. The early one, carried over from the previous century is the 'mentalistic phase' which explored the nature of the animal mind and elucidated the principles of mental evolution. It stressed the continuity of human and animal consciousness. By the second decade of the century, the second or 'behavioristic phase' had developed. It based its procedure on the assumption that human behaviour could be treated from the same objective viewpoint as animal behaviour. The use of laboratory experiments which emphasized conditioning and trial-and-error learning reflected the influence of behaviorism. It attempted to do away with the intervening variable 'mind' and studied the operational aspects of learning.

Beloff (1973) suggests that ethology arose in America out of comparative psychology as an alternative to the extreme behaviorism of Watson's school. Behaviorism denied any innate tendencies in human activity, whereas the evolutionary framework of ethology implied that we cannot ignore our animal inheritance and that human nature is not infinitely pliable (as the behaviorists believed). Ethology provided a 'new' theory of instinct, different again from that of W. McDougall (1923) which postulated an instinctual basis underlying every major human activity and every principal emotion and sentiment. In ethology, the manifestation of innate tendencies could be modified by the (life) experience of the individual.

As will be discussed later,¹ primate field studies began in the 1920's

¹ Yerkes is considered more fully in section 3.11.5.

in America under Robert Yerkes. Yerkes was not a behaviorist, but one of the last representatives of the mentalistic phase of comparative psychology (Beloff, 1973). He conducted laboratory studies, but also pioneered in sending scientists into the field to study apes in their natural environment.

3.3 Early Development of Ethology

In the seventeenth century, the word 'ethology' denoted the portrayal of character by mimicry and the mimic or actor was called an ethologist. This usage lapsed in the eighteenth century when ethology signified the science of ethics (Thorpe, 1979; Durant, in press). Both definitions now seem to be obsolete. In the nineteenth century, John Stuart Mill (1843) used 'ethology' to mean the "science of building character".

Mill wrote:

"... if we employ the name psychology for the science of the elementary law(s) of mind, ethology will serve to denote the science which determines the kind of character produced in conformities of those general laws, by any set of circumstance, physical and moral. According to this definition, ethology is the science which corresponds to the act of education, in the widest sense of the term, including the formation of national or collective character, as well as individual" (quoted in Thorpe, 1979, p.9).

Mill chose this term as its etymology, from the Greek ethos or 'character', was suitable for this usage (Durant, in press). Ethology as the new science of character, however, was not very successful. It found some favour in America for a few years at the turn of the century, but in Europe it was almost totally ignored (ibid.). Instead, the term was taken up by biologists and used to refer to the branch of biology that studied animals in their natural habitats (Jaynes, 1969).

The earliest seed of this biological usage is found in the eighteenth century in France in the writings of C.G. Le Roy (1723-1789), a nobleman's

gamekeeper. His book, The Intelligence and Affectability of Animals from a Philosophic Point of View, with a Few Letters on Man, was published in France in 1764. An English translation appeared in 1870. The book is in the form of letters and contains many arguments and insights that presage the modern practice of ethology. LeRoy held that one can only know animals thoroughly and appreciate their intelligence by associating with them. He said that,

"... in the study of animals, isolated facts must be put aside. It is their daily conduct, the whole of their acts, with their modifications according to circumstances, all working towards the objects which they must necessarily have in view, each according to its nature, that constitutes the true field of observation" (quoted in Thorpe, 1979, p.11).

In his first 'letter' LeRoy stated:

"For instance I should like to have the complete biography of every animal. I should wish that after its individual character, natural appetites, and way of life had been treated of, the observer should endeavour to see it in all the circumstances which may arise to oppose the immediate satisfaction of its wants - circumstances whose varying nature breaks the regularity of its ordinary proceedings, and forces it to have recourse to fresh devices" (ibid., p.11).

As Thorpe (1979) points out, LeRoy is here asking for an ethogram for each species. LeRoy was against the theory of animals as automata saying that he conceived of each individual as set in motion by some degree of sensibility,¹ obeying his own peculiar affections. He believed this as much for economy of argument ("I give myself up the more readily to this idea because we have seen how much trouble and how many unintelligible and gratuitous suppositions the contrary opinion will cost us" (ibid., p.12)),

1 That is, not entirely without motives for action (Thorpe, 1979, p.12).

as for reasons of his close observation of animals. LeRoy further held that it did not matter that we could never understand the nature of the mind of animals as the important result of a study of animals is the increase in our self-knowledge. Thus, LeRoy in many ways was the spiritual founder of the comparative analysis of behaviour in Europe (Gray, 1968).

The ground was further prepared by Lamarck in the years between LeRoy's writing and the debates in the Académie des Sciences in Paris around 1830 in which (biological) ethology was formally presented to the European scientific community (Thorpe, 1979). Lamarck's (1809) support of evolutionism and his denial of the idea of special creation was in direct contrast to Baron Georges Cuvier's beliefs. Cuvier was head of the Académie and his adherence to the theories of catastrophism and special creation led to an emphasis on laboratory studies of the morphology of dead specimens. Lamarck, on the other hand, adhered to the idea of genuine change in animals (transformisme) through their adjustment to changes in the environment. Lamarck (1914) wrote:

"... according as changes occur in the environment, situation, climate, food, habits of life, etcetera, corresponding changes in the animals likewise occur in size, shape, proportions of the parts, color, consistency, swiftness and skill" (p.109).

Study of animals in their natural environment may be the extent of Lamarck's contribution to the modern formulation of ethology. Thorpe (1979) states that Lamarck brought forward a basic problem of ethology, that of the nature and origin of the 'internal drive' of animals, through his emphasis on change occurring in animals by their striving to reach new goals or occupy new niches. Thorpe (1979) wrote that, "The Lamarckian trends as they are found in nature ... were considered to be the result of the conscious strivings of the animals themselves" (p.15). However, as

Mayr (1976) points out, the explanatory principle of change in animals through their volition or their willing change is erroneously attributed to Lamarck. Cannon (1957) showed that Lamarck did not say this and that the misconception may have arisen from a mistranslation of besoin (need). For instance, Lyell (1835) in Principles of Geology consistently translated Lamarck's besoin as the 'wants' of animals. T.H. Huxley's review of the Origin of Species (Times, December, 1859) contained the statement that according to Lamarck, "... the new needs will create new desires, and the attempt to gratify such desires will result in an appropriate modification" (quoted in Mayr, 1976, p.225). The word 'desire' could easily be misinterpreted to imply that conscious striving for change would follow.

The Lamarckian view of evolution,¹ however, did provide an opposing stand to that of Cuvier in the Paris debates. Lamarck died in 1829. Etienne Geoffroy-Saint-Hilaire (1772-1844) took up the cause of Lamarckism against Cuvier's immutability of species. Etienne was a proponent of ethology with his naturalistic evolutionary point of view (Thorpe, 1979). He emphasized the unity of plan of composition in all animal species and the trends to be found in nature (Jaynes, 1969). This was a considerable departure from mainstream zoology of the time which was nearly equivalent to comparative anatomy. Jaynes (1969) noted that the discovery of any new species at that time led to its speedy dissection by zoologists and that larger questions about the animals' lives were ignored. Ethology was a protest against this situation and criticism of the laboratory study of animals to the exclusion of any other kind of observation has been a

¹ Lamarck himself did not, it seems, use the terms 'evolution', 'evolutionism' or 'transformationism' (Mayr, 1976, p.15, note). He wrote instead, for instance, of "modification in shape and organization of animals". The terms are used here in conjunction with Lamarck for convenience. The 18th and 19th century conceptions of evolution have been discussed in sections 2.3.2 and 2.4.1.

feature of the ethologically oriented from Le Roy through to modern times (for example, Thorpe, 1979). Etienne's arguments for ethology were, however, defeated, as much by Cuvier's "suffocating authority" (Thorpe, 1979) as by his expertise in his laboratory-based studies.

Ethology was revived by Etienne's son, Isidore Geoffroy-Saint-Hilaire. Between 1854 and 1862 he produced his Histoire naturelle générale, and in the last of the three volumes he used 'ethology' with virtually its present-day meaning (which was also that of Le Roy and Etienne and included some of what is now ecology) (Thorpe, 1979). He in effect re-founded ethology (Jaynes, 1969; Thorpe, 1979). However, just as his father had had to contend with an imposing opponent in Cuvier, Isidore had an equally obstructive contender in the German Ernst Haeckel. In this instance, the point of contention was terminological. Haeckel¹ had in 1866 coined the term 'oecology' to denote the study of the organism in its natural environment (Jaynes, 1969; Thorpe, 1979). He defined it as, "the science of the economy, of the habits, of the external relations of animals to each other" (Durant, in press, p.5).

Thus, while comparative psychology became rapidly and securely established after 1870, ethology remained in a state of considerable confusion. To begin with, the term 'ethology' had two distinct meanings: Mill's sense of ethology as the 'science of character formation' was still current in England at the time of Isidore Geoffroy-Saint-Hilaire's biological ethology. The latter overlapped with Haeckel's oecology (Thorpe, 1979). People confused ecology with ethology and were uncertain as to what was meant by either term.

1 For Haeckel see Stauffer (1957) and Haeckel, E. (1905),

Ethology was again put forward in France by the marine biologist and Professor at the Sorbonne, Alfred Giard (1846-1908). Giard (1904) wrote that there was too much emphasis on anatomy and physiology and a need for study of the "exterior physiology" or the study of the customs of animals and their mutual relationships. He saw the need for both ethology and ecology, and together with the entomologist J.-H. Fabre (1823-1915) kept the concept of ethology alive in Europe (Thorpe, 1979).

Although there was a great tradition of naturalistic study of animals in both Britain and America, ethology was first firmly established only in Austria, Germany and Holland. One reason for this in the case of Britain may have been the confusion over terminology mentioned earlier. Durant (in press) has traced how 'ethology' was catalogued from 1902 in The Zoological Record. The Record is a classification of the zoological literature of the Zoological Society of London. In that year, ethology appeared in the Record as a subdivision of a section devoted to "Textbooks, General Works, Evolution, Essays". By 1907, ethology had its own section, but this was devoted to works on "Behaviour, habits, plankton, psychology, symbiosis, parasitism". Durant remarked that the scope of ethology was "anything but clear" (p.5). Doubt persisted in the Record until as late as 1940 when ethology was dropped altogether and replaced by a section called "Ecology and Habits".

1 See The Zoological Record, vols. 39 (1902) - 77 (1940).

Another reason for ethology not getting established in Britain may have been that natural behaviour studies, particularly ornithology, were mostly the domain of the amateur, and there were no general scientific outlets for their publication (apart from the journal Nature) (Thorpe, 1979). Furthermore, work that broke important new ground in concepts of animal behaviour, such as that of H. Eliot Howard (1929, 1935, 1940) was published in deluxe format and did not become widely circulated (Thorpe, 1979).

In America, William Morton Wheeler began a campaign for ethology in 1902. He argued that zoologists were in urgent need of a new term to refer to the relationship between the habits of animals and their habitats, and that the only term hitherto suggested that would cover this was ethology (Wheeler, 1902). He used the term in a number of his papers over the next few years (Wheeler, 1905, 1906, 1908), but no one appears to have followed suit. Instead, Haeckel's 'oecology' established a firm position in both botany and zoology.

Another factor influencing the fate of ethology in America was that behaviorism was already firmly established by the second decade of this century. This may in part have contributed to the fact that although Karl Spencer Lashley's (1938) paper on the experimental analysis of instinctive behaviour expressed, independently of Lorenz, almost every important point which came to characterize the ethological view of instinct, he failed to get a research following to extend his theories (Thorpe, 1979). Having assumed the directorship of the Primate Research Station at Orange Park, Florida, after Yerkes's retirement in 1941, he spent little time at Harvard where he held a professorship because of the unpleasant atmosphere created by the disdain of the behaviorists

there for ethology. Thorpe (1979) records that when he (Thorpe) told Skinner, a behaviorist, he was going to visit Lashley at Florida, Skinner had said, "Why bother to see Lashley? You won't learn anything from him!" (p.49) and when Thorpe arrived at Orange Park, he found that Lashley regarded the appointment of Skinner to the major chair of psychology at Harvard as disastrous. Lashley also had a marked trait of publicly demolishing his own theories when he came up with a better one. Given his intellectual ability this happened quite often and his self-criticism seems to have confused and alienated many of his students. This too, may have caused him to lose a potential research following (Thorpe, 1979).

Although ethology did not get fully launched in Britain or America, the work of the ethologically oriented amateurs and professional scientists at the turn of the century and until publication of Tinbergen's (1951) Study of Instinct, is worth including with that of the Europeans as they made several important theoretical contributions to the founding of ethology. Durant (in press) made a useful division of the history of ethology into three phases. The first is the 'formative phase' (up to 1930) in which the term 'ethology' became fairly widely associated with the study of animal behaviour and pioneering studies were made. The second is the 'classical phase' (1930-1950) in which traditions of ethological research were established in Europe (especially under Lorenz and Tinbergen). The third is the 'mature phase' (beginning in 1950) in which ethology became a well-established discipline in America after publication of Tinbergen's (1951) Study of Instinct and in Britain with Tinbergen's move to Oxford and Thorpe's move to Madingley, Cambridge, to set up animal behaviour research groups, particularly of birds in Thorpe's case (Thorpe, 1979).

The background to ethology that is considered below covers the part played by Britain, America and Europe in the 'formative phase' and by Europe in the 'classical phase'.

3.4 Formative Phase in Britain

The eighteenth century in Britain produced some examples of reliable natural history of which Gilbert White's (1789) Natural History of Selborne is one of the best known and enjoyed. Douglas Spalding (c. 1840-1874) is probably the real pioneer in the British contribution to ethology (Thorpe, 1979). His first paper (Spalding, 1872) on instinct, his main article published in MacMillan's Magazine (1873) and his subsequent papers relating instinct to the acquisition of behaviour through experience, antedated most of the important writing on animal behaviour produced in nineteenth century England. Apparently as a result of his first paper read before the British Association for the Advancement of Science, Lord Amberly (father of Bertrand Russell), appointed Spalding tutor to his sons (Thorpe, 1979). The Amberleys co-operated with Spalding in his experiments carried out on the family estate at Ravenscroft.

As British naturalists had generally accepted Hume's (1739) conclusion that higher animals use the same principles of intelligence that man uses, they were not as interested in animal learning or 'problem solving' as in instinct (Thorpe, 1979). Spalding carried out his research on instinct with domestic chicks. This was a good choice as the behaviour of chicks at and after hatching shows itself too quickly to be merely the result of experience. In order to control the experience of the chick, Spalding hatched the eggs himself. He did this long before incubators had been developed, by suspending the eggs in a cloth slung above a kettle of steaming water. To control the chicks' experience after hatching it was necessary to prevent the functioning of the eyes and ears. To control

their visual experience, Spalding attached a small hood over the chicks' heads before they hatched by opening the eggs at the air-sac end and drawing out the chicks' heads. The chicks do not need to eat for a few days after they have broken through to the air-sac until the food supply of the yolk is exhausted. He would later help the chick divest itself of its shell. To control auditory experience, Spalding sealed the ears of some unhatched chicks with gummed paper. He found that after hatching these chicks went straight to the calling hen when the gum was removed. His studies of piglets separated from their mother at birth which also performed to the sounds of the mother provided further confirmation of instinctive reaction.

Spalding's experiments encouraged subsequent work on 'releasers' (Gray, 1967) and the releaser concept of modern ethology was to some extent anticipated by him (Thorpe, 1979). Spalding believed that instinct and learning are not exclusive of each other and that in many cases the function of instinct is to guide the course of learning and is not a complete substitute for it. He pointed out that different species of animals are born in different developmental stages and that absurd mistakes can be made in interspecific comparisons of behaviour unless the unfolding of the powers of the subjects are observed in as nearly as possible the conditions of their natural lives.

Spalding's contributions to ethological study of animals were in the areas of the nature of instinct, the release of instinctive reactions, the embryology of behaviour, the maturation of behavioural function and, in particular, of 'imprinting' (Thorpe, 1979). His work received much notice for about fifteen years after his death, primarily because of the writings of Lloyd Morgan who was perhaps attracted most by Spalding's outstanding experimental approach.

As mentioned, Lloyd Morgan¹ began comparative behavioural studies partly as a reaction to the anecdotal content of Romanes's (1882) Animal Intelligence. He spent the greater part of his life teaching at Bristol, nurturing the University College through to its full University status from 1883 to 1919. He was the University's first Vice-Chancellor and Professor of both zoology and geology. One of his contributions to ethological theory was his support for the view that instinct is fundamentally species-specific behaviour (Lloyd Morgan, 1896). He was also concerned with the problem of imitation, implying what is now called 'observational learning' (Thorpe, 1979). He held that the concept of instinctively governed restraints or predispositions restricted observational learning to particular objects and situations (Lloyd Morgan, 1896, 1900). He made what were probably the first observations on social distance in the earlier work (1896). Finally, he strongly emphasized the virtues of a physiological approach in study of behaviour (ibid., 1894, 1912).

In the first three decades of the twentieth century, ornithology in particular was brought to the point of understanding the need for more precise and detailed studies of behaviour. Ornithology was chiefly in the hands of amateurs and one of the most original early workers was Edmund Selous (1858-1934). Selous was an early representative of a long line of English ornithologists in this century interested in the study of naturalistic bird behaviour. He had a direct influence on, for instance, E.S. Armstrong, H.E. Howard², J.S. Huxley and F.B. Kirkman. Later representatives are

1 For a fuller summary of Lloyd Morgan's contribution, see: H.E. Adler (1973) and W.H. Thorpe (1979).

2 H. Eliot Howard (1920) was founder of the modern concept of territoriality in bird life (Thorpe, 1979).

D.L. Lack, W.P. Pycraft and W.H. Thorpe.

Selous was perhaps the first ornithologist to simply observe and note down with great thoroughness exactly what birds were doing in the field when left undisturbed (Selous, 1901, 1906, 1907). Selous (1927) described himself as "but the birds' amanuensis" (p.11), seeing himself as a passive vehicle through which the birds could, as it were, speak for themselves. His central aim was to gather evidence for the evolution of habits, especially in birds, by natural selection (Selous, 1933). He was a severe critic of the experimental methods of laboratory-based psychologists and of the lack of interest in behaviour among his fellow ornithologists. He wished to establish the study of the normal habits of birds on a secure foundation of detailed observation.

Julian Huxley acknowledged that his interest in "scientific bird-watching" was first aroused by Selous's work in his introduction to Selous's (1927) Realities of Bird Life. He began his undergraduate career at Balliol College, Oxford, in 1906. A year later he delivered his first paper titled 'Habits of Birds' (Huxley, 1907) to the College's Decalogue Club. In the paper he dealt with sexual selection in birds and the evolution of habit and instinct.

Throughout his life, Huxley was fascinated by bird 'courtship'. He first made a study of it in 1911 in North Wales where he observed the courtship of redshanks (Tringa totanus) (Huxley, 1930). His most important work on courtship was done at Tring in Hertfordshire on the behaviour of the great crested grebe (Podiceps cristatus) (Huxley, 1914)¹. Huxley saw the elaborate movements in the birds' lengthy courtship as being rather like a curious set ritual. From time to time the ritual was

¹ This paper has become something of a classic and an abridged version has been published as a book with a foreword by Desmond Morris: J.S. Huxley (1968), The Courtship of the Great Crested Grebe. London: Cape.

interrupted by apparently irrelevant actions. Huxley (1914) proposed that rituals were movements that were once of direct use to the birds but had been transformed into gestures of purely symbolic value and from there it was a short step to the development of rituals.

For the meaning of the rituals, Huxley relied on sympathetic understanding of the birds' characters. He thought that the courtship rituals were not simply a prelude to mating but that they permitted an interplay of consciousness or emotions between the birds. He concluded that a great deal of the courtship was enjoyed by the grebes for its own sake and that the display of emotion between the birds served to form and strengthen the all-important bonds of 'marriage' (Huxley, 1914). This interpretation was enormously influential and the concept of 'ritualization' was taken up by many continental ethologists.

Huxley's method was to treat birds as individual personalities whose conduct was dominated by complex emotions. The way to true understanding of birds was through a close acquaintance with their ordinary lives (Huxley, 1930). For Huxley, the starting point of any investigation was an intimate acquaintance with a bird's character. On this basis he sought direct insight into the bird's mental and emotional life by comparing its actions with that of humans in similar circumstances (Huxley, 1914, 1923).

The comparison with human actions was a feature of much early ethology and reappeared in Lorenz's work and in ethological literature of the 1960's. In effect, man and animals were united in a single theory of innate character which later contributed to the rise of human ethology.

3.5 Formative Phase in America

In America, William Morton Wheeler's (1865-1937) efforts to establish the use of the term 'ethology' at the beginning of this century were not successful. He was labelling not only his own, but also work of his predecessors that had been done in an ethological mode. Although Wheeler

was probably the first in the English-speaking world to use the term in its present-day sense (which he almost certainly obtained from J.-H. Fabre and probably also Giard (see p.50)), his approach had been shaped under Carl Akeley, George Peckham and Charles Otis Whitman.

Akeley was the founder of modern taxidermy and of the diorama in museums in which naturalistic presentations of animals and plants were achieved. He thought that an animal is 'meaningless' unless presented in a manner that conveyed its real character or ethos. This was manifested, according to Akeley, by the animal's specific motor behaviour in a specific natural environment (Wheeler, 1927).

Peckham was a biology teacher and with his wife made some classic studies on the courtship behaviour of spiders (for example, Peckham & Peckham, 1889). They were enthusiastic Darwinists and on the basis of painstaking observations of several species they fully corroborated Darwin's widely criticized theory of sexual selection. Wheeler assisted the Peckhams in further field work on the behaviour and evolution of wasps (Peckham & Peckham, 1905).

C.O. Whitman was the leading American figure in nineteenth century zoology for thirty years from 1880 (Thorpe, 1979; Durant, in press). He founded the Journal of Morphology in 1887, became the first Director of the marine biology laboratory at Woods Hole, Massachusetts in 1888, and is credited with having introduced European methods and ideas in zoology to America (Durant, in press). He held the chair in zoology at Tokyo University after Edward Morse left in 1879 (Lillie, 1911). Whitman kept pigeons as a boy and was said to be fascinated by them, sitting watching them by the hour, intensely interested in their feeding, their young and everything they did (Lillie, 1911). Whitman's views on the comparative study of animals in their natural environment are illustrated in his lectures. He taught that instincts were not isolated, disconnected pheno-

mena which had developed in unrelated groups of organisms, but that they were fundamental biological entities, subject to the laws of variation and natural selection. He developed four maxims in a lecture at the Woods Hole laboratory (Whitman, 1898):

Instincts are evolved, not improvised and their genealogy may be as complex and far-reaching as the history of their organic bases.

The first criterion of instinct is that it can be performed by the animal without learning by experience, instruction, or imitation. The first performance is therefore the crucial one.

The main guidance for getting at the phyletic history of animals must be comparative study.

Plasticity of instinct is not intelligence; but it is the open door through which the great educator, experience, comes in and works every wonder of intelligence.

It followed from this that, "Instinct and structure are to be studied from the common standpoint of phyletic descent" (*ibid.*, p.328). This statement has been hailed as initiating the birth of modern ethology (Thorpe, 1979). Whitman put this principle into practice in his monumental study of pigeons. He integrated the behavioural and morphological evidence to reconstruct the evolutionary relationships among nearly forty wild species and several domesticated varieties of pigeons.¹

Whitman felt that nothing could be understood about behaviour without the most prolonged and intimate acquaintance with the animals. He insisted that,

"The one qualification absolutely indispensable to reliable diagnosis of an animal's conduct is an intimate acquaintance with the creature's normal life, its habits and instincts" (Whitman, 1899, p.530).

He was another of the ethologically oriented who criticized laboratory-based comparative psychologists, characterizing their study as "parlour diversion with caged animals". Whitman, with Oskar Heinroth in Germany,

1 See O. Riddle (ed) (1919) C.O. Whitman: Posthumous Works. Washington. 3 vols. 3: The Behaviour of Pigeons.

have come to be seen as the true founders of ethology (Klopfer & Hailman, 1967; Lorenz, 1970). Lorenz once remarked that, "My scientific merit lies in discovering Whitman and Heinroth" (Evans, 1975, p.7).

William Morton Wheeler, as a student of Whitman, followed very much in his footsteps. Wheeler's campaign for a "renaissance of zoology" was to be based upon the treatment of animals as "living individuals more or less like ourselves" (Durant, in press, p.12). His use of the term 'ethology' to cover "the study of animals, with a view to elucidating their true character as expressed in their physical and psychical behaviour towards their living and organic environment" gave the most appropriate name to work on which Whitman had been engaged for many years (*ibid.*, pp. 12-13). Wheeler's characterization of ethology was reflected in his own work with social insects, especially ants. Close attention to both the physical environment (for example, the nest) and behaviour was often necessary for accurate identification and classification of species (Wheeler, 1908).

Wallace Craig (1876-1954) was a contemporary of Wheeler and also a student of Whitman. He found inspiration in Whitman's work for a theory of animal instinct that had an important influence on European ethology (Durant, in press). His studies of doves reared in isolation, doves learning to drink (Thorpe, 1979), and particularly his paper on 'Appetites and Aversions as Constituents of Instincts' (Craig, 1918), were of major theoretical importance. The 1918 publication had a great influence on Lorenz. It was through Craig's work that American and European ethologists came to know of one another. In one of his earliest papers on pigeons, Craig noted that his long term aim was to study the characteristic sounds and bodily movements of one species and to compare them with "all the species in Professor Whitman's large collection of living birds" (Craig, 1909, p.30).

Some of Craig's original ideas on topics that were becoming of central interest to ethology were:

'appetitive behaviour': a condition that showed itself externally as a state of agitation which continued as long as a certain stimulus was absent. When the proper stimulus is received, a consummatory reaction ensues, and the appetitive behaviour ceases and is succeeded by a state of relative rest.¹

'aversion': a state of agitation which continues as long as the disturbing stimulus is present.

'expectancy': for learning to occur, the reinforcement must in some sense confirm an expectancy. The animal does not know what to expect, but its behaviour suggests that it is expecting something. The evidence for this is that on first performing an innate consummatory act, organisms will show some evidence of surprise.

the value of practice to provide fine adjustment of an instinctively coded technique.

evidence for deliberate practice for aesthetic improvement in bird song (for example, the eastern wood peewee (Contopus virens)). (Thorpe, 1979, p.39).

After publication of his 1918 paper, Craig lost contact with developments in ethology. Thorpe (1979) related that when he lectured on ethology at Harvard in 1951 he was amazed to hear later that Craig was in the audience. Only two people in a large audience knew who Craig was and Thorpe had assumed that he was dead. However, Craig's contribution to ethology has been consistently acknowledged in modern ethological literature.

The last American figure who will be considered here is Karl Spencer Lashley. He had in his early days worked with J.B. Watson, but turned from behaviorism to become one of the great brain physiologists of his time. He had been an enthusiastic naturalist as a boy and became as well one of the leading primatologists after taking over from Yerkes at the

1. Thus, Craig pointed out, appetitive behaviour is from one point of view a reaction to the absence of something. This was what Karl Lashley later meant by instinct being a reaction to a deficit (Thorpe, 1979).

Primate Station in Florida. His ethological achievement was his paper (Lashley, 1938) on the experimental analysis of instinctive behaviour. As mentioned, it expressed almost every point which came to characterize the ethological view of instinct.

Although Britain and America came very close to establishing a science of ethology and although the Americans in particular were in advance of workers anywhere else, it was in Europe (Austria, Germany and Holland) that ethology was finally established.

3.6 Formative Phase in Europe

In the 1890's, Friedrich Dahl, a German zoologist, urged that greater importance should be attached to "comparative ethology", by which he meant the comparative study of the life habits of related groups of animals (Dahl, 1902). He gained the support of Oskar Heinroth who was at that time assistant director of the Berlin Zoological Gardens. In her biography, Heinroth's second wife records that Dahl influenced her husband in matters of nomenclature and it therefore seems likely that he adopted the term 'ethology' from him.¹

Heinroth (1871-1945) is arguably the single most important figure in the early history of ethology (Thorpe, 1979; Durant, in press). Particularly through his ornithological studies, he laid the methodological and theoretical foundations of classical ethology.² In 1896 Heinroth began his degree in zoology at the Friedrich-Wilhelms-Universität in Berlin. He became interested in instinctive or inborn customs and manners of animals.

1 Biographical details about Heinroth are contained in: K. Heinroth (1971) Oskar Heinroth. Vater der Verhaltensforschung, 1871-1945. (Oskar Heinroth. Father of Behavioural Research, 1871-1945). Stuttgart.

2 Heinroth's key paper was: (1911) 'Beiträge zur Biologie, namentlich Ethologie und Psychologie der Anatiden' (Contributions to the Biology and particularly to the Ethology and Psychology of the Anatidae). Verhandlungen des V Internationalen Ornithologen-Kongresses (1910), 589-702. Berlin.

He wished to investigate in animals the sort of behaviour which in man is described as gestural, symbolic or expressive. He saw birds possessing, by analogy with man, innate characters or personalities. He considered that the task of ethology was to analyse the part these innate characters played in birds' lives and to reconstruct evolutionary genealogies.

In his 1911 survey of the Anatidae, Heinroth attempted to give a complete account of the activities of the birds (an ethogram) and to interpret the meaning of those activities in the birds' lives. He introduced several behavioural concepts in this seminal paper which featured in many subsequent ethological studies. Some of these terms were 'incitement' behaviour (Hetzen)¹ of female ducks; 'display postures' (Imponierstellungen) of the males; 'triumph ceremonies' (Triumphgeschreien) of swans and geese; 'greeting signals' (Begrüßungszeichen), and 'intention movements' (Intentionsbewegungen), apparently trivial actions that served as greeting or intentional signals. Heinroth also recounted how the innate responses of hand-reared birds were often redirected to man (imprinted on the wrong object), which was later made famous by Lorenz and his 'devoted' goslings.

Heinroth's interpretation of behaviour was as a complex of external signs which expressed internal psychological or emotional predispositions. This was reflected in the terms with which he described the behaviour, such as 'intention movement' or 'triumph ceremony'. This qualitative description depended upon his willingness to identify with the animals he observed. This identification rested in turn upon the fundamental analogy

¹ Some concepts, such as Hetzen (incitement behaviour) and Triumphgeschrei (triumph ceremony), which Heinroth introduced, have been mistakenly attributed to Lorenz (see Heymer, 1977, pp.86 and 180).

between animal and human character¹ (Heinroth, 1911).

With his wife, Heinroth produced a major book on the birds of middle Europe (1924-33)² which contained much original observation in an ethological framework (Thorpe, 1979; Durant, in press). What Heinroth achieved for ethology was to make it clear that behaviour patterns (as in the duck) can be reliably used as evidence for systematic relationships between species and as a basis for theorizing about the course of evolution of such characters (Thorpe, 1979). His methodology of making a complete inventory of the characteristic behaviour of animals based on exhaustive natural observations became a major preoccupation of later workers. Both Lorenz and Tinbergen developed much of their studies on the basis of Heinroth's work. Heinroth was probably the single most important influence on Lorenz during the 1920's and 1930's. In particular, his analysis of the emotional life of birds and the expressive nature of their behaviour entered the mainstream of classical ethology, mostly through Lorenz's work.

Other workers who played a part in the European formative phase of ethology were Jakob von Uexküll (1864-1944), Hans Lissman and Karl von Frisch. Von Uexküll had a subtle influence on the thinking of the biologists of his day (Thorpe, 1979). He directed his attention early in his career to muscle and nerve physiology, but moved from that to explore "the harmonious co-operation of the organs within the animal body", shifting his interest to "whole animal biology". He studied behaviour to try to understand the subjective world (Umwelt) of each animal and devised many ingenious experiments to try to see the world from the animal's point of view.

1 Heinroth's (1911) argument that "animals could be understood just like people" (quoted in Durant, in press, p.16) is discussed in chapter 4.

2 Heinroth, O. & K. (1924-33). Die Vögel Mitteleuropas in allen Lebens- und Entwicklungsstufen photographisch aufgenommen und in ihrem Seelenleben bei der Aufzucht vom Ei ab beobachtet (The Birds of Central Europe, their Life Histories photographically recorded, and their Mental Lives Observed by rearing from the Egg). Berlin. 4 vols.

Hans Lissman was a student of von Uexküll at the Hamburg Biological Laboratory. He based his doctoral thesis on research into fish behaviour. A resulting paper on Siamese Fighting Fish (Betta splendens), 'Die Umwelt des Kampffisches' (1932) is one of the most important early studies in ethology (Thorpe, 1979).

Karl von Frisch had ideal surroundings as a child at Brunnwinkl on Lake Wolfgang in Austria in which to cultivate his naturalist interests. His early work was on fish biology. He was especially interested in sudden colour changes in fish and found that their reaction to light was not through the eyes, but through a local effect of light on some pigment spots on the forehead of the fish underneath a small translucent patch of skin. This was the pineal organ. His discovery spurred several other zoologists to continue research into the function of the pineal body. Von Frisch himself went on to the question of the ability of lower animals to perceive colour. At the time that he found that fish could adapt their colour changes to that of their background, Karl von Hess, Director of the Munich Eye Clinic, published his conclusions that fish and all invertebrate animals were colourblind. An acrimonious debate with von Hess ensued which lasted many years (Thorpe, 1979). Von Frisch extended his work on colour vision to bees and other animals and was ultimately proven correct.

In 1912 he began seriously experimenting with bees. He proved that bees possess a colour sense and his studies of the nature and extent of their vision were the first of his world famous investigations on Apis mellifida. He first observed the honey bee dance in 1919. Although von Frisch never appears to have used the term ethology himself (Thorpe, 1979), his work added greatly to the descriptive and conceptual store of the discipline. Especially astonishing to the ethologists were features of the bees' dance which showed that there are associational ties between signals of dance language and features in the outer world, and that the dance language can refer to things in both time and space (Thorpe, 1979).

Recently, Griffin (1976) made quite extensive reference to the honey bees' dance in arguing for the development of experimental study of mental abilities in animals, or 'cognitive ethology'.

3.7 Classical Phase in Europe

During the 1920's and 1930's, Heinroth inspired Konrad Lorenz and a group of Dutch researchers¹ including G.F. Makkink (1936), A.F. Portielje (1928), J. Verwey (1930), A. Kortlandt (1940) and Niko Tinbergen. In their writings, the term 'ethology' was firmly linked with the biological study of animal behaviour. Kortlandt's paper led to his study of displacement activity and the phenomenon he called 'sparking-over' (Übersprungbewegung). This referred to the fact that when an aroused impulse is denied an expression, it 'sparks over' to a definite behaviour group, usually the same no matter what the nature of the thwarting cause. Such displacements could have an important secondary function if they became ritualized by serving as a social signal for releasing special responses in other individuals of the same species.

Lorenz (born in 1903) looked to Heinroth for the framework of his entire early research programme. Lorenz extended Heinroth's views on the role of instinct in the life of birds and developed a more sophisticated analysis of the communicative and releasing functions of ritualized

1 G.F. Makkink (1936) An attempt at an ethogram of the European avocet (Recurvirostra avosetta), with ethological and psychological remarks. Ardea 25, 1-60.

A.F. Portielje (1928) Zur Ethologie bezw. Psychologie der Silbermöwe (Larus argentatus argentatus Pont.) (On the ethology, or rather the psychology of the Herring gull). Ardea 27, 112-149.

J. Verwey (1930) Die Paaraungsbiologie des Fischreihers (The mating behaviour of the heron (Ardea cinerea)). Zoologische Jahrbücher, Abteilung für allgemeine Zoologie 48, 1-120.

A. Kortlandt (1940) Eine Übersicht der angeborenen Verhaltensweisen des Mitteleuropäischen Kormorans (Phalacrocorax carbo sinensis)... (Review of the innate behaviour of the cormorant), Arch. neerl. Zool. 4, 401-442. First published in Dutch, 1938.

behaviour. Moreover, he refined the comparative ethology of the Anatidae. Lorenz's series of publications in the 1930's are widely regarded as having established the boundaries of classical ethology (Thorpe, 1979; Durant, in press). Six of the papers (published between 1931 and 1941) which are considered especially important are listed below.¹ Lorenz made these observations at his family home at Altenberg near the village of Greifenstein in Austria. During this time he was in close contact with Heinroth whom he acknowledges as his 'teacher' (Durant, in press), but he also paid tribute to the influence of von Uexküll, and dedicated his paper of 1935 to him on the occasion of von Uexküll's seventieth birthday.

In 1937 Lorenz became co-editor with Otto Koehler of the Zeitschrift für Tierpsychologie. With this move, ethology found important official recognition. Koehler was Professor of Zoology at Freiburg im Briesgau. His great contribution to the study of animal behaviour was his investigation of the number sense or 'counting ability' of animals. He showed that animals, especially birds, can "think un-named numbers", or have a prelinguistic number sense.

1 The papers were originally written in German. Their English titles are given below. The 1931, 1935, 1937 and 1939 articles appear in English in C.H. Schiller (1957); 1938 appears in Lorenz (1970) and 1941 appears in Lorenz (1971).

(1931) Beiträge zur Ethologie sozialer Corviden (Contributions to the study of the ethology of social Corvidae). J. für Ornithologie 79, 67-127.

(1935) Der Kumpan in der Umwelt des Vogels (Companions as factors in the bird's environment). J. für Ornithologie 83, 137-214; 289-413.

(1937) "Über den Begriff der Instinkthandlung (On the idea of instinctive behaviour). Folia Biotheoretica 2, 17-50.

(1938) (with Tinbergen) Taxis und Instinkthandlung in der Eirollbewegung der Graugans (Taxis and instinctive behaviour pattern in egg-rolling by the Greylag goose). Zeitschrift für Tierpsychologie 2, 1-29.

(1939) Vergleichende Verhaltensforschung (Comparative study of behaviour). Zoologische Anzeiger Supp., 12, 69-102.

(1941) Vergleichende Bewegungsstudien an Anatinen (Comparative studies of the motor patterns of Anatinae). J. für Ornithologie 89, 194-294.

Tinbergen (born in 1907) carried out his early zoological work at Hulshorst in Holland. He had been a zoology student at Leiden and by 1931 was an Assistant in the department of zoology there. He was interested in the behaviour of insects and birds and had a remarkable talent for devising simple field experiments (which Lorenz almost never did) on animals in the wild without unduly disturbing them. His early publications were on the common tern (Sterna hirundo) and the herring gull (Larus argentatus argentatus Pont.), but in Hulshorst he made extensive researches into the homing and hunting behaviour of the bee-hunting digger wasp (Philanthus triangulum) and the caterpillar-killer sand wasps (Ammophila campestris and A. sabulosa).

In 1938 Tinbergen worked with Lorenz at Altenberg for a year. The joint paper they published (Lorenz & Tinbergen, 1938) on the egg-rolling movements of the greylag goose (Anser anser) combining taxis and instinctive action is famous. He wrote other important papers on the releasing and directing stimuli of the gaping response in young blackbirds and thrushes (with D.J. Kuenen, 1939), on displacement activities (1940) and a theoretical paper on the objective study of the innate behaviour of animals (1942).

The second world war interrupted the work of Lorenz, held captive by the Russians, and of Tinbergen, held in a German prisoner of war camp. The end of the war reached Austria before other parts of Europe and animal behaviour research was first resumed in Vienna (Thorpe, 1979). The Biologische Station Wilhelminenbergen, as it was called, produced ethograms on five species of herons and the bee-eater (Merops apiaster) (for example, L. König, 1951). Eibl-Eibesfeldt (1952) made a study of the toad (Bufo bufo). The institute ran a journal named Umwelt and made a substantial contribution to the post-war development of ethology, especially in central Europe (Thorpe, 1979).

A researcher of great importance in the post-war period was Erich von Holst. His main interest was behavioural physiology. Although in his research he had actively to intervene in the functioning of the central nervous system of animals, his basic orientation was that of Heinroth, von Uexküll and Lorenz. Thus his interest in the central nervous system was to understand its part in controlling the behaviour of the whole animal. He showed that in addition to stimulus-response activity, the central nervous system was spontaneously active. He demonstrated that not only the structure of the brain and accessory systems are inherited, but also an entire range of spontaneously active mechanisms which are species-characteristic behaviour patterns (von Holst, 1954).

In Holland, Gerard Baerends, who had worked with Tinbergen at Hulshorst on the digger wasp (A. campestris), set up a department of ethology at the University of Groningen in 1946. Members of the department studied the ethology, ecology and neurophysiology underlying behaviour. By the early 1950's, it provided teaching facilities for ethology far in advance of anything available at other universities (Thorpe, 1979).

By 1946 contacts between British and Dutch scientists were again possible. A conference on 'Physiological Mechanisms in Animal Behaviour' held in Cambridge in 1949 organized by the British Society for Experimental Biology and the British Association for the Study of Animal Behaviour (ASAB), marked the beginning of real international co-operation between ethologists (Thorpe, 1979). Scientists from Britain, Holland, Germany, Poland and the U.S.A. attended. At this meeting, definitions for terms that form the bulk of ethology's conceptual system were agreed upon. Among those concepts defined were instinct, mood, drive, appetitive behaviour, consummatory act, fixed action pattern, specific action potential, displacement activity, releaser, social releaser and imprinting (Thorpe, 1979).

In the same year, Sir Alister Hardy invited Tinbergen to fill the post of Lecturer in Zoology at Oxford, and to develop an animal behaviour research group. By 1950, W.H. Thorpe, who had been studying instinct and learning in birds at Cambridge, had moved to a four acre site at Madingley that the University had purchased for an ornithological field station. Thorpe invited Lorenz to superintend the station. Lorenz had accepted, but was almost immediately offered a substantial grant from the Max-Planck Gesellschaft to set up his own institute in Germany (Thorpe, 1979). Thus, R.A. Hinde became the Madingley station's curator and began studies of species-specific behaviour in finches, imprinting on the moorhen (Gallinula chloropus), domestic chick and duck, and studies of song and song-learning, primarily with the chaffinch (Fringilla coelebs). Thus ethology was firmly established in Britain from 1949.

Pierre-Paul Grasse began the renaissance of ethology in France. More recently, Remy Chauvin at the Sorbonne and Gaston Richard at Rennes have started ethological stations (Thorpe, 1979). In America, two notable exceptions to the predominant comparative psychology studies, C.R. Carpenter's (1930's) studies of howler monkeys (Alouatta palliata) and gibbons (Hylobates), and the ready acceptance of the coming of ethology by F.A. Beach, Professor of Psychology at Yale, had far-reaching effects on its spread and development there (Thorpe, 1979).

In his Study of Instinct (1951), which marks the end of the classical phase of ethology, Tinbergen outlined four questions that ethology seeks to answer. The first three have to do with causes of behaviour and the fourth with its function. Thus, the ethologist seeks at one level the physiological mechanisms underlying observed behaviour; at another, the ontogeny of behaviour, or its development in the individual;

at a third, the phylogeny or evolutionary development of behaviour and fourthly, the function or 'biological significance' of the behaviour in question. These questions are still guidelines for ethology, though the original classical explanatory system of the 1930's and 1940's has since been modified.

3.8 Summary

Over a period of about seventy-five years, ethology overlapped in meaning with psychology at one extreme and ecology at the other. The distinctive view of ethologists (including the amateur naturalists), especially after 1900, was that animals possess specific, innate 'characters' which can be understood, often by direct analogy with human character, on the basis of prolonged and sympathetic observation. For Heinroth, ethology was as close to psychology as to ecology, but at the same time was an independent field of inquiry which deserved a place of its own in science.

Ethology was founded upon naturalistic observation. Most of its practitioners were sharply critical of the laboratory-based studies of comparative psychology. Ethologists worked within a Darwinian tradition employing a comparative and evolutionary approach. For early ethologists, emotions and physical attitudes were as much species' characteristics as were colours or structures. The concept of 'gesture' was thus very important. It was the basic classificatory unit in comparative studies of innate behaviour or 'motor patterns', providing a theoretical link between observed motor patterns and inferred feelings or emotions. In his introduction to Lorenz's King Solomon's Ring (1952) Thorpe noted that for twentieth century pioneers, the word 'ethology' was almost synonymous with the comparative anatomy of gesture (p.viii).¹

1 1961 edition.

Perhaps the greatest difference between ethology and comparative psychology was that at a time when comparative psychologists were struggling to make their work more objective and experimental, the early 'starers-at-animals' held fast to a method that was based on personal insight. Lorenz retained this aspect of the early ethological approach, though Tinbergen, perhaps because of his greater use of experiment in observation, stressed its objectivity (for example, Tinbergen, 1942, 1951).

There was, however, direct continuity between early preoccupation with emotional expression and later, less seemingly anthropomorphic interest in the question of motivation. For instance, Heinroth's 'moods' (Stimmungen) were interpretations of movements as expressive signs and he explored the varied and changeable moods that governed the lives of animals. Craig's interest in the psychological functions of emotion led to his theory of the role of 'appetites' and 'aversions' in instinctive behaviour. He argued that subjective aspects of instinct are manifested in specific bodily attitudes and gestures which are easily recognized as signs or expressions of appetite or aversion (Craig, 1918, pp.91-2, 95). Lorenz developed ideas about motivation which culminated in his putatively physiological 'hydraulic drive' model of instinct, as a direct derivation from the work of Heinroth and Craig (Lorenz, 1950). The contribution to ethology of von Frisch, Lorenz and Tinbergen was acknowledged by their being awarded the Nobel Prize in 1973.

The final twist in ethology has been to apply the results of study of animals to man. This was a familiar feature of ethology in the 1960's, but the position had been stated long before by Heinroth and Lorenz. Heinroth had stated that human behaviour involves far more inborn and ancient influences than we commonly think (Heinroth, 1911, p.702). He was willing to exploit the analogy between animal and human character in both directions. The effect was to unite animals and man in a single

theory of innate character. Lorenz continued this tradition (A. Lorenz, 1936; K. Heinroth, 1971, pp.155, 156).¹

Pioneering work in this field to gain insight into human psychology from animal behaviour studies was done by W.M.S. & C. Russell (1961, 1968). In the second of these books, Violence, Monkeys and Man (1968), they presented an argument that violence in man and animals is not "unconditional" (that is, genetic) but depends upon certain external conditions, especially overcrowding. Through the results of primate and other mammalian studies, they concluded that even a sufficient food supply does not preclude violence, but that sufficient space and food are necessary for harmonious social groupings. Perhaps the most representative of the Lorenzian tradition in human ethology is I. Eibl-Eibesfeldt (1970, 1971). A recent book by P. Marsh (1978) soberly and successfully illuminates a human behaviour pattern that appears strikingly similar to that in other animal species. That is conflict resolution, which he calls "aggro" or a way of expressing aggression in a ritualistic or relatively noninjurious manner. Marsh says that at the level of 'postures' there are certainly parallels with animal communication.

With the background to the development of comparative psychology and ethology, the development of primatology from its dual foundations can be traced.

1 Adolph Lorenz (Konrad's father) (1936) wrote: "Konrad contends that human psychology has much to learn from animal psychology and that there is no essential difference between these two branches of science" (p.319).

3.9 Development of Primate Ethology: Introduction

One of the most apt and succinct descriptions of primatology is that of Bramblett (1976a): "Primatology (is) a discipline defined by the animal subject rather than the academic speciality of the researcher..." (p.1). Those who have studied non-human primates include anthropologists, linguists, mathematicians¹, neurologists, psychiatrists, psychologists and zoologists (S. Altmann, 1967). As the non-human primates, and particularly the great apes (Pan, Gorilla and Pongo) are man's closest living relatives in the animal kingdom, it was inevitable that once begun, scientific studies of primates would comprise several specialities, corresponding to the study of human biology, development, behaviour and evolutionary history. Primatology can be divided broadly into three branches or areas of specialization. One is the use of non-human primates for medical research such as the development of drugs as well as experimentation on the neurological and physiological bases of behaviour. Overlapping to some extent with neurological studies is research by psychologists into social and mental development such as the effects of early social deprivation on later behaviour and experiments for 'intelligence' and 'linguistic abilities' in apes. Morphological studies of non-human primates have helped palaeontologists construct a framework for human evolution and field studies of several species of primates have contributed to our understanding of the myriad adaptations that have produced man's way of life. Thus, primatology is an amalgam of medical, social and natural sciences.

The development of field studies of primates is outlined below. Some of the earliest known descriptions of monkeys and apes have been collected together in modern times by Yerkes and Yerkes (1929) and Reynolds (1967)

1 For instance, J. Altmann (S. Altmann, 1967, p.ix).

and in previous centuries by Tyson (1699) and T.H. Huxley (1863). These will be very briefly summarized. Early in this century most knowledge of primate behaviour came through studies of captive apes and monkeys, kept either singly in the home or in groups in private enclosures. An exception to this was the three year field study of the chacma baboon (Papio ursinus) carried out by Eugene Marais in Waterberg in the northern Transvaal, South Africa, just after the Anglo-Boer war (Marais, 1939, 1969). This was probably the first true field study of a primate, but the work remained in relative obscurity as Marais was not a scientist, his work was not translated from its original Afrikaans for many years and his thesis was far ahead of its time. Marais was a brilliant journalist, lawyer, poet and naturalist and was very interested in the human psyche. What he sought in the study of baboons and thought he found was the "so-called subliminal soul - the subconscious mentality - which in man is none other than the old animal mentality which has been put out of action by the new mentality" (Marais, 1969, p.23).

In the 1920's in America comparative psychology was the dominant framework for animal behaviour studies and primate field studies were inaugurated there by a comparative psychologist, Robert M. Yerkes. Field study or primate ethology, as the term implies, is however based on an ethological approach to primate behaviour. Rather than the laboratory-based studies of comparative psychology, primate ethology derives its theoretical framework from evolutionary theory. Michael and Crook (1973) defined primate ethology as the study of behaviour in an evolutionary framework. The focal question, 'Of what adaptive use is the behaviour that is performed?', is understood in the study of the correlation between the behavioural organization of a species and features of its environment.

Likewise, Stuart Altmann (1967) pointed out that a strong trend evident in the papers given at the 1964 international symposium of communication and social interactions in primates was toward naturalistic approaches which were, in many cases, explicitly evolutionary. Even those studying behaviour in laboratory settings were interested in the relevance of their work to understanding the animals' naturally occurring problems and the extent to which their experimental situations provided an adequate paradigm of processes of adaptation. In the 'comments' on Imanishi's (1960a) paper, Emlen (1960) stated, "I doubt any adoption or revision of terminology will solve our basic problems of understanding the evolutionary significance of similarities and differences (in primate social groupings)" (p.404) and Carpenter (1960) in the same article stated, "Primatologists generally assume theories of evolution" (p.402).

3.10 Knowledge of Primates to the Nineteenth Century

In their survey of some early references to non-human primates (for instance, The Holy Bible, Hanno in the fifth century B.C. and Aristotle in the fourth century B.C.)¹, the Yerkes (1929) found that it was seldom possible even to identify the animals referred to in those writings. Moreover, most information was uncritically copied or paraphrased by subsequent authors so that superstitions, rumours, unverifiable observations and unwarranted conclusions were repeated through the centuries. Galen's (130-?200 A.D.) work was an early exception to this as he made careful dissections of apes (probably the orang-utan (Camper, 1779)) and monkeys, recommending their use to gain knowledge of human anatomy.²

1 The Holy Bible, II Chron. 9. 21; Hanno, Periplus, trans. from the Greek by Wilfred H. Schoff (1912); Aristotle, Historia Animalium, trans. by D'Arcy Wentworth Thomspon (1910). Book II.

2 See J.R. Coxe (1846) The Writings of Hippocrates and Galen. Epitomized from the original Latin translations. Philadelphia

From the second to the early sixteenth century, any acquaintance with primates seems to have mostly perished with its possessors. The work of Conrad Gesner (1551), while historically important in gathering together the ancients' knowledge of primates, did not contribute to knowledge of types of apes and monkeys or their lifestyles. Filippo Pigafetta (1591) gave some accurate description of habits of baboons and chimpanzees but in some confusion, attributing chimpanzee behaviour to baboons. With Tulp (1641) there is a marked change in writing to a more detailed and accurate description of primates; however, a confusion of types remained (in this case, between chimpanzee and orang-utan). John Ray's (1693) development of principles of classification and nomenclature marked the beginning of modern systematic zoology and he produced order from the rather chaotic compilations of writers such as Gesner. Where Ray's work was a milestone in taxonomy, Tyson's (1699) work marked the beginning of exact and detailed description of anthropoid structure. His Anatomy of a Pygmie (chimpanzee) is, in the opinion of the Yerkes (1929), the most important contribution to anthropoid knowledge prior to the eighteenth century.

The most accurate eighteenth century source of information about primates is that of Buffon (1766)¹. Interest in the relationship of man to apes gave rise to comparative studies of the vocal mechanism, speech or other forms of vocalization, and of the anatomy of the hand and foot between apes and man. For instance, Lord Monboddo (1773) reviewed much of the available information about anthropoid apes in order to prove to his satisfaction the close structural and psychobiological similarity between man and great ape, and argued that speech is not distinctively human. Good anatomical and behavioural descriptions of the orang-utan were contributed by Vosmaer (1778), Camper (1779) and Wurmb (1798), though

1 Volume 14 of Buffon (1749-1803).

E. Geoffroy-Saint-Hilaire (1798) felt that Wurmb's morphological description was not of an orang-utan but of a new species of ape.

By the end of the eighteenth century, the three known types of ape (chimpanzee, orang-utan and gibbon)¹ were generally confused and the gorilla was practically unknown. The gibbon was uncertainly known and the chimpanzee and orang-utan were most often confused, partly due to the long-standing assumption that they were two varieties of the same ape, the black in Africa and the red in Asia (Yerkes & Yerkes, 1929).

The gorilla was not definitely identified until the nineteenth century. Its being made known to the scientific world was due primarily to the naturalistic interest of missionaries in Africa and their personal contacts with scientists and anatomists. One such team was T.S. Savage (a missionary) and J. Wyman (a scientist). The paper by Savage and Wyman (1847) is the first scientific publication about the gorilla, to which the specific name Troglodytes gorilla (Savage) was given after its discoverer (Savage, 1947). Almost simultaneously Owen, a British anatomist, made a careful study of the osteological remains of a gorilla and also decided that they differed sufficiently from the skeleton of Troglodytes niger (chimpanzee) to justify establishing a new species. He proposed to call it Troglodytes savagei after its discoverer (Owen, 1859).

Responsibility for the establishment of the genus Gorilla rests with Isidore Geoffroy-Saint-Hilaire. He noted that since 1828 his father Etienne had suspected the existence of a second type of African ape, and having assembled the widely scattered facts about the history and characteristics of the gorilla, Isidore proposed that it be called Gorilla gina (I. Geoffroy-Saint-Hilaire, 1858-61). This was the western lowland

¹ Strictly speaking, two great apes and a lesser ape.

gorilla, today designated Gorilla gorilla. The mountain gorilla¹ was not discovered until 1902 by a German colonial officer and was described by Matschie (1903). It is distinguished from the lowland gorilla at the subspecific level as Gorilla gorilla beringei, after its discoverer, Captain von Beringe. A third subspecies, the eastern lowland gorilla, is designated Gorilla gorilla graueri. Another recently identified species of ape is the pygmy chimpanzee or bonobo (Pan paniscus), first described by Schwartz (1929).

3.11 Modern Primate Studies

Twentieth century behavioural studies of non-human primates fall into two broad categories. One is study of the psychobiology (Yerkes & Yerkes, 1929) of primates, carried out for the most part in zoos or enclosures of varying sizes and in laboratories. Studies of apes kept in private homes and experiments to teach language to apes are included in this category. The other type of behavioural study, and the one of most concern to the present study, is observation of primates in their natural environment including suitable locations to which they have been imported, such as Cayo Santiago.

3.11.1 Psychobiological Studies

In the first three decades of the century, privately maintained enclosures provided one source of data about primate behaviour. Madame Rosalia Abreu established a primate colony in Havana, Cuba in 1902 (Yerkes & Yerkes, 1929; Reynolds, 1967). The Abreu colony contained gibbons, orang-utans, chimpanzees and several species of monkeys and was successful at breeding and rearing chimpanzees. It lasted for over forty years. Yerkes (1925)

¹ Also called the eastern highland gorilla (Napier & Napier, 1967).

fully described the colony and H. Bingham made studies there of parental play in chimpanzees (1927) and of sex development in apes (1928).

From 1910 to 1918 G.V. Hamilton privately maintained a primate colony at Santa Barbara, California. It contained mostly monkeys, but included at least one ape (Yerkes & Yerkes, 1929). Hamilton was interested in the problems of psychopathology and used the colony to study the nature and conditions of behavioural adjustment and maladjustment (Hamilton, 1911, 1914, 1916). It was here too that Yerkes (1916) conducted his comparative study of behavioural adaptivity in monkey and orang-utan.

In 1912, M. Rothmann and W. Waldeyer in Berlin set up a German station for biological research on apes on Tenerife, in the Canary Islands. They planned to use it for studies of functional neurology and psychology. The first resident investigator was a psychologist, E. Teuber. The second was W. Köhler, whose book The Mentality of Apes (1925) made the Tenerife colony famous.

In 1916 in Moscow, Nadie Kohts (1921, 1928) made psychobiological studies on a chimpanzee and some monkeys at the Zoopsychological Laboratory of the Darwinian Museum. In 1928 'Pastoria', a station for the experimental use of apes and other primates for medical research, was developed by the Pasteur Institute of Paris at Kindia in French Guinea. (Yerkes & Yerkes, 1929).

In 1924 the Primate Laboratory of Yale University was established in New Haven, Connecticut, in association with the University's Institute of Psychology. It was originally established for study of psychobiological problems using the chimpanzee as experimental subject. Yerkes's (1927) programme of research was for the setting up of stations or camps for study of primates in their natural environment, for a subtropical breeding station for study of reproduction, development and rearing of anthropoids, and for special laboratories for the study of psychobiological and social problems. The Primate Laboratory fulfilled the third request and in 1930

the second project - a breeding and observation station - was established at Orange Park, Florida, and named the Laboratory of Primate Biology (Bramblett, 1976a). The plan for naturalistic studies of primates was inaugurated by three of Yerkes's assistants, H. Bingham (1932), H. Nissen (1931) and C.R. Carpenter (1934). Before turning to field studies, one other group of pioneering studies should be mentioned: the psychological study of individual apes in the home, including attempts to teach language to apes.

V. Reynolds (1967) surveyed what he considered to be the best documented and most scientifically valuable accounts of apes kept in private homes. They will simply be listed here as fuller descriptions can be found in Reynolds's book. In 1913, Nadie Kohts in Russia raised an infant chimpanzee, Joni, for two and a half years (Bramblett, 1976a). In 1930, the Kelloggs (1933) of the Yerkes Institute, took a seven and a half month old chimpanzee named Gua into their home and cared for him with their own small son (aged seventeen months) for nine months. In 1932, Mrs. Maria Hoyt (1941) in Havana adopted an infant female gorilla, Toto. Though sold to a circus in 1941, Mrs. Hoyt bought Toto back in 1956 and in 1962 they were still together in New York (Reynolds, 1967). Cathy Hayes (1952) and her husband, a psychologist at the Yerkes Station, reared a female chimpanzee Vicki for six and one half years from her birth in 1947. Lilo Hess (1954) raised an infant female chimpanzee, Christine, on her farm in Pennsylvania around 1950. Desmond Morris (1958) tested the drawing abilities of Congo, a chimpanzee in the London Zoo, and showed that chimpanzees show the basic elements of composition and patterning in their 'art'. E.M. Lang (1962), director of the Basel Zoo, kept an infant gorilla, Goma, the first gorilla born in Europe and which had been neglected by its mother. Barbara Harrison (1961), wife of the director of the Sarawak Museum in Borneo, looked

after orphaned orang-utans, trying to rehabilitate them for life in the wild. Temerlin (1975) kept a female chimpanzee, Lucy, in his family home. Most recently, Terrace (1980) and his assistants have taught Ameslan to a young male chimpanzee, Nim, in predominantly a home environment. Laidler (1980) has attempted to raise an infant male orang-utan, Cody, as a child in his home.

3.11.2 Studies of Language in Apes

Studies of language learning in apes were at first unsuccessful attempts to make the animals talk. Yerkes attempted to teach a three year old male chimpanzee, Chim, to speak without success (Yerkes & Learned, 1925). The Kelloggs (1933) found that although their chimpanzee Gua could respond appropriately to about seventy English utterances, she could not duplicate any. Similarly, the Hayes (Hayes & Hayes, 1951; Hayes & Nissen, 1971) found that the female chimpanzee Vicki could not master speech, learning only four sounds that approximated English words, though she could readily imitate gestures. The Gardners (Gardner & Gardner, 1971) of the University of Nevada, suggested that it was only human speech and not the ability to communicate, that was beyond the ape's grasp. They suggested a more appropriate medium be used. Gardner got the idea to use gestures as the agency for communication from his brother, a playwright (R. Harré, personal communication) and decided to employ the American Sign Language (ASL or Ameslan) of the deaf.¹ In 1966 they obtained a wild-caught female chimpanzee of about eleven months and kept her in a house trailer. They did not attempt to simulate the environment of a human family, only to

¹ This was already anticipated by Yerkes in 1925 when he wrote: "I'm inclined to conclude from various evidences that the great apes have plenty to talk about, but no gift for the use of sounds to represent individual, as contrasted with racial, feelings or ideas. Perhaps they can be taught to use their fingers, somewhat as does the deaf and dumb person, and thus helped to acquire a simple, nonvocal, 'sign language' (quoted in P. Marler, 1980, p.221). Marler's source for Yerkes (1925) does not appear in the references and this passage does not appear in Yerkes & Learned (1925). However, there is no reason to doubt that Yerkes did in fact write this.

make the surroundings as interesting as possible. The chimpanzee, Washoe, named after Washoe county, Nevada, proved that two-way communication between human and chimpanzee is possible. After thirty-six months training, she had a reliable vocabulary of eighty-five signs and after fifty-one months, could use one hundred thirty-two signs reliably and even invent some new ones for novel objects. Her use of signs was fluid and her errors were reminiscent of those committed by deaf children learning ASL (Bramblett, 1976a).

R. Fouts (1973) followed up this work by teaching ASL to four young chimpanzees (two males and two females, thirty to fifty-one months old) at the Institute of Primate Studies, Norman, Oklahoma. They all readily accepted ASL and so showed that Washoe's ability was not unique.

The Premacks (1971a, 1971b) began a parallel attempt to teach language to a chimpanzee at the University of California, Santa Barbara. They used plastic symbols of different colours and shapes as part of a language they devised which they hoped had a more universal semantic organization than any human language.

Their subject was a five year old female chimpanzee named Sarah, housed in a chain-link cage. The Premacks claimed that she mastered nouns, verbs, the interrogative, 'yes', 'no', 'name of' and concepts such as 'the same' and 'different'. She acquired adjectives (colour names), position words such as 'in' and quantifiers such as 'one', 'none', 'all' and 'several'. She was introduced to the copula 'is' and to plurals and trained in logic of the form 'if-then'. She acquired a vocabulary of about one hundred thirty terms which she used correctly 75-80% of the time. Premack estimated that after eighteen months training, Sarah had language capabilities comparable in many ways to that of a two and a half year old human child.

A third method of teaching language to an ape is with a computer. This was the method used by Rumbaugh, Gill and von Glasersfeld (1973) at the Yerkes Regional Primate Center in Atlanta, Georgia. They taught a young female chimpanzee, Lana, to communicate with her keepers by pressing keys on a lighted keyboard. The keys had colour-coded symbols that represented vocabulary terms. These served a similar function to the language of the plastic chips, but the symbols of this language are called 'Yerkish'. After six months training Lana could reliably recognize symbols for approximately thirty words and respond to a machine-initiated sentence 'Please Lana come to door'. The use of a computer incidentally insured there were no clues as to the correct response unintentionally given by the human experimenter for at least some of the time. Lana learned not only to 'write' sentences, but to 'read' the sequences displayed by the computer.

The approach to teaching language to an ape taken in a study by Terrace (1980) was based on certain reservations he had about these earlier studies. He questioned how much of the language the chimpanzees had really understood; that is, whether they understood the meaning of the signs they were taught, or only used them as elaborate tricks for gaining rewards (Terrace & Bever, 1980). For instance, when Washoe signed 'time eat', she may simply have been imitating her teacher, adding the useless (meaningless) sign 'time' to 'eat' in order to get the reward of food, rather than out of a sense of it being time to eat. Although Washoe did sign to herself when she was not aware she was being watched, it is not known to what level of abstraction she was able to understand. Similarly, Terrace thought it unlikely that Lana at her computer console understood the meaning of 'please' or 'machine' in the sequence 'please machine give apple'. 'Please machine' is redundant and requires no understanding of what the terms stand for. She never had the chance to omit 'please' nor was 'please' contrasted with other related words. Lana simply had to

learn to associate the symbol 'give', for instance, with the symbol (lexigram) for such incentives as food rewards. Word order and so-called sentence construction may also have been learned simply by rote. The chimpanzee Sarah likewise performed for the reward of food. She learned that things have a 'name' but here too there is no unequivocal evidence of sentence structure.

In his own study, Terrace (1980) set out to do two things. One was to change the motivation of the chimpanzee for learning symbols from that of food and other immediate rewards (such as a game of 'tickle') to that of communication simply for the reward of greater integration with the humans around it. The other goal was to determine whether a chimpanzee can create a sentence. The hypothesis underlying these goals was that the potential to attach a symbol to oneself is important to the eventual acquisition of syntax. In speaking of a human child learning syntax, Terrace and Bever (1980) wrote:

"Human language has two important functions: (1) it facilitates communication (particularly about events and objects displaced in time and/or space and (2) it structures how we perceive ourselves and the world. The child's tendency to symbolize interpersonal relations between himself and others is obviously a fundamental ingredient of personality development in all human societies - in particular, the concept of self bounded on one side by desires and on the other by social patterns. A child's ability to refer to itself, its desires, and the social pressures of its environment requires little, if any, syntactic ability. Yet this basic function of language has profound effects. We suggest that the mastery of language to express feelings and to encode socially desirable and undesirable behaviors to oneself, may provide sources of motivation for advancing to more elaborate usages of language - usages that do require syntax. A necessary condition of human language may prove to be the ability to symbolize oneself. In our own research, we hope to see if this condition is sufficient for an already socialized chimpanzee by teaching it the concept and use of 'self'" (p.180).

The hypothesis was based on the argument that once we can think about ourselves symbolically, we can think abstractly about our relations to others and to the world. A basic function of syntax is to express the internal relations between different symbols. This in turn facilitates the representation and exploration of relations in the outside world. Terrace and Bever (1980) felt that one indicator of a symbolic self in a symbol-learning chimpanzee would be specific reference to its own emotions and feelings. A chimpanzee is prone to emotional expression of fear, anger, happiness, frustration, like, dislike, sadness (these of course are human terms and may not be felt in precisely the same way in chimpanzees, but we 'recognize' something like these human states in the ape) and, Terrace thought, it may be possible to teach a chimpanzee to name those states.

Terrace felt that whereas the human child learns language to please its parents and to represent its world, these motivations may be lacking in previous studies of language-learning chimpanzees. He took a newborn male chimpanzee, Nim, and taught it ASL for four years with the help of many volunteers. Every effort was made to 'socialize' the ape by giving it almost constant human attention during waking hours. Nim achieved a vocabulary of one hundred twenty-five signs and linked them together in pairs, threes and larger sequences up to sixteen signs. Despite all this, Terrace remains uncertain whether a chimpanzee can make a sentence. The long sequences were repetitious and redundant and compared with speech in a human child, the chimpanzee showed a lack of originality and spontaneity in signing, no increase in length of sequences and a lack of self-imposed grammatical structure.

Efforts continue to be made to teach language to apes. The Gardners have taught ASL to four other chimpanzees since Washoe and the chimpanzees use it among themselves. The Premacks taught three other chimpanzees to use the plastic chip language the the Rumbaugh team trained four other chimpanzees in Yerkish. There has also been a branching out into other

species. A Stanford University graduate student, G. Patterson (1978a, 1978b, 1979) has taught ASL to an infant gorilla, Koko. The third species of ape is represented by K. Laidler's (1980) recent attempt to bring up an infant orang-utan as a human child. His efforts to teach the orang-utan Cody (a male) to 'speak' after the fashion of the attempts of Yerkes, Kohts and the Hayes, have resulted in the ape's acquisition of four sounds.

3.11.3 Criticisms of Ape Language Studies

Two areas of doubt in the ape language studies have already been alluded to by Terrace (1980) and Terrace & Bever (1980). One concerns whether the apes understood the meanings of the different symbol systems (gestures, plastic chips and lexigrams) and another was that there is no conclusive evidence that the apes meaningfully relate the symbols (or have syntax). R. Brown (1980) considered the evidence for syntax in Washoe's strings of words. He compared the performance of two to three year old children with that of Washoe at three years. He found that whereas children could discriminate with respect to the order of the elements in two pictures of a dog biting a cat and of a cat biting a dog, Washoe does approximately the equivalent of producing all possible combinations for one picture. Thus, where the child says in response to the picture of a dog biting a cat; "Dog bite", or "Dog-cat", or "Bite cat" and to the picture of a cat biting a dog, "Cat bite", or "Cat-dog", or "Bite dog", Washoe does the equivalent of signing for either picture, "Dog bite", "Bite dog", "Cat bite", "Bite cat", "Cat-dog" or "Dog-cat". There is no evidence that structural relationships are understood. Brown (1980) suggested that a frequency comparison for a 'preference' for the correct order in the signing chimp would help determine whether the ape has any idea of the relationship between the objects.

In their erudite consideration of the ape language studies, Umiker-Sebeok and Sebeok (1980) discussed three sources of error in the findings of the experimenters. One is inaccurate observations and/or recordings of the ape's behaviour, another is the overinterpretation of ape performances and a third is the unintentional modification of the ape's behaviour in the direction of the desired results (the 'Clever Hans' effect). Their criticisms can only be briefly sketched here; they have brought together a substantial collection of papers written by linguists, psychologists, anthropologists and primatologists on this topic (Sebeok & Umiker-Sebeok, 1980).

Umiker-Sebeok and Sebeok (1980) point out that the necessity to use many observers for the arduous tasks of teaching and recording a signing chimpanzee results in the sharing and discussion of findings, diaries, and so on. This can lead to a situation in which an observer is 'primed' by a previous observer to 'see' a sign or to count any gesture that remotely resembles a sign seen by someone else as being that sign. Reports of what the ape has signed may be incorrectly recorded as the trainer has to rely on memory of complex sign exchanges to later enter them in a daily diary. Even with a second observer recording the exchanges between a trainer and an ape, the verbal reporting of what the observer thought was signed could influence the trainer's own interpretation of the ape's signs and thus influence the direction of the human-ape conversation.

Overinterpretation of the ape's spontaneous signing may be common in the literature. Lenneberg (1980) remarked:

"If we consider the animal's spontaneous productions and assess the appropriateness of these 'messages', we are simply testing our own ingenuity to assign interpretations to productions that might, for all we know, have been emitted randomly. It would always be possible to claim that the ape had intended to tell us something ..." (p.81).

In the so-called word 'innovations' of apes there is often not enough contextual information given to judge whether this is again over-interpretation on the part of the trainer. In the example of Washoe seeing a swan for the first time and creating a new compound of 'water' plus 'bird' (waterbird), she may simply have been responding to the familiar question "What that?" by first identifying a body of water and then a bird. There is no evidence that she meant a 'bird that inhabits water'.

One other area of criticism that can be mentioned is the social cuing of the apes. The edited films and photographs of the apes' performances usually do not show the trainer's face and activities at the same time. The argument here is that there is likely to be a great deal of social cuing going on in which, for instance, the trainer is tense and expectant after asking the ape to solve a problem and begins to relax as it starts to do the correct thing. The ape has a multitude of involuntary human cues to help it to decide what is expected. It was, after all, the change from the experimenter's anticipatory tension to relaxation as the correct response to a question was approached that allowed even a horse, Clever Hans, to perform what appeared to be mathematical and linguistic operations. In the few photographs in which he or she is shown, the ape trainer is seen to be giving off obvious social signals.

Many questions about apes' language abilities are still open: their possible abilities have not been disproved. There is a suggestion to use such studies to focus on interspecific communication between man and ape rather than to see how far an ape can perform a human language (Umiker-Sebeok & Sebeok, 1980). There is also interest to try to find out what the ape's view of the surrounding world is, to find the meaning of the so-called 'x-signs' (Terrace, 1980) that the chimpanzee Nim made which it had not been trained to do and which may have been efforts to communicate something unique to the ape's world. Recently, evidence that alarm calls

of vervet monkeys (Cercopithecus aethiops) function in a semantic manner has been presented by Seyfarth et al. (1980). They reported that the monkeys take different evasive action in response to different alarm calls which are given for different categories of danger, for instance, snakes, leopards or eagles.

3.11.4 Origin of Primate Field Studies: Anecdotal Reports

The second category of modern primate behaviour studies is the observation of social behaviour in the animals' natural environment. In America before 1920 there were no scientific studies of the natural behaviour of primates. Concentration had been on studies of anatomy and taxonomy. Most naturalist-type reports of primates were anecdotal with often naive and sometimes facetious treatment of the man/ape comparison. For instance, Garner (1896), who was in many ways a pioneer of primate field studies, was of the opinion that monkeys are "little effigies of the human race" (p.1). His descriptions of chimpanzee and gorilla life have more of an ethnographical than naturalist flavour. For example, he related that the chimpanzee is polygamous, but the father retains his children until they are fully mature, which is longer than males of most species. The family consists of three or four wives and ten or twelve children with one adult male. In cases where there are two or three males in the same family, each appear to have their own wives and children. In that event, however, one male seems to be supreme and this suggested to Garner that a form of patriarchal government prevails. He said that the wives and children do not appear to question the authority of the male, or to rebel against it.

The gorilla family, according to Garner, consisted of one adult male, a number of females and thier young. The father exercised the function of patriarch in the sense of a ruler. The gorilla family was in itself

a nation in that it did not associate with other families. The father or patriarch was called a king and was obeyed by the wives and children. Garner had heard from the natives that gorillas occasionally held a court or council in the jungle, about which he wrote, "To what extent the king gorilla exercises the judicial function is a matter of grave doubt, but there appears to be some real ground for the story" (p.216). He continued, "As to the succession of kingship there is no certainty, but the facts point to the belief that on the death of the king, if there be an adult male he assumes the royal prerogative; otherwise the family disbands, and they are absorbed by or attached to other families" (p.217). On sex and marriage among gorillas, Garner wrote:

"In the beginning of his career, in independent life, the gorilla selects a wife with whom he appears to sustain conjugal relations thereafter, and preserves a certain degree of marital fidelity. From time to time he adopts a new wife, but does not discard the old one; in this manner he gathers round him a numerous family, consisting of his wives and children. Each mother nurses and cares for her own young, but all of them grow up together as the children of one family" (p.214).

Other naturalist-explorers, such as T.A. Barns (1922, 1923, 1926) and Burbridge (1928) wrote in a similar, naively anthropomorphic fashion. An example of the humorous treatment of primate observations is that of Bradley (1922). Of gorillas she wrote:

"The organization seems to be a band rather than a family ... the group might consist of two or more males with a larger proportion of females. The question arises whether these bands consisted of two or more respectable monogamous couples and their marriageable daughters - or whether it consisted of a couple of gorilla gentlemen and their respective harems, or of unassorted and liberally inclined ladies and gentlemen" (p.133).

The nineteen thirties marked the beginning of more genuinely ethological reports of primate behaviour which were readily distinguishable from psychological and anecdotal reports. These later studies are of most interest for the present study. Their development is traced first through consideration of their instigator, R.M. Yerkes.

3.11.5 Robert Mearns Yerkes

Field studies were planned by R.M. Yerkes to supplement the experimental studies of the Yale Laboratory set up in 1924 to study the psychology of primates. In Yerkes, comparative psychology and naturalistic study of primates come together in that he was the initial driving force behind field studies. The route by which he came to advocate these studies is relevant to an understanding of the nature of some of the comparisons he made between man and other primates.

Yerkes (1876-1956) was part of the eugenics movement in America before and after the first world war (M. McClintock, 1981). A leading figure in the movement was biologist Charles B. Davenport. Yerkes had studied zoology with Davenport at Harvard University and then focused on animal psychology, receiving his doctorate in 1902. His research included constructing a phylogeny of intelligence in the animal kingdom. This was characteristic of the original 'mentalistic' approach of comparative psychology (Beloff, 1973) which advocated a hierarchical mental continuity between man and animals and was in contrast to the subsequent behavioristic orientation of comparative psychology.

Davenport was secretary to the Committee on Eugenics of the American Breeders Association created by the Association of American Agricultural Colleges and Experimental Stations. In 1901 he organized subcommittees to encourage study of human heredity in universities and other institutions (McClintock, 1981). The subcommittee on the inheritance of mental traits included E.L. Thorndike, R.M. Yerkes and F. Woods (Haller, 1963). The eugenics movement was international in scope and in 1912 Davenport and colleagues helped to organize the first international eugenics congress held in London. Psychology in America had no direct control over peoples' lives, but it influenced those who did. Psychological testing became attractive to military, business and industrial interests. By 1918 the

Galton Society was formed to forge close links between the scientific and business communities to promote work in human genetics. This interest gained strength against a background of social unrest in America and concern over a large, mostly unassimilated immigrant population.

Psychological counselling for industry began in 1915 at the Carnegie Institute of Technology under W.V. Bingham. A central figure in this was Yerkes, acclaimed leader of comparative psychology. Yerkes became President of the American Psychological Association in 1916-17. He organized a group of psychologists to help with the war effort in the areas of psychological testing, classification of personnel and in the investigation of special problems such as eye-hand co-ordination (Yerkes, 1920).

After the war, increasing social unrest between economically based classes and between races encouraged the growth of such 'ultrapatriotic' groups as the Klu Klux Klan. Psychology contributed to the unrest by providing 'evidence' for racial differences in intelligence. The findings of the intelligence tests developed by Yerkes and six other psychologists that 50% of the whites and 90% of the blacks drafted into the army had the minds of twelve year olds (Joncich, 1968) contributed to the conception of a hierarchy of nationalities with the Nordic race innately superior to others (Gossett, 1963).

In 1924 Yerkes became Professor of Psychology at the newly formed Institute of Psychology at Yale University. In 1925 he organized a laboratory for study of primate behaviour and in 1930 the breeding and research station was established at Orange Park, Florida. In 1931 permanent headquarters were established at Yale University called the Laboratories of Comparative Psychobiology (Yerkes, 1932). Virtually all primate research in America centred around Yerkes and his laboratories until the 1940's.

So far as the study of non-human primates was concerned, Yerkes (1916) felt that through the science of genetics, as advanced by experimental studies of monkeys and apes, practical eugenic procedures could be more safely based and the ability to predict organic phenomena greatly increased. He also noted that studies of fundamental instincts, forms of habit formation and social relations in other primates should lead to improvements in educational methods and other forms of social science. He concluded his monumental study with his wife (Yerkes & Yerkes, 1929) on the existing knowledge of apes with the question, "Why study anthropoid apes or any other infrahuman primate when so many idle and apparently nearly useless human subjects are at hand?" (p.588). This he answered by saying that the freedom does not exist to use humans to investigate various problems. Those investigations involved, for instance, in genetics, experimentation by selective mating, crossbreeding and artificial insemination; in physiology, operation of the living organism and radical changes in the functional economy; in neuro- and psychopathology, experimental control of neural development, production of atrophy or hypertrophy, inducement and control of mental defects and diseases; in sociology, experiments involving prolonged isolation of the individual, and in hygiene, experimentation on the phenomena and hygiene of sex with attempted control of the sex impulse and its forms of expression and continuous and comparative study of sexual and other aspects of reproductive activity and experience throughout the life history of an individual. Yerkes noted that for many of these lines of inquiry, apes must be used initially at least in preference to man as they cost less in terms of money, labour, anxiety and risk of social censure or legal infringement (ibid., p.589). He noted that structurally, physiologically and psychologically the apes resemble man much more closely than does any other animal and that they are inevitably the preferred substitutes in investigations which may not be carried out with humans

and which have as objectives the extension of knowledge and control of human life (ibid., p.590).

Thus, Yerkes's interest in comparative study of primates was for immediate application to social programmes for improvement of human behaviour. It assumed similarity of the basis of phylogenetic relatedness. How far Yerkes's students and later researchers shared his views cannot be fully ascertained. The publications of the most successful pioneer of field research, C.R. Carpenter, do not reveal much in the way of application of results to eugenics (though Yerkes continued to obtain funds for the work), and are perhaps best taken as studies complete in their own right.

3.11.6 Rise of Primate Field Studies

Yerkes saw the need for field studies to provide complementary and supplementary information to laboratory-based observations and experiments. Three of Yerkes's assistants each carried out a field study. The first of the studies to be reported was that of H.W. Nissen (1931) who observed chimpanzees (Pan troglodytes verus) in western French Guinea. The second field study published was that of H.C. Bingham (1932) on the mountain gorilla (Gorilla g. beringei) in the Belgian Congo. The importance of these attempts, despite their failure to collect much data, was in their preparing the ground for scientific field study of primates.

Primate ethology began in earnest with C.R. Carpenter, the third of Yerkes's assistants. Carpenter's (1934) first study was of howling monkeys (Alouatta palliata) on Barro Colorado Island in the Panama Canal Zone. He spent eight months doing intensive research on Barro Colorado, supplemented by two months' observations on two other subspecies of howler in the Coto region of northwestern Panama and on Coiba Island off the west coast of Panama. Subsequently, Carpenter (1935) made a preliminary report on the red spider monkeys (Ateles geoffroyi Kuhl) which he observed for

forty-eight days in the Coto region. In 1937 Carpenter made a one month survey of wildlife in Atjeh, North Sumatra, with emphasis on the orang-utan (Pongo pygmaeus abelii) (Carpenter referred to it as Simia satyrus) and its habitat (Carpenter, 1938). He published his major field study on the gibbon (Hylobates lar) in Siam in 1940.

In September, 1938, Carpenter trapped over five hundred rhesus monkeys (Macaca mulatta) near Lucknow, India, and shipped them to Cayo Santiago, a small islet of about thirty-seven acres off the southeastern coast of Puerto Rico. The idea was to have the monkeys in a setting where both laboratory and naturalistic studies could be carried out. In December the four hundred and nine survivors were released. Carpenter studied their sexual behaviour (1942a, 1942b). Carpenter established the methodology for study of animal sociology in America and may fairly be called the pioneer of Western field research on non-human primates (Russell & Russell, 1968).

At approximately the same time as field studies began in America, Sir Solly Zuckerman, a South African anatomist, made a detailed behavioural study of a colony of hamadryas baboons (Papio hamadryas) at the London Zoo, Regents Park. Professor G.E. Elliot Smith, a prominent anatomist and brain physiologist, encouraged him to present his studies to the Anthropological Society of University College, London. Encouraged by the reception of his work there, he pursued his study with a view to elucidating certain questions about the evolution of human society. On the basis of his research he published his well known book, The Social Life of Monkeys and Apes (1932) which was considered a milestone in primatology. Unfortunately, it was not realized at the time that the behaviour displayed by the captive and overcrowded hamadryas was highly aberrant and the conclusion that the main determining factor of social

grouping was sexual attraction was incorrect. Twenty years later, Michael Chance (1956), a British zoologist, began a new wave of research on the rhesus monkeys (Macaca mulatta) at the London Zoo.

With World War Two there was a lull in primate field studies but in the 1950's, the number of studies increased dramatically. It would be pointless to list all the pioneering postwar field studies done by European and American scientists on different species of primates. Such information can be found in almost any basic text on the subject. S. Altmann (1967) tabulated the cumulative man-months devoted to field studies of primates in natural and semi-natural (for example, island colonies) environments from 1930 to 1965. He found that since 1955 there had been a doubling of actual research activity every five years. He pointed out that on this basis the growth rate in primate ethology was faster than in scientific research as a whole, which doubles every fifteen years. The amount of research in this field during 1962 to 1965 alone was greater than all the research that preceded it (ibid., p.xi).

3.11.7 Applications of Primate Field Studies

Throughout its short modern history, scientific field study of primates has been undertaken to shed light on human behaviour. The man/animal comparison has followed two main lines of inquiry and attempted to do two things. One is to reconstruct the form of early human society and the other is to derive the biological or natural basis of human behaviour, particularly in the face of complex modern life. The modes of comparison are, respectively, speculation on the basis of adaptation to similar ecologies, and comparison from phylogenetic relatedness.

Boulenger (1936) argued that because man has evolved from an arboreal stock, we can see certain parallels in life-style of present day primitive

tribes and that of non-human primates. Carpenter (1940) wrote that man must be studied in the zoological context from which he came and of which he is a part. Count (1958) argued that if there is a morphology of the nervous system, there must be a morphology of behaviour, which he called a 'biogram' or way of living. Since the vertebrate nervous system has undergone evolutionary elaborations, it is to be expected, he felt, that the biogram has correspondingly been elaborated, but without being destroyed or otherwise radically modified. He wrote:

"The human has retained, practically unaltered, the physiology of the primate, but has developed the cerebral potential of the Order to an extreme degree ... In this regard there is nothing about the human brain that justifies its appraisal as anything other than the most intense expression of the primate potentiality" (p.1073).

Chance and Mead (1953) felt that the explanation of the enlargement of the neocortex would be in terms of adaptive evolution. The point was to discover the selective forces acting on man's ancestors. For this, behavioural studies of non-human primates were important to show the behaviour patterns that are characteristic of primates and "... to define those circumstances of their lives which precipitate particular stresses requiring a type of adaptive response not dependent upon possession of specialized effector organs" (p.396).

Speculation about early human society made on the basis of similar adaptations to similar ecologies began in earnest after it was realized that the social structure of even two groups of the same species differed greatly if they lived in different environments (for example, T. Rowell, 1967). In the 1960's an increasing body of palaeontological evidence added a further dimension to the reconstruction of early human society. The reconstruction consisted of investigation of ecological similarity in habitats of the species to be compared, of their adaptation to that environment and of archaeological evidence of early man. Crook and Gartlan (1966)

outlined this programme:

"Research on primate behaviour has tended to concentrate on similarities ... between taxa thereby allowing authors to make generalizations concerning the evolution of primate and human societies ... Analysis of function provides some understanding of the selection pressures responsible for adaptive change in social structure, and, given information regarding relevant ecological change in past time, allows the construction of evolutionary hypotheses" (p.1200).

This approach to reconstruction of early human society was followed by several authors, for instance, Bourlière (1961), Washburn and DeVore (1961), R. Fox (1967) and C.J. Jolly (1970).

Schaller and Lowther (1969) extended the comparative reconstruction on the basis of similar ecologies to study of the phylogenetically more distant social carnivores. These species, like early man and unlike other primates, regularly hunt in groups in savannah and forest fringe ecologies. The argument for their usefulness as comparative models is that man as a social hunter probably had similar pressures to adapt to as do existing social carnivores and furthermore would have competed with their ancestors for the same resources.

The second goal of the man/animal comparison has been to determine what are biological or genetically based tendencies in modern human behaviour. The comparison from phylogenetic relatedness is based on the assumption that animals closest to man are likely to show similar and perhaps homologous behaviour patterns. In the 1930's Klüver (1933) stated the problem: "It is clear that we have to study primates, and not only humans to determine what a 'typical' primate reaction is" (p.11). Numerous imaginative speculations have been made, often basing the comparison on particular aspects of non-human primate behaviour, such as toleration of strangers or openness of groups (Reynolds, 1966), kinship and family (Reynolds, 1968; Fox, 1975), early development and mother-infant relations (Hinde, 1974).

Comparisons using the non-human primate analogy on a more general level have also been made, such as that of Chance and Jolly (1970), Crook (1970), Fox (1975) and E.O. Wilson (1975). Recently, Reynolds (1980a) has addressed the question of the extent to which inferences can be drawn about human behaviour solely on the basis of man's evolutionary ancestry. Reynolds concluded that biology offers insights only on certain specific fronts, such as, through human palaeontology, an understanding of our emergence as a distinct species; a perspective on development from conception to maturity of our bodies, and 'behaviour' in the ethological sense; of disease and death and of psychobiology. However, the complex aspects of human life such as ideas and social arrangements cannot, in his opinion, be revealed or understood in biological terms.

Primate field studies have moved from being largely systematic descriptions of behaviour to a more analytical and synthetic stage, which has brought together and superseded the results of the approaches outlined above. There is emphasis on the development of a predictive model on the basis of comparisons of the structure of social behaviour in different natural environments and between different species of primates to establish a genuinely synthetic theory of primate social behaviour in which man may be included (Martin, 1979).

3.12 Summary

This chapter has summarized the conceptual background to naturalistic studies of non-human primates. Primate field studies were begun under the aegis of comparative psychology in order to provide complementary and supplementary information to laboratory-based observations and experiments and to reveal other significant problems about behaviour which could in turn be investigated experimentally. C.R. Carpenter's (1934) early study of howler monkeys (Alouatta palliata) set out the aims of his field study

which are still relevant to modern primate studies. He wrote that his purpose was to secure data on the behaviour, social relations and ecology of the monkeys and to observe the manner in which groups are organized and integrated. He planned to collect data on the monkeys' food habits, territoriality, nomadism, intra- and intergroup relations, reproductive behaviour and the relationship of the monkeys to their total biotic environment. Similar aims in more recent primate studies have been called 'socio-ecological ethology' (Michael & Crook, 1973, p.ii).

A modern application of these studies is to shed light on possible evolutionary stages through which protohominids and early hominids may have passed. Thus, the Darwinian inheritance which assumes that man is part of the evolutionary stream of all organisms is accepted and behavioural, anatomical and physiological continuity with other primates is assumed. Ethology and primatology use the comparative method to add the perspective of biological continuity to the study of man (Bramblett, 1976b). The main points of ethology as set out by its pioneers are: the view that animals possess specific innate 'characters' that can be understood by direct analogy with human character; study of animals in a natural environment; the assumption that emotions and physical attitudes ('gestures') are as much species characteristic as colours or structure, and the assumption of a comparative and evolutionary approach. For the comparative study of gesture, the development of an ethogram of each species is considered essential. In primate ethology, the identification of behaviour units comprises the ethogram of a species. By definition, primate ethology assumes naturalistic observation and an evolutionary framework.

Three themes stand out from the ethological background which have been applied to primate studies. One is the importance of field study

and another related theme is the study of the animals' whole way of life. These have proved very important in making Western researchers aware of the complexities of non-human primate social life. As more and more data has been gathered enabling more sophisticated questions to be asked about the dynamics of primate social life, descriptions of behaviour have correspondingly employed a wider range of ordinary language terms. It is these terms that give rise to the implication of purposeful behaviour or a generic anthropomorphism, as will be shown in chapter five.

The third theme that stands out from the ethological background is that of explanation for the present form of primate societies in terms of the adaptive advantage to members of the species, or the evolutionary framework. The presence of this theme will be seen to be in sharp contrast to Japanese primate studies in which evolutionary explanations for present behaviour are not used to nearly the same extent as in Western studies.

The next chapter collects together some of the scattered observations about terminological problems and anthropomorphism in primatology and makes the distinction between the two kinds of anthropomorphism that will become evident in Western and Japanese primate studies.

CHAPTER FOUR

ANTHROPOMORPHISM IN WESTERN BEHAVIOUR STUDIES

4.1 Introduction

In a discussion of anthropomorphism there is a certain urgency for prompt delimitation of an area of focus. In its most general sense, anthropomorphism is the attribution of human form or personality to anything: organic, inorganic or spiritual. An exhaustive treatment of anthropomorphism would, among other things, consider its applications in theology (the anthropomorphic view of God);¹ its relation to personification in literature; its use as a vehicle to moralize about human behaviour where animals were seen as projections of our own fears and desires, both in moral philosophy (for example, the Beast Within, first actively endorsed by Plato)² and in fables, and its application in those cultural beliefs throughout the world which have humanized the surrounding flora and fauna. The scholarly and comprehensive survey contained in Antal and Harthan's (1971) Animals in Art and Thought to the End of the Middle Ages highlights the important and pervasive presence of anthropomorphism, especially as applied to animals, in human thought. Though the tendency to anthropomorphize is now perhaps most readily associated with humanizing animals, we can see, as Hediger (1968) remarked, "... how alive in us this rooted tendency to humanize is even today by glancing at the advertisements, where for example we can see sausages or machines with human faces" (p.84).

1 Encyclopedia of Philosophy, vol. 1 (ed. P. Edwards): "The anthropomorphic conception of God is that in which predicates such as 'powerful' and 'good' are applied literally to God" (p.176).

2 M. Midgley (1978) has discussed Platonic, Aristotelian and Kantian use of beasts in her chapter 'Animals and the Problem of Evil'.

Within the limits of the present study, anthropomorphism in the scientific description of animal behaviour is discussed. The study is restricted to professional papers and books as opposed to 'popular' reports. The need for such restriction is clear as the inquiry centres upon the meaning certain terms acquire in the recording of animal behaviour, and not upon a secondary translation of that record involving possibly a different motive, especially in a popularized version.

Of the many slightly differently worded definitions of anthropomorphism in the literature, that of Katz (1937) seems the most unambiguous for the present purpose. His definition of anthropomorphism is:

"... to endow an animal with psychical capabilities like those of men and to say that it acts from similar motives" (p.19).

Such anthropomorphism is readily identifiable in descriptions like that of a naturalist, McCann (1928), who made the following notes on what he called the common Indian langur (probably the hanuman langur (Presbytis entellus)):

"They even made bold to enter the carriages to receive offerings of food and on one occasion I had two great fellows ... complacently eating the fruit I gave them. They accepted all they got as a right, but resented and were suspicious of any familiarity" (p.192).

However, even Carpenter (1935), though very conscious of problems of terminology, wrote of the red spider monkey (Ateles geoffroyi):

"When males ... are closely approached they may growl in a strikingly 'vicious' manner" (p.173). Carpenter's use of quotation marks around 'vicious' reveals his concern that too much is not read into the word.

Since the first scientific studies of primate behaviour anthropomorphism of a more conservative form has been apparent in most reports. It occurs through the use of ordinary language terms as basic units or elements of the animals' behavioural repertoire and as names for types

of social organization. By ordinary language terminology is meant terms that are used in ordinary discourse, that are not peculiar to ethology, nor technical neologisms, and that are usually used to refer to human activities. It includes the use of such words as 'threat', 'greeting', 'groom', 'hide', 'dominance', 'troop' and 'family'. Some are nouns, some are verbs; some refer to activities and relationships among the animals, others to the type of social organization (which is in effect a summary term for various relationships among the members of a group). The terms are of different levels of descriptive complexity; for instance, 'dominance' is inclusive of more aspects of behaviour and requires more interpretation of sequences of behaviour than does the term 'chase'. There are many ordinary language terms, such as 'nobility', that are rarely, if ever, used to describe animals in ethology, but the selection of appropriate terms is based on little more than a vague apprehension of 'anthropomorphic licence'. Thus, a term such as 'friendship' might not be used, whereas a 'bond'¹ is more acceptable in that it need not imply such a complex arrangement of emotions as does 'friendship'. Nevertheless, however more or less anthropomorphic ordinary language terms are considered to be, they reflect assumptions about behaviour based upon experience of human actions. Thus they carry in their meanings something about underlying mental states in humans which is carried over as attributes of the animals. F.V. Smith (1971), a psychologist, has called this "indirect anthropomorphism", noting that human behaviour²

1 For instance, Eisenberg et al. (1972) assume that the term 'bond' includes only social relationships between specific individuals based on the daily performance of mutually reinforcing activities (e.g., grooming, huddling) in addition to mating behaviours. A 'bond' is usually associated with two individuals of the opposite sex and thus termed a 'pair bond'.

2 This use of 'behaviour' by Smith is equivalent to 'action' in Weber's (1947) scheme (see section 5.3).

is commonly assumed to be purposive and derived from a conscious awareness of the environment and thus that to use the same language to describe the behaviour of animals is questionable for the reasons already stated. He includes as "questionable terms", 'chase', 'intercept', 'elude' 'avoid' and 'pursue' as well as the more explicitly purposeful words 'endeavour' and 'strive'.

The difficulty with ordinary language is that the terms have vague meanings when employed in ethology because they cannot be completely defined in terms of neurochemical control (which is mostly unknown) or movement. The detailed morphology of expressed behaviour differs even among individuals of the same species thus giving rise to the additional problem of non-comparability of terms based on this sort of definition. This problem was also recognized by human ethologists where, for instance, Grant (1969) noted that if description of behaviour is most acceptable at the level of a complete record of the pattern of muscular contraction, then we would have to recognize, for instance, 'fleeing' by walking rather than by flying or swimming as separate elements. Ethologists have developed more sophisticated techniques to posit some uniformity in the concepts of fleeing, threatening, and so on. They have used, for example, causal or functional criteria which can be applied with consistency across species.¹ Thus, 'warning' conspecifics about a potential predator may be recognized (defined) by the function that the behaviour fulfils regardless of how it was manifested (for instance, by shaking branches, calling, running or freezing). However, the problem remains that the existence or nature of the animal's intention to perform the function, or maintain group relations, and so on, though implied by the terms, is not at all clear.

¹ But see Purton (1978) for the problems of category conflation in this approach. (p. 121 ff.).

The implication of intentional actions or purposefulness in animals is considered undesirable by most ethologists. Tinbergen's (1951) remark is quite often repeated with regard to this; namely, "Because subjective phenomena cannot be observed objectively in animals, it is idle either to claim or to deny their existence" (p.4). The existence of subjective awareness in animals is still an ontological rather than epistemological question and that being so, it cannot be objectively studied. Perhaps less well known, because he has often been criticized for his anthropomorphic descriptions, is Lorenz's (1956) distinction between ethology and "subjectivist psychology" which claims to know something about the subjective experience of animals. He noted: "We hold, for epistemological reasons, that no such attempt can be considered scientific" (p.67). Tinbergen (1951) emphasized however, that the ethologist does not want to deny the possible existence of subjective phenomena in animals, only that it is futile to present them as causes of behaviour as they cannot be objectively studied.

It is apparent from these statements that the attribution of human psychical experiences to animals, or anthropomorphism, is closely related in the minds of the scientists to a subjective or intuitive approach to animal behaviour. It seems in fact to be one of the main reasons for the condemnation of anthropomorphism. Thus, Tinbergen is actually criticizing the apparent impossibility of intersubjective agreement on states that cannot be objectively observed in animals, rather than the ascription of subjective phenomena per se. Though related, the conflation of anthropomorphism with a methodology has given rise to some confusion among animal behaviourists as to what anthropomorphism actually means. For instance, Hediger (1968), an animal psychologist, stated that, "... the biologist must carefully guard against the intrusion of anthropomorphisms" (p.84). Yet later in

the same book he gave an example of interpreting vulture behaviour by relating that when a condor greeted a human friend in Amsterdam Zoo by spreading its wings, a vulture mistook this for the condor's sunning itself and so followed suit until "... it realized its mistake and discovered that the sun was not shining at all". Hediger continued,

"Anyone critically inclined can of course object that this is just assertion without proof, since I could never know what was going on in the vulture's mind. The objection is theoretically justified. On the other hand, it must be stated here and now that people who have some experience in this field, and who see hundreds or thousands of animals daily eventually, by noting the expressions, develop a kind of intuition, rather like a doctor's diagnostic sense" (p.143).

He also noted that animal psychology could be described as "the investigation of behaviour, plus sympathetic understanding". This implies that intersubjective agreement is possible among peoples' intuitive judgements. Animal psychology would not exist as a discipline if its practitioners could not understand one another. Likewise, the ethologist Bierens de Haan (1947) rejected a rigidly objective approach that denies subjective experiences in animals, yet criticized the earlier anecdotal evolutionists (after Darwin) of generating an anthropomorphizing of the animal and overestimation of its psychic capacities.

Callan (1970) has made the point that it is unclear how the attribution or not of subjective experiences to an animal is related to the aim of understanding its behaviour, or how much of the subjective and often non-communicable aspects of field work can be allowed to contribute to the observer's assessment of what he sees. Two varieties of the intuitive approach are evident: one is a sympathetic open-mindedness towards the object of study and the other is the 'if I were a horse' type of thinking whereby the observer enters empathetically into the animal's situation. Thorpe (1979) appears to advocate the latter approach.

He wrote:

"... when we are studying living animals, which are in some degree, however slightly, similar to ourselves, it is always salutary to attempt to put ourselves in the animal's place in our imagination, and consider what we should do in similar circumstances" (p.xi).

Thorpe felt that if we have learned enough about the animal's sensory equipment and its 'world' (in perhaps the sense of von Uexküll's Umwelt) by objective experiments, then a subjective attitude can be of value in designing better subsequent experiments and in knowing how to evaluate the animal's behaviour. Exactly how it helps one to evaluate observed behaviour is not explained by Thorpe and there is always the likelihood that the observer will impose his own human Gestalt on the animal's situation. An advocate of what appears to be the first variety of intuitive approach, a sympathetic open-mindedness toward the animal, is J.S. Huxley (1962):

"It is ... both scientifically legitimate and operationally necessary to ascribe mind, in the sense of subjective awareness, to higher animals. This is obvious as regards the anthropoid apes: they not only possess very similar bodies and sense organs to ours, but also manifest similar behaviour, with quite a similar range of emotional expressions ... It is equally legitimate and necessary for other mammals, although the similarities are not so close. We just cannot understand or properly interpret (their) behaviour ... unless we do so to some extent in mental terms. This is not anthropomorphism: it is merely an extension of the principles of comparative study that have been so fruitful in comparative anatomy, comparative physiology, comparative cytology and other biological fields" (p.167).

The necessity to ascribe mind to animals if we are to fully understand their behaviour is explained elsewhere: Huxley (1923) wrote that, "... to omit a whole category of phenomena (mental) from consideration is unscientific and must in the long run lead to an unreal, because limited, view of things" (p.107). Huxley understood animal character and emotion by analogy with man, in the same way that humans understand

and interpret the subjective experiences of other human beings.

While it may be true that in the present state of the science any serious anthropomorphism can only be supported by a subjective approach, it is also true that the anthropomorphism arising through ordinary language terminology appears in reports carried out with scrupulous attention to an objective methodology. It occurs simply as a result of the nature of our language, or more specifically, meaning in language. Remarking on the attempt by behaviorists to describe only the outer manifestations of behaviour and to deem inner experience indescribable and thus omit the behaving agent, Midgley (1978) noted that this cannot succeed. She wrote:

"It fails inevitably because most of the terms in which we can describe behavior effectively do refer to the experiences of the agents as well. Reference to a conscious subject always slips in, whatever the dis-infecting precautions, simply because language has been so framed to carry it" (p.106).

An inheritance from Cartesian philosophy is the supposition that man alone among animals has a reasoning mind. Thus, any ascription of purposeful behaviour to animals is anthropomorphism. A distinction is suggested here between general or generic anthropomorphism and specific anthropomorphism. The former refers to the ascription of (a general) purposefulness to higher animals, i.e., animals are aware of what they are doing, but does not imply that psychological experiences are necessarily exactly the same in animals as in man. On the other hand, specific anthropomorphism refers to the ascription of particular or specific mental and emotional states to animals and to describe them in 'human terms'. Thus, J.S. Huxley's (1962) statement (quoted on the preceding page) that to ascribe subjective awareness to animals and interpret their behaviour to some extent in mental terms is not anthropomorphism, refers to not being specifically anthropomorphic according to the distinction just outlined. He is, however, advocating a generic anthropomorphism.

Midgley's (1978) statement supports the contention that generic anthropomorphism is inevitable or unavoidable in primate behaviour studies due to the nature of language. The vocabulary of greeting, dominance, avoidance, courtship, and so on is imbued with generic anthropomorphism; the terms refer to more than only the movement patterns by means of which they are defined. The basis for this inevitable anthropomorphism is the concern of the inquiry into Western studies of primate behaviour.

Because ordinary language terms form the bulk of the descriptive vocabulary of primate ethology, it is useful to note the related terminological problems that have concerned primatologists about its use. A review of these notes makes it clear that anthropomorphism has not received any systematic treatment with the exception of part of an M.Phil. thesis by Purton (1970). That is not to say that anthropomorphism is not considered a problem by field primatologists; a great many reports include a sentence or two to the effect that the author is aware of the possibility of its unsolicited presence.

The different 'categories' of anthropomorphism evident in behaviour reports will be exemplified, and arguments about the use of anthropomorphism and the nature of subjective awareness in animals will be presented. The anthropomorphic nature of early ethological work is re-examined. The critical attitude of many primate ethologists to anthropomorphism is shown to be an argument against the use of specific anthropomorphism. Although the study does not address the question of whether or not we should ascribe subjective awareness to animals, the comparatively new field of cognitive ethology will be considered. Its practitioners would probably deny that ascribing purposefulness to animals necessitates a subjective approach to behaviour. Rather, they are seeking ways to objectively prove the existence of subjective awareness in animals and emphasize the necessity to consider it in explanations for animal behaviour.

4.2 Problems of Terminology

Problems with the use of an ordinary language or qualitative terminology have been mentioned only in passing in most behaviour reports and even in books that review ethology generally (for instance, Tinbergen, 1951; Lorenz, 1971; Bateson & Klopfer, 1973; Hinde, 1970, 1974). Exceptions to a superficial treatment are few and the work on particular aspects of terminology by S. Altmann (1965, 1968), Reynolds (1976), Asquith (1978) and Purton (1970, 1978) will be set out below. Yet qualitative terms are of necessity so pervasive throughout all studies that it is almost self-defeating to criticize their use. Reflection upon the state of a terminology is a comparable enterprise to Neurath's description of science which he likened "to a boat which, if we are to rebuild it, we must rebuild plank by plank while staying afloat in it" (Quine, 1964, p.3). Perhaps fortunately it would be a virtually impossible task for any one person or team to consider all aspects of terminology in any one area of science.

The incidental references to terminology, however, which appear since the early field studies in primate ethology, have raised numerous different kinds of problems. Over and above their intrinsic value, primate behaviour studies provide comparative data by which to speculate about early hominid behaviour and the biological basis of modern human behaviour. As the behavioural history of man encompasses his mental, social and physical development, not only zoologists, but also anthropologists and psychologists are interested in primate field studies. The eclecticism of its membership has had a predictably confusing effect on terminology in the borrowing of terms and their attendant meanings across disciplines. As early as 1940 C.R. Carpenter noted that the final reporting of field observations was made difficult where it was necessary

to borrow available descriptive terminology which was either more suited to laboratory experiments or to common speech than to field observation. He mentioned that the attempt to introduce a new and occasionally specialized terminology to describe animal activities in the wild was not generally accepted.¹ Twenty years later Carpenter (1962) and K.R.L. Hall (1963) reiterated the problem more specifically. In Carpenter's words,

"The diversities of backgrounds, differences of training standards, the plurality of orienting conceptual systems and approaches to investigations, and the heterogeneity of technical terminology, or indeed the lack of a commonly used and understood technical language, all constitute major unsolved problems for the emerging science of primatology" (p.491).

Bourlière (1961) warned that terms that had precise human sociological significance should be avoided for describing primate social organization. Again in 1969 at the second congress of the Primatological Society, Carpenter outlined what he felt to be two of the most pressing concerns for primatology. One of those was to develop systematic, validated and generally acceptable taxonomies and classification of behaviour. (The second was for study of more kinds and numbers of species to facilitate generalizations about behaviour).

In addition to problems with borrowing of terms across disciplines, was mention of the difficulty of attaining an objective approach to behaviour. Once again, Carpenter (1962) was very aware of these problems:

¹ I have, however, not found any evidence of the specialized terminology except for his 'socioeconomic sex ratio' (the ratio of group-living males to females (Carpenter, 1934)) which was taken up in the literature.

"The major problem which is illustrated and must be confronted honestly by field investigators and especially those working in the areas of behavior and social interactions, is that of developing objective conceptual approaches and corresponding language and appropriate styles of reporting clearly and accurately the predominantly qualitative observations that are made. To achieve this is most difficult without rigorous extended training, persistent effort to achieve these goals and the development and use of what might be termed scientific literary criticism" (p.491).

An intuitive approach extended sometimes to the identification of a social unit of animals in the field, and the naming of a social group is dependent upon this initial identification. Thus Rowell (1966) noted that the 'troop' of forest living baboons (Papio anubis) she was observing had a fluctuating membership. Individuals moved between two groups, groups occasionally joined together and there was occasional division into smaller groups. Because of this, Rowell felt that the validity of the 'troop' as a population unit might be questioned. She said however, that there was no subjective doubt in the field as to the entity of the troop, probably because each troop had a stable nucleus of known individuals.

An interesting variation to the view that one should be careful not to read too much into primate societies by using terms with precise significance in human behaviour was that of Klüver (1933) who felt that the human model might well restrict findings:

"It is clear that we have to study primates, and not only humans, to determine what a 'typical' primate reaction is. It is highly probable that the categories which have been evolved for the understanding of human behavior and which ... have become instrumental in shaping the course of our research on sub-human primates will turn out to be quite inadequate for the description and for the understanding of primate behavior in general; it is very likely that research on sub-human primates will reveal factors the nature of which cannot even be guessed on the basis of present studies of human nature" (pp.11-12).

Something like this point seems to have arisen again only recently with reference to interpreting the language abilities of apes. For instance, Menzel (1978) disagreed with the assertion that because chimpanzees in the wild have not been seen to use anything that approximates a language, they probably do not have one, despite the apparent linguistic capacities they have demonstrated in captivity. He felt that it is possible that their communication systems are more complex than we suspect today and that,

"... in addition to the problems that chimpanzee societies share with many other animal societies we must also look with special care for problems that might be unique to them, for here might be the secret of whatever uniqueness they have by way of communicative behaviours" (p.892).

The efforts to teach a young male chimpanzee, Nim, to communicate his emotions through ASL (referred to in chapter three) brought about an apparent effort on the part of Nim to express something for which he did not have a sign. Terrace (1980) called these 'x' signs. Reynolds (1980b) has distinguished between chimpanzees living under natural conditions and chimpanzees that are raised in a human environment (which is the case for those that are taught a 'language') by naming the latter 'chumans'. He has suggested that rather than ask, 'can a "chuman" be said to think and communicate like a human?', we could ask 'how do "chumans" think?' If the 'x' signs made by Nim could be interpreted, they might afford some insight into the chimpanzee's (or at least the 'chuman's') world or those aspects for which humans have provided them no signs. These statements emphasize the fact that the terms by which we describe and understand animal behaviour have a human referent. What has been described in the chimpanzee language experiments are activities that may be analogous to or that simply remind us of human activities because those are the terms in which we think.

Detailed studies of terminology are rarer in the primate literature. Between 1956 and 1962 four studies of Macaca mulatta were carried out (by Chance, 1956; Reynolds, 1961; S. Altmann, 1962, Hinde & Rowell, 1962).¹ Reynolds (1961) and Altmann (1965, 1968) drew up comparative lists of terminology used in the four studies and noted some discrepancies in both names of behavioural elements and the more inclusive categories of behaviour. Reynolds (1976) then made a detailed analysis of the behavioural catalogues and discerned various bases for naming observed behaviours and grouping these elements into wider categories. His comparison of the behavioural catalogues of Chance (1956), Reynolds (1961), Altmann (1962) and Hinde and Rowell (1962) revealed that only sixteen descriptive terms seemed to refer to the same kinds of behaviour, though most of the terms themselves differed. By excluding Chance's study, he found a further eight behaviours common to the three other studies, but which again had been labelled differently by each observer. There were, then, a total of twenty-four types of social behaviour that seemed, despite terminological inconsistencies, to have been seen by different observers of separate rhesus monkey groups and were therefore arguably species-characteristic behaviours. The question remained, however, whether the other differences in the behaviour catalogues reflected actual differences in the monkeys' behaviour, or differences in the observers' classificatory systems, or arose from differences in their aims and interests.

At the more inclusive level of classifying behavioural elements into wider categories, the category schemes in all four studies were incompatible

¹ Also Rowell and Hinde (1962). Their study was published in two parts, one dealing with vocal communication and the other with postural communication.

with each other. Reynolds identified several different ways by which the authors had grouped their terms: namely, according to the sense modality of the behaviour (vocal, auditory, olfactory), the social and contextual situations in which the behaviour occurs (mother-infant, agonistic patterns, etcetera), motivation (fear, submission) or locomotor (sitting postures). He suggested various principles by which the category structures may be derived (p.40):

- "(a) sequentially, i.e., acts occurring one after another are grouped together;
- (b) chronologically, i.e., acts occurring in particular time zones are grouped together;
- (c) morphologically, i.e., acts referring to the same parts of the body are grouped together;
- (d) on a sensory basis, i.e., acts involving the same sense modality are grouped together;
- (e) functionally, i.e., acts having a common effect or consequence are grouped together;
- (f) ontogenetically, i.e., acts linked together in a developmental sequence during the life of the individual are grouped together;
- (g) causally, i.e., acts sharing a common cause are grouped together, and in this case we can distinguish internal causes, i.e., motivations, from external ones, i.e., environmental factors;
- (h) evolutionarily, i.e., those types thought to have a common phylogenetic origin are grouped together, or
- (i) contextually, i.e., acts occurring in a given situation are grouped together."

Finally, Reynolds suggested several reasons for differences in the initial naming of behavioural elements: (i) observers may have different aims in view, and make, for instance, certain areas of behaviour their centre of interest and exclude others; (ii) they may lump or split behaviour into fewer or more named sub-units; (iii) they may be influenced in their choice of terms by prior studies; (iv) they may have different language usage, for example: (a) dialect differences, such as inventing a neologism like 'gethering' (Rowell's term for Reynolds's 'sputtering'), (b) effects of translation from one language into another, (c) the vocabulary or articulateness of the observer, (d) the observer's prior field, e.g.,

anthropology, psychology, zoology, (e) the implicit social theory of the observer, or cultural effects on what the observer may see and how he may characterize behaviour, or (f) principles of naming, for instance, motivational, contextual, functional, etcetera. Two other factors that may affect naming the behavioural elements are: (v) access to the group studied, i.e., (a) distance from animals, for instance, observers of a caged group may make more fine-level signalling distinctions than observers in the field and (b) technological aids, for instance, the use of spectrography can reveal much finer distinctions of vocalizations which will appear in the behavioural catalogue and (vi) catalogues may differ due to mistakes made by the observer in the field or in making comparisons with other catalogues, and a longer time spent in the field will usually result in more behavioural elements being distinguished.

Reynolds's study is to date the most comprehensive outline of factors affecting the observer and his choice of terms. It raised some important points for re-evaluation of existing studies and for future primate studies. For instance, the inevitable trend to make specific study of particular categories, such as agonistic activities, mother-infant behaviour, sexual behaviour, and so on, brings into question where the 'borders' of the study should be, after one sees that there are so many possible ways of grouping a set of behavioural elements into categories. Thus, the chosen area of study may be indistinct. Another important question raised by the study is how far differing descriptions of behaviour reflect actual differences in the monkeys' behaviour and equally for similarities of description.

Another area of terminological difficulty noted by the present author (Asquith, 1978) was in the non-comparability of names for the social organization of primates. Besides the behavioural elements (flee,

chase, threat posture) and second-level categories of behaviour (dominance, courtship), a more inclusive set of terms are those that describe social organization (party, band, troop, multi-male troop, etcetera). Naming several animals that are in some way 'together' a 'troop' (or 'band' or 'party') implies something distinct from a merely amorphous gathering. Primatologists have been interested in this level of behaviour in terms of the adaptive significance of differences in group structure, though there is growing emphasis on the causal and developmental and not only functional aspects of social organization (Kummer, 1971; Hinde, 1978; Mason, 1978). Justification for calling terms of social organization 'behavioural' terms is that social structure is dependent upon the behaviour of individuals and labelled according to the relationships observed to hold among group members (Vaitl, 1978).

The point the present author wished to make was that when we speak of the intra- and interspecific comparability of social organization it might be helpful to treat the terms that describe it as vocabulary that needs defining in the same way as the vocabulary of behavioural units and categories. Definitions in terms of such things as group size and age/sex composition do not adequately distinguish among group structures. They have not given any uniformity of definition by which to compare, for instance, a 'troop' in one species with a 'troop' in another. In other words, we would not know what a 'troop' of a hitherto unstudied species was until we had the specific definition of what the word 'troop' was to denote from a particular observer. This can happen even when another observer has previously given a version of his definition of 'troop' in this or another species.

Examination of the term 'troop' as employed by primatologists in several studies revealed major discrepancies in what it signifies.

Meanings differed with regard to number of members, age/sex composition, specific roles of members, marching order, home range, territory, openness and aggregating and dispersing tendencies at different times of the day. Not only were there differences in number of members as would perhaps be expected, but by no means did all employers of 'troop' include reference to all the above mentioned aspects. If social organization is thought of as a derivative of behaviour then a particular kind of social organization should be identifiable from aspects of its behavioural base. We do need to note aspects such as number, composition and so on, and these differ from group type to group type in some cases, but as they give no uniform meaning for a particular group term they are not the best criteria by which to define it. What is needed are fixed behaviour-based criteria that can be applied to varying groups that may vary in demographic aspects but that we would still want to call a 'troop' rather than a 'band'.

A suggestion as to what those fixed criteria could be was taken from Wilson's (1975) 'qualities of sociality' (pp.16-18), or features that distinguish a communicating and co-operating group from a mere aggregation of animals. By dividing Wilson's list of qualities of sociality into demographic factors and behaviour-based factors it was possible to suggest the elements in a definition of social structure that would be consistent across groups and species. Thus, such qualities as the connectedness of a group or the network of communication (this can be unpatterned where all signals are directed randomly at any individuals, or patterned where different kinds of signals are directed at particular individuals or classes of individuals); the permeability or openness of a group; compartmentalization or the extent to which subgroups of a society operate as discrete units; roles or specialization

of behaviour of members; integration of behaviour or co-ordination of those specialists, and information flow or the magnitude of communication flow among individuals, could be regarded as fixed criteria by which to define a group. Not all societies need show all these qualities and more complex societies may show more of them. Thus, for instance, if one wished to define a certain social group partly in terms of openness (permeability) it does not necessarily matter whether it is ten or twenty animals that are involved in tolerating strangers of the same species; the quality of openness that characterizes the group (or other groups so-named) remains the same. Some of these qualities of sociality have already been included in definitions of social groups, but not exclusively nor in a systematic way.

A third study of terminology considered the consequences of conflating categories of behaviour in ethology (Purton, 1978). He addressed his remarks to ethology as a whole, but they are relevant to primate studies. Purton made the point that various schemes of classifying observed behaviour are not necessarily compatible and their conflation can be seriously misleading. He noted four general questions that can be asked about behaviour: What is the form of this behaviour? What is its function? What is its cause? and What is its purpose (in the psychological sense)? (These differ substantially from Tinbergen's (1951) original four questions ethologists ask about behaviour (see pp.70-71)). Of these four ways in which behaviour can be understood, Purton concentrated on the first three in this paper.¹ The questions provide different contexts in which behaviour can be described; namely,

1 In his thesis (Purton, 1970), he discussed purposive definition of terms at length. As it is directly relevant to anthropomorphism in description, it will be considered in another section (see 4.4).

in formal categories (the form or type of movement pattern that occurs, such as 'nodding', 'facing away', 'ventral roll'); in functional categories (how it contributes to the survival of the species, or the effect of the behaviour, such as 'threat', 'appeasement', 'courtship'),¹ and in causal categories (the physiological basis or cause of behaviour underlying, for instance, 'aggressively motivated' behaviour, or behaviour caused by mechanisms which are also causally responsible for attacking, fighting, and so on).

One problem with these different categories existing side by side is that what counts as 'the same sort' of behaviour according to one classificatory scheme may not count as 'the same' according to another (Hinde, 1970 and Reynolds, 1976, have already noted this). Thus, courtship behaviour, defined functionally, may involve quite different sorts of causal mechanisms in different species, so that behaviour patterns that are functionally similar in that they exemplify courtship, may be of quite different types when categorized according to the physiological systems that give rise to them.

Likewise, behaviours classified together functionally as appeasement displays may involve in different species quite different sorts of movements or other physical changes. Purton analysed the root of the confusion arising from conflating the formal and functional aspects of behaviour by reference to 'cluster concepts' (Putnam, 1966). Purton (1978) explained:

1. These same terms can also be read in a psychological context and then imply purposefulness and become anthropomorphic (Purton, 1970).

"A cluster concept is one such that it applies to a thing just if that thing has many or most (but not necessarily all) of a cluster of characteristics which tend to occur together. Thus a concept of a metal, such that substances count as metals if they have many or most of the characteristics: shiny, dense, good conductor of heat and electricity, malleable, ductile, would be a cluster concept. Things to which such a concept applies do not necessarily have any one characteristic in common; instead there is what Wittgenstein (1953) called a 'family resemblance' between them. The criteria for the application of such concepts are obviously multiple: a material will count as a metal if it satisfies any one of a set of criteria, each of which involves having a set of characteristics" (pp.656-7).

The basic condition for the employment of a cluster concept is that the set of characteristics must be known (or believed) to be associated in a lawful way. With the cluster concept of a metal there is a lawful connection between a material's having the characteristics A, B, C, D, E, and its normally having F; between its having A, C, D, F, and its normally having B and so on. These relations hold through certain laws of chemical structure. If they did not hold, the cluster concept of a metal would have no use.

In ethological concepts, such as threat or appeasement, in which some of the elements are formal and some functional, the cluster concept meets with serious problems, because the formal elements (types of movement) that also have the function of, for example, eliciting escape (together defining 'threat') in one species, may be the same as the formal elements that also have the function of eliminating attack (together defining 'appeasement') in another species. For example, 'threat' in the sandwich tern (Sterna sandvicensis) (van Iersel & Bol, 1958) is defined by the elements: (i) head-nodding, (ii) display of prominent markings, and (iii) function of eliciting escape, whereas 'appeasement' in the night heron (Nycticorax nycticorax) (Lorenz, 1938) is defined by the elements (i) head-nodding, (ii) display of markings

and (iii) function of eliminating attack. There are no general laws linking functional characteristics with formal characteristics; the relation varies from species to species.¹

Purton noted that some behaviours are classified solely by their formal characteristics, such as the 'upright' of most gull species. These classifications are very useful in studies of homology and phylogeny. There is also the possibility of a thoroughgoing functional classification, for terms such as threat, appeasement, etcetera. As has been shown, behaviours which are of the same type according to one scheme will not necessarily be the same according to the other. However, both are essential to an understanding of behaviour. Thus Purton proposed that one cannot construct a satisfactory ethogram for a species by merely 'listing its displays'. Two lists at least are needed: a functional list and a formal list. Ethologists generally commence by classifying formal characteristics and then begin to inquire about function. However, if they have more general questions about, for instance, courtship in different species, the formal elements will be irrelevant.

Purton noted that besides the formal, functional and causal classi-

¹ A similar problem has been discussed in social anthropology. R. Needham (1975) noted that the traditional idea about members of a class was that every member must have some property in common. This is not, however, the only method of grouping things into classes. In Wittgenstein's (1953) 'family resemblances' there is the idea that among members of a class there is a complex network of similarities overlapping and crisscrossing; sometimes there are overall similarities and sometimes similarities of detail. Under this head, a class is no longer necessarily defined by the invariable presence of certain common attributes. Since members of a class are not identical, what is known of one member of a class is not necessarily true of the other members. Needham gave the example that if in patrilineal societies there are six elementary ways in which rights can be transmitted from one generation to the next, at least two of three societies classified as patrilineal might not have any formal aspect in common: i.e.,

A p, q, r B r, s, t C t, u, v	}	Elementary modes in which rights can be transmitted (p.351).

A and C are both patrilineal societies, but are unlike in formal characteristics. This causes difficulties in comparisons of social types.

ficatory schemes in animal behaviour studies there is another:

"In addition, a fourth scheme plays an important background role, i.e., our ordinary scheme of talk about human actions which centres around questions concerning motive or purpose" (p.668).

This fourth scheme of ordinary language discourse is 'background' only by virtue of its ubiquity. It informs almost all description of natural animal behaviour and it is this 'motivational' category that gives rise to anthropomorphism in description. The remainder of this chapter examines its various forms and attitudes of primate ethologists to its use.

4.3 Categories of Anthropomorphic Terminology

The definition of anthropomorphism, to endow an animal with psychical capabilities like those of man and to say that it acts from similar motives, appears clear enough but in practice finer distinctions may be needed. There are at an intuitive level different degrees or categories of anthropomorphic terminology. These differences can be drawn more easily if the categories are labelled. Three categories can be distinguished with reference to animal behaviour studies.

The first may be called metaphorical anthropomorphism in which the ascription of human characteristics or processes usually associated with purposeful human behaviour are not applied directly to an animal's behaviour, but at a stage removed, with reference to the underlying approach to a subject. For example, R. Chauvin (1971) related that groups of mice and rats have an 'alpha' animal or chief, and asked if that was too anthropomorphic a way of speaking. He then described how the alpha animal behaves: "He may chastise everybody, he eats before all the others, and he stops everyone copulating, except when he is asleep" (p.154).

On the other hand, Kennedy (1954) characterized the whole of (classical) ethology as subjectivist in that the concept of ethological 'energy' (or 'potential' or 'biological need') was he felt drawn from human experience in an unwarranted way. He said that Lorenz's central thesis was that there are two distinct neurophysiological processes, one internal and the other reflex. Kennedy thought that ethological energy, which was conceived as absolutely distinct from reflex mechanisms (which have direct external relations) was as subjective a concept as the Freudian id. He continued:

"It matters little whether the prime mover inside the animal is called a 'biological need' or 'purpose' or by other such explicitly teleological names, or whether it is called 'energy' or 'potential' or 'impulses' which have a neutral and even physiological sound. What matters is that all these are prime movers and inside/sic/ and quite distinct from reflexes: that is what makes them subjective. That is to say they are all unwarranted analogies from man, in whose behaviour subjective phenomena, appearing to us as prime movers inside, do undoubtedly play some causal role" (p.13).

He further noted that: "... in transferring back to animals the sort of dualism which Descartes restricted to man, he (Lorenz) is re-creating a vitalistic, subjective theory of animal behaviour" (p.13). Kennedy equated 'instinct' or ethological 'energy' with the Freudian id, and reflex (which regulates the discharge of 'energy' in relation to the external situation) with the ego ('a special organization which acts as an intermediary between the id and the external world'). He concluded that Lorenz had managed to win wide acceptance among zoologists for the wholly subjective concepts of psycho-analysis.

A second category of anthropomorphism may be called explicit or naive or specific anthropomorphism. In this sort of description specific mental states are ascribed to the animals. Specific anthropomorphism is characterized by such description as 'a sentimental elephant' or

that of Hornaday (1922) who wrote of a captive orang-utan (Pongo):

"Dohong was of a reflective turn of mind, and never was entirely willing to learn the things that his keepers sought to teach him, To him, dining at a table was tiresomely dull, and the donning of fashionable clothing was a frivolous pastime. On the other hand, the interior of his cage, and his gymnastic appliances of ropes, trapeze and horizontal bars, all interested him greatly" (p.77).

Specific anthropomorphism is characteristic of many Japanese primate descriptions, for example:

"One of them in particular - a monkey on Takasakiyama called Jupiter - will always be remembered by all of us. He was a monkey of great spirit and valor. Always on the alert, he was strict at times to the point of cruelty" (Itani, 1961, p.424).

A third category is that which can be called general or generic anthropomorphism. This includes expressions like 'threaten', 'appease', as also 'indifferent', 'sulk', 'protect' and so on. In these cases it seems we speak as fellow members of a common communicative system (that we naturally wear King Solomon's Ring). The interpretation of, for instance, a threat by a gorilla is not merely intellectual but intuitive and untutored as well. To some extent, this has a basis in adaptability since threatening signals would be useless as inter-specific communication unless recognizable as threatening. It is these expressions, employed because the animals' behaviour 'reminds us of' the comparable human activity, or appears to serve a very similar function in communication, that appear so frequently in primate behaviour reports. Because they are usually used to refer to human actions they have an inherent purposefulness and it is the ascription of that purposefulness that gives rise to generic anthropomorphism. This sort of anthropomorphism is characteristic of many Western primate studies. It is the specific and generic anthropomorphism that is the concern of this study.

4.4 Arguments About Anthropomorphism

Some of the main points in the debate through the seventeenth to nineteenth centuries about the nature of the separateness of man and animals have been outlined in chapter two. Specific arguments for and against the use of anthropomorphic terminology in studies of animal behaviour generated by Darwin's publications of 1859 and 1872 have remained essentially unaltered throughout this century.

Darwin's theory inspired the 'anecdotal school' or 'anthropomorphists' (Warden, 1927) to provide evidence for mental evolution or mental continuity between man and animals. The result was a plethora of anecdotal writing about the mental life of higher animals. As mentioned in chapter three, these writings prompted Lloyd Morgan's counter-attacks on the anthropomorphists. Morgan's Canon, that higher psychical abilities should not be invoked where a simpler explanation would do, has, some would say (e.g., Griffin, 1976) been so seriously adhered to, "that behavioral scientists have grown highly uncomfortable at the very thought of mental states or subjective qualities in animals" (p.47).

A school of 'objectivists' or 'scepticists' also developed in reaction to the anthropomorphists at the end of the nineteenth century (Bierens de Haan, 1947). The physiologists Beer, Bethe and von Uexküll (1899) in Germany represented the first objectivist movement. They did not deny subjective experiences in animals, but did not think it was susceptible of scientific inquiry. Such phenomena are knowable only in ourselves, and are known only by analogy in other human beings or in animals. This school of thought apparently did not take on; instead, behaviorism became predominant. Accordingly, any explanation of behaviour that remotely suggested conscious activity was unacceptable. In psychology

and biology there were few exceptions to this tradition and to the related stress on parsimonious explanations in biology.¹

For present purposes, the arguments of two writers who addressed themselves to the question of anthropomorphism illustrate some of the relevant points for and against its use and the relative conservatism of those arguments. The papers, written forty years apart, are by J.S. Huxley (1923) who was part of the formative and classical phases in ethology, and by O. Lowenstein (1964), then president of the Association for the Study of Animal Behaviour. Both were writing sympathetically for anthropomorphic description in animal behaviour studies.

J.S. Huxley (1923) studied bird behaviour. His observations led him to conclude that birds experience emotion, and experience it strongly. As part of the ethological tradition which sought to compare species-specific 'gestures' Huxley noted that:

"... the further we push our analysis of animal behaviour, the more we find it composed of a series of automatisms, the more we see it rigorously determined by combination of inner constitution and outer circumstance, the more we have cause to deny to animals the possession of anything deserving the name of reason, ideals, or abstract thought. ... They are mechanisms, because their mode of operation is regular; but they differ from any other type of mechanism known to us in that their working is - to put it in the most non-committal way - accompanied by emotion" (pp.105-6).

He said that we most definitely find this emotional content running through the lives of higher animals. In comparing birds with other animals he wrote:

"The variety of their emotions is greater, their intensity more striking, than in four-footed beasts, while their power of modifying behaviour by experience is less, the subjection to instinct more complete" (p.108)

¹ See Griffin (1976) for some of these exceptions (pp.47-50).

Hence the implication of the full quotation from which the title of his article ('Ils n'ont que de l'âme') was taken: 'Ils n'ont pas de cerveau - ils n'ont que de l'âme' (they have no brains, only soul).

An excerpt from his description of herons (Ardea cinerea) reveals the sort of behaviour to which Huxley ascribed emotion in otherwise highly 'automatic' behaviour. This description begins after two birds have formed a pair and chosen a nesting site:

"Instead of proceeding at once to biological business in the shape of nest-building and egg-laying, they indulge in what can only be styled a honeymoon. For three or four days both members of the pair are always on the chosen spot, save for the necessary visits which they alternatively pay to the distant feeding grounds. When both are there, they will spend hours at a time sitting quite still, just touching one another ... Now and again, however, this passivity of sentiment gives place to wild excitement. Upon some unascertainable cause the two birds raise their necks and wings, and, with loud cries, intertwine their necks. ... This once accomplished, each bird then ... runs its beak quickly and amorously through the just raised aigrettes of the other, again and again, nibbling and clapping them from base to tip. Of this I can only say that it seemed to bring such a pitch of emotion that I could have wished to be a Heron that I might experience it. This over, they would untwist their necks and subside once more into their usual quieter sentimentality" (pp.110-11).

He showed how natural activities have been utilized as the raw material of, for instance, courtship ceremonies. He said that in the grebe (Podiceps cristatus), "The elevation and conversion of its useful powers of diving and underwater swimming into ceremonials of passion is, from an evolutionary point of view, natural enough" (1923, p.119). It also has its counterparts elsewhere. For instance, in divers, not too distant relatives of grebes, swimming and diving play a role in courtship. He felt that an evolutionary explanation could be found for birds to have acquired a capacity for affection, jealousy, joy, fear, curiosity, and other emotions.

Huxley's first defence of the use of emotional terms was that they serve as a shorthand and give a smoother and more understandable picture of animal behaviour. He wrote:

"... when a great detail of analysis is not required, but only broad lines and general comparison, the psychological terminology of memory, fear, anger, curiosity, affection, is the simpler and more direct tool, and should be used to supplement and make more real the cumbersome and less complete behavioristic terminology" (p.107).

The anthropomorphic terms sound from this to be simply a stylistic device. However, that he means to apply them literally to bird behaviour is soon made evident:

"It is at least abundantly clear that, if we are to believe in the principle of uniformity at all, we must ascribe emotion to animals as well as to men: the similarity of behaviour is so great that to assert the absence of a whole class of phenomena in one case, its presence in the other, is to make scientific reasoning a farce" (pp.107-8).

He argued that the fact that there is no direct proof of the existence of any purely mental process in an animal's life is no more problematical than the equivalent situation in humans. Though we have no direct knowledge of mental processes in other people, we feel no hesitation in deducing them from their behaviour. Of course, being a member of the same species and being able to ask another person what he thinks is a great advantage, though Huxley did not note this.

The second paper in defence of anthropomorphism, by Lowenstein (1964), was written in response to a reproach by a fellow member of the Association for the Study of Animal Behaviour for his having condoned the use of anthropomorphic and teleological terms in description of items of animal behaviour. Lowenstein tackled his defence by first going back to the roots of mechanistic biology (on the assumption that implicit in the reproach was the idea that animal

behaviour should only be described in rigorously mechanistic terms). He began by describing René Descartes's (1637) concept of the organism as a mechanism. Lowenstein pointed out that 'mechanism' is a more suitable term than 'machine' when applied to living or other things, as machines are man-made mechanisms, but not all mechanisms (such as a plant, animal or the universe) are machines. (Huxley (1923) also made this distinction). For Descartes, he noted, the animal organism was a true mechanism in which nothing happened outside the confines of strict causality. His mechanistic interpretation of living systems extended to include the human body. However, having laid the foundation for a monistic interpretation of life, Descartes then dug a chasm between man and his fellow creatures by making him alone dependent for the fulness of existence on the possession of a non-material soul, interacting with the body via the pineal organ. He thus perpetuated the dualistic Body-Soul and Matter-Mind antitheses.

Lowenstein went on to advocate a holistic approach at least at one level of behavioural analysis. In this framework (which he called 'organismal mechanism'):

"... the description of a living organism that ignores concepts like microscopic and cellular organization, adaptation, self-preservation, regeneration, ontogenetic and phylogenetic change, sensitivity, reactivity, conditionability, consciousness, creativeness and finally self-awareness, must be considered as manifestly incomplete" (p.110).

He drew an analogy to trying to understand a cathedral when it is reduced to a rubble of bricks, by looking only at the bricks. It would be foolish not to look at still intact girders and columns - to operate with concepts of intermediate analytical importance. These concepts are quite legitimately used by biologists. Anthropomorphic terms are in order so long as the loadedness of the terms is recognized and they are included in the appropriate inverted commas. Complex concepts

are useful in a partial analysis which in many cases cannot and need not be driven further. If in contrast to Descartes's thesis of a dualistic nature of man we think of him as a monistic system, or a mechanism of high complexity, differing from his fellow animals in degree and not in quality, then it is legitimate to learn about animals on the basis of human experience or to learn about human mental or other functional processes on the basis of our knowledge of animal behaviour. Lowenstein concluded that our ignorance about the causation of specific motivation in an organism is entirely due to our ignorance of the whole causal nexus. He was unwilling to deny conscious experience to any animal and hence was prepared to tolerate anthropomorphic terminology (but only as a partial analysis of behaviour).

Both Huxley and Lowenstein felt that to omit considerations of psychic phenomena in animals renders an incomplete view of their behaviour and that man differs from animals in degree and not in quality. They also felt that anthropomorphic terms are useful as a partial analysis of behaviour in the sense of a more general level of analysis.

Western scientists' self-consciousness about ascribing feelings and motives to animals has generated several other comments on and defences of anthropomorphism. Some of these are linguistic and methodological considerations. To illustrate how anthropomorphism arises in ordinary language description in ethology, Purton (1970) distinguished between two kinds of purposive terminology. One was "A-purposive" (A for agent) in which an aware agent does what appears to him to be necessary to attain his goal, and the other was "O-purposive" (O for organic) which refers to functional explanation of behaviour so that we can speak of the 'goal' of species survival without making any reference to purposiveness in the psychological sense. For example, 'aggression' defined as 'striking in order to inflict damage' is very different from

'aggression' defined as 'striking which has the biological function of causing damage'. In the former there is an angry agent, whereas in the latter there is an organism with fixed action patterns of behaviour of which one is classified as 'aggression' since its biological function is to cause damage. When the A-purposive sense of terms is applied to animal behaviour, the terms are anthropomorphic.

Purton outlined how the A-purposive sense arises in biological description:

"... in speaking of behaviour in everyday life, we make a selection which is guided by our knowledge of human and animal desires. ... Just by looking at the movements we cannot tell whether a kick was aggressive or accidental, and the matter is only finally decided when we know whether the purpose was aggressive. What is important here is not the movements, or the effect of the movements, but what is being done in a sense of 'done' which implies that a purposive agent performed an action.

"Since we know the sorts of things which animals want and do, we inevitably carry over this selection of significant movements into ethology. ... We come to the study of ethology with a background schema of what is important. Yet this schema is a purposive one, and quite foreign to biology or the physical sciences" (pp.40-1).

However, there is a structural analogy between the psychological conceptual scheme and the biological scheme, which can lead to confusions, but which can also be of heuristic value. Purton noted that the successful use of 'anthropomorphic' terminology in biological ethology depends largely on the existence of this analogy. Its heuristic value lies in the familiarity we have with the connections between, for instance, 'attack', 'threat', and 'appeasement' which to a large extent forms the starting point for the ethologist's investigations. Biologists could devise a new terminology to describe what they now call 'threat' and so on, but it would be difficult to understand. Thus, Purton concludes, the value of using purposive terminology is that we can give precise biological descriptions of behaviour (if the terms are understood in their

0-purposive sense) which at the same time can be easily 'understood' in terms of ordinary experience. This is because the structure of ordinary language connections remains the same when transferred to the biological framework. This point will become important for metaphor. Purton concluded it is only when the biological and psychological realms of discourse are confused that anthropomorphism results.

Midgley (1978) also made the point that it is necessary to decide what the purpose of a movement is in order to determine its meaning. She wrote:

"If we did not grasp the general motive uniting apparently diverse actions, it would be impossible to explain behavior in either man or beast. For explaining it is bringing it under a general motive. That approach was an insult and a demonstration of independence; this one, differently carried out, is a friendly greeting and an offer of forgiveness. That prostration is a sign of submission; this one of despair. Both in animal and in human life we constantly need such explanations. And we can safely use them, provided that we have and use the relevant experience of this sort of context. We are not illicitly claiming private access to the exact quality of the subjects' feelings, we are classifying their behavior by the essentially public criteria common to their species" (p.346).

Our ordinary language terms for describing behaviour are logically imbued with agency. Midgley remarks that words such as seeking, escaping, attacking, withdrawing, and resting, have been built up from the inside, as it were, as well as the outside. We mean by them something we do as well as something we watch. (What, Midgley asks, is 'resting' from the observer's point of view?). She does not, like Purton, stop at applying purposive terminology literally to animals. She explains: "The species barrier is, in itself, irrelevant. Members of one species do in fact often succeed in understanding members of another well enough for both prediction and a personal bond" (p.348). The success with which we use these words depends upon our own familiarity 'from the inside' with the feeling in question and upon our familiarity with

the man or animal being observed. (Certainly early ethologists stressed the importance of becoming thoroughly acquainted with the animal whose 'character' they wished to understand).

Anthropomorphism then for Midgley is simply one form of a general kind of failure; a mistake about the animal's motives because we do not have the necessary background (acquaintance with the animal) and simply make up motives by projecting our own feelings onto them. It is a mistake often made in interpreting human behaviour too.

All this presupposes that animals have feelings and intentions. With respect to 'mind' in animals, ethologists have made a rough distinction between the emotional and cognitive aspects. Early ethologists found their birds to be intensely emotional and described their behaviour accordingly. Griffin (1976, 1978) on the other hand, feels that emotion cannot yet be tested for objectively and recommends study of the cognitive aspect.

There appear to be two kinds of distinction that can be made between human and animal mind: one of degree (in the sense of complexity, not intensity), and one of difference in kind (sort, type). The latter will be very difficult for us to understand as members of a different species. There is a third possible comparison: that the animal mind shares in some of the characteristics of the human mind. This seems the most workable assumption. Much of the vocabulary about consciousness, mind, and so on in animals is very vague but opinions about the nature of the animal mind go back a long way. In the Historia animalium Aristotle stated that proof that animals perceive and form images is the fact that they dream, remember, learn, have pleasure, pain, desire and aversion, but are not capable of deliberation and rational thinking, though in some cases they show practical intelligence (cited in Bierens de Haan, 1947, p.73).

A similar distinction between rational and practical thinking was set out in Reynolds (1980a). He presented a scheme for intelligence developed by Viaud (1960), who divided activities into four levels: (i) reflexes, (ii) instincts, (iii) practical intelligence, and (iv) rational intelligence. Reflexes and instincts are relatively primitive levels of activity. The distinction between practical and rational intelligence is made on the basis of language. The first includes the doing or making aspect of human action, and the latter, the logical, conceptual, thinking or rationalizing aspect. Language is crucial to rational intelligence, providing the means by which to name and classify objects of our experience according to their properties; to describe these concepts and so consolidate them into a system of knowledge and to keep the vast network containing all our knowledge and ideas readily available to us. Language both allows us to construct this immense network and to use it.

Reynolds (1980a) applied Viaud's scheme to make the point that because animals lack symbolic language systems, they "do not conceptualize either themselves, or others, or the external world and its parts, or their social group" (p.46). He does not deny animals a conscious awareness of themselves, things and relationships, nor of some kind of feelings and emotions but he makes the distinction between humans and higher animals at the point where consciousness is encoded in symbolic forms. He felt that, "if animals cannot think in the sense of manipulating conscious symbols, one is forced to explain their activities in ways that do not involve such thinking" (p.46).

A third scheme is that of F.V. Smith (1971) who was interested in the point in evolution at which purposive behaviour appears in animals. His criteria for purposive behaviour were: (i) independence, (ii) retention, and (iii) variability.

Independence in an organism refers to a capacity to resist or behave independently of environmental forces, not to be at all times passively moved by them. To behave independently of environmental forces and to achieve a result consistent with the behavioural history of the species in different and changing circumstances suggests some form of awareness of features of the environment. Retention refers to behaviour that persists independently of the situations which may have given rise to it, or evidence that behaviour is influenced by objects or situations not immediately present. Variability refers to two things: (a) variation in the nature and direction of successive acts of behaviour and (b) the same animal attaining the same result in different ways on different occasions, and different members of the same species attaining a result in different ways. The case for purposive behaviour can be made if any one of these criteria is met, but is strongest if the behaviour event can be shown to involve all three criteria.

In these three schemes the boundary between human and animal thinking is drawn quite arbitrarily and based on common sense notions of what the differences might be. Underlying the modern support for mind in animals is belief that biological evolution implies that mental experiences in other animals will share important properties with those of man, and that it is unparsimonious to assume mental experiences exist in one species and in no other (C.W. Hume, 1959; Griffin, 1976, 1978; Purton, 1978). For instance, with certain specific phenomena in many species, such as 'intention movements' in which relatively slight movements of an animal convey reliable information about its probable future behaviour to other animals (metacommunication), most ethologists stop short of attributing a conscious intention to the

animal. Yet, as Griffin (1976) pointed out:

"Since both conspecifics and human observers can predict the future behavior of an animal from its intention movements, it seems remarkably unparsimonious to assume that the animal executing the intention movement cannot anticipate the next steps in its own behavior" (p.44).

Mental continuity in evolution seems a reasonable postulate; however, one experiment for the presence of self-awareness in non-human primates has not shown this continuity to exist between apes and monkeys. Gallup (1977) discovered that by using mirrors to test for self-awareness in apes and monkeys, the monkeys¹ were not able to recognize themselves in a mirror, though the apes were. Gallup wrote that there are at least two dimensions to conscious experience: one is having an experience and the other is being aware of having an experience. The reflective dimension of consciousness is isomorphic with self-awareness. The postulate in the experiment was that in mirror-image stimulation the identity of the observer and his reflection are necessarily one and the same. Gallup said:

"The capacity to correctly infer the identity of the reflection must, therefore, presuppose an already existent identity on the part of the organism making the inference..., and

"The monkey's inability to recognize himself may be due to the absence of a sufficiently well-integrated self-concept" (p.334).

He postulated that therein may lie the basic difference between monkeys and great apes and that the differences raise serious questions about claims concerning the evolutionary continuity of mental experience. He admitted, however, that different tests requiring a 'lower threshold' for recognition might yield positive evidence for monkeys.

Besides the argument from evolution for conscious awareness in animals, are the philosophical arguments. There is no important difference between denying mental experiences in animals because we

1 No self-recognition has been demonstrated in rhesus, java, spider monkeys, stump-tail macaques, capuchins, mandrill, olive or hamadryas baboons, nor in two species of gibbons.

lack direct evidence for their existence and denying them in other humans. Most people avoid solipsism because they are ready to accept that we can know something about other people's feelings at least. C.W. Hume (1959) and Midgley (1978) felt that a workable intuitive interpretation of animal behaviour is empirically demonstrated by the success of animal trainers and our everyday experience with pets. Griffin (1976) is more cautious, and recommends an open-minded agnosticism on the question.

The common criticism that it is somehow unscientific to study subjective experience in animals is based on a confusion. Bierens de Haan (1947) drew a useful distinction between two types of objectivity. One is to confine oneself to the objectively knowable (a positivistic and behavioristic approach) and the other is to adopt an impartial or neutral point of view. The first type of objectivity is often confused with the second, but there is no logical necessity to confine oneself to the objectively knowable. Thus, as Midgley (1978) said, "it is not unscientific to talk about feelings" (p.106). One can have an impartial, objective approach to the study of subjective experiences and indeed that is what is proposed in cognitive ethology (Griffin, 1976, 1978).

Having set out very generally some of the issues thought to be important to the question of anthropomorphism, we can examine a specific genre of animal behaviour studies often thought to be anthropomorphic. Ethology in the formative (up to 1930) and classical (especially in Lorenz's writings) phases presented empathetic studies mostly of birds. Primate ethologists later eschewed this style of study (e.g., Morris, 1967) while adopting much else of ethology's method.

4.5 Anthropomorphism in Ethology

The first ethologists studied set patterns of behaviour in animals or those movements which have become stereotyped in each species in order to gain a better understanding of the part they play in the animals' lives and to trace evolutionary affinities among species. Early workers such as Whitman, Heinroth and Wheeler showed that an organism's 'ethos' or character is an innate attribute of the species and as diagnostic of a species as its physical form. The ethos or character of animals consisted of their life habits, manners and customs or the sort of behaviour which in man is often described as gestural, symbolic or expressive (Heinroth, 1911). These specific, innate characters could be understood often by direct analogy with human character only after a prolonged and intimate acquaintance with the animals.

In these studies both the focus and the approach were subjective. For instance, Heinroth's accounts of bird life were based on the interpretation of behaviour as a complex of external signs which expressed internal psychological or emotional predispositions (Durant, in press). Selous (1927) noted in the course of describing the courtship of a pair of birds:

"It is in watching such imponderables, such by-products or unessentials, as we may call them ... that the automaton theory as applied to animals ... entirely breaks down. One sees now not a mere species acting on certain definite lines necessary to its salvation, but two tenderly affectionate little persons, behaving, because they both feel like that, in very much the same way as a pair of young human lovers ..." (p.64).

He stated as a general conclusion:

"It follows ... as the result of my observations that the 'brute beast' is a more intelligent, more emotional, more affectionate and generally fuller-feeling being than he has yet been acknowledged to be ..." (ibid., p.341).

J.S. Huxley (1930) saw birds as individual personalities whose conduct was dominated by complex emotions. He wrote (1916): "... all my observations have gone to root deeply in me the conviction that birds have a mind of the same general nature as ours, though of course more rudimentary" (pp.143-4, 269). Similarly, Lorenz (1970) wrote:

"After years of close contact with animals, one is forcibly struck with the impression that instinctive behaviour patterns are correlated with subjective phenomena which correspond to feelings and passions. No genuine animal observer can overlook the homologies which exist between man and animals and which virtually impel one to draw conclusions about the subjective processes within animals" (p.251).

Nearly all the early ethologists were amateur naturalists or zoologists interested in what species' 'gestures' meant to the animals that performed them. They were thus interested in the mind (i.e., subjective qualities) of the animals they studied and behaviour was described in those terms. The method of early ethologists was also subjective. Whitman, Heinroth, Wheeler, Selous, Huxley and Lorenz all reiterated that the success of their study depended upon their becoming intimately acquainted with the animals and their willingness to identify with them and to have an intuitive 'feel' for their character, before attempting any ethological analysis. Lorenz (1970) wrote: "In fact, it seems necessary to become emotionally involved to the point of 'falling in love' with such a group ..." (p.xvi).

The identification with the animals rested on the fundamental analogy postulated between human and animal character. Huxley (1914) sought direct insight into the birds' mental and emotional life "by comparing ... (its) ... actions with our own in circumstances as similar as possible" (p.510). These ethologists felt it was possible to understand animals in just the same way that we understand our fellow men. However, although

the ethologists felt they could understand the minds of animals (especially birds) they did not crudely project human capacities onto animals on a wholesale basis. They felt animals shared in some mental characteristics of man but at a more rudimentary level. Their interpretation of the emotions behind their rituals was based on the 'if I were a horse' type of analogy. They wished to understand how things appeared from the animals' point of view. That early ethologists were not merely projecting human psychic capacities onto animals is revealed in Heinroth's (1911) qualification about the science of ethology. He wrote:

"As you know, the term 'ethos' refers to customs and manners in a human sense. Strictly speaking, this word is not really applicable to animals, since in our case language, customs and manners are taught and learnt, whereas a duck brings its language and rituals - which I shall describe in due course as its communication system (Verkehrsformen) - with it into the world, and exercises both without ever having heard or seen another member of its own species. Thus we speak in this instance of instinctive or inborn customs and manners, and we use the term ethos in a way which is quite different from its original meaning" (pp.589-90).

Further, the free movement between description of observed external behaviour and attributed internal feelings yield what Purton (1970) noted as precise biological description which can be understood easily in terms of ordinary experience. For instance, one of Lorenz's (1966) descriptions that is often called anthropomorphic is the following:

"A gander may have affairs of long duration, regularly meeting a female other than his wife in a 'secret' place and copulating with her. However, she is his partner only in copulation; he never accompanies her when she is walking and he never gives even the slightest hint of a triumph ceremony in her presence. In this respect he remains absolutely faithful to his wife. Nor does he guard the strange female's nest; should she happen to be successful in acquiring a nest site and in rearing a family, she must do so unaided by the gander. He does not love her in the least" (p.203).

Each term in this passage has meaning by virtue of a full and detailed knowledge of the species' behaviour. Description and interpretation are interwoven into a single insightful story. The absolute 'correctness' or otherwise of the last sentence is not perhaps as important as how well it and related terminology allowed ethologists to construct a predictable picture of the animals' behaviour patterns.

Thus, early ethologists were not by any means thoroughgoing anthropomorphists. Klopfer and Hailman (1967) noted that, "European ethological studies are permeated with an empathetic, albeit not necessarily anthropomorphic, view of animal behavior" (p.32). Ethology prompted quite the opposite reaction from considering it anthropomorphic in H.M. Thomas (1979):

"I well remember in the early 1950's the sense of welcome escape from anthropomorphism that accompanied the revelation in my first reading of Konrad Lorenz's King Solomon's Ring, a new orientation reinforced by my perusal of Niko Tinbergen's A Study of Instinct about the same time" (p.3).

For Thomas, ethology was characterized by open-minded and patient observation, free from preconception.

It will be seen in section 4.7 that primatologists made a point of distinguishing primate ethology from what was seen as the anthropomorphic description of early and classical ethology. It is interesting to briefly describe first, however, a relatively new development among ethologists to form a subdiscipline, cognitive ethology, to objectively study mental phenomena in animals. Some experiments have already been carried out on primates for this (e.g., Menzel, 1975) and data already gathered especially in language experiments with chimpanzees are being re-examined with this question in mind.

4.6 Cognitive Ethology

The major author of this subfield of ethology is Donald Griffin (1976, 1978), a specialist in bird navigation and echolocation in bats. It is partly because of his solid credentials as a 'hard' scientist that his views on mental experiences in animals are receiving more serious attention than they might otherwise have among ethologists generally.¹ His rationale for the proposed field of study is that it is likely that mental experiences occur in animals and have important effects on their behaviour. Griffin's definitions of mental experiences and related terms have been criticized as too vague to work with (Humphrey, 1977); however, they can be listed here as a point of reference for his proposals. Griffin's (1976) definitions are:

<u>"mental experience:</u>	to think about objects and events that are remote in time and space from the immediate flux of sensations.
<u>mind:</u>	something that has mental experiences.
<u>awareness:</u>	the whole set of interrelated mental images of the flow of events; they may be close at hand like a tooth-ache, or remote, as an astronomer's concept of stellar evolution.
<u>intention:</u>	mental images of future events in which the intender pictures himself as participant and makes a choice as to which image he will try to bring to reality.
<u>consciousness:</u>	presence of mental images and their use by an animal to regulate its behavior." (p.5).

Mental experiences also include feelings, desires, hopes, fears and sensations such as pain, hunger, rage and affection. However, as these are private data, directly observable only to the person who experiences them, Griffin suggests concentrating at first on the former sort of

1 R. Dawkins, a former editor of Anim. Beh., personal communication, Oxford. At the international ethological meeting to be held in Oxford in the autumn of 1981, it is hoped to include a section on cognitive ethology.

mental experiences. He sees more chance of developing objective methods for gathering data about independently verifiable evidence that animals have mental images of objects, relationships or events and intentions about their own future activities.

It was evidence that animals employ some sort of internal imagery of their surroundings that suggested to Griffin a need to reconsider the general question of subjective mental experiences in animals. For instance, in bats Griffin feels there is suggestive evidence for this internal imagery in instances where bats fail to orientate properly by echolocation. He noted:

"When flying through thoroughly familiar surroundings, many bats seem to rely heavily on spatial memory. Although orientation sounds continue to be emitted in an apparently normal manner, the bats collide with newly placed obstacles and turn back from the former location of objects that have suddenly been removed" (1976, p.13).

Griffin (1978) suggested what would constitute verification for mental imagery:

"Communication about mental images and intentions offers cognitive ethologists an important opportunity for experimental verification and analysis. The communication of a message may involve any of three kinds of relationships, alone or in combination: (1) the message may relate directly to the animal's perception of the immediate situation; that is, it may report about current sensory input; (2) the animal may report about information acquired at an earlier time and stored as some sort of memory, or (3) the animal may announce an intention or a plan for future behavior. The third category is especially important, insofar as it occurs, because it may involve patterns of information quite different from anything arriving contemporaneously through the animal's sense organs or retrieved from its store of memories. To be sure, the elements involved in a plan will in many cases have been sensed or perceived before, but they may be recombined in novel ways when projected into the future. Thus if such intentions or plans are consistently reported, and verified by correspondence with subsequent behavior, they provide a more convincing type of evidence for the existence of mental images than do responses to current, or even to remembered, past sensations" (p.532).

A final point about cognitive ethology is that Griffin is at great pains to ensure that the study of mental experiences in animals is not misconstrued as anthropomorphism. It would only be anthropomorphic if it were held that other species have exactly the same mental experiences as a man might under comparable circumstances. However, Griffin feels that we cannot assume that human experiences are the only kind that exist; "it is more likely than not", he wrote, "that mental experiences, like many other characters, are widespread, at least among multicellular animals, but differ greatly in nature and complexity" (1978, p.105).

4.7 Anthropomorphism in Primate Ethology

In the introduction to a collection of papers on primate ethology, Morris (1967) noted that the papers were unified by the contributors all being zoologists in the tradition of classical ethology and trained either by Lorenz and Tinbergen or their pupils. They depart from their founder science, however, by being against the use of anthropomorphic description. Right at the beginning, Morris warned against anthropomorphism and pointed out that the objective study of primate behaviour is probably the most demanding branch of zoology for precisely the reasons that would make the attribution of some psychic capacity reasonable: that non-human primates are very intelligent with complex and variable social organizations and that they are very closely related to man. For these reasons, Morris noted, "the dangers of anthropomorphism are constantly present" (p.1). He pointed out two different types of humanizing that occur in primate studies. In medical and psychological research on primates where the intention is to apply the results to humans, primates are treated as 'dummy humans'. This is deliberate humanizing of the animal. The second sort is accidental humanizing

in which, for instance, closely related facial expressions of some primates to those of man are thought to imply identical inner states; herein lies the real danger of anthropomorphic distortion. However, the ethological approach to primates involves evolutionary thinking and detailed description of motor patterns.

As noted in a previous section (4.5) early and classical ethology was subjective (empathetic) in approach, and Morris was justified in making the distinction between that and an objective approach wherein the observer does not (or attempts not to) empathize with the animals studied. However, the sort of anthropomorphic description he implied of the ethologists was not in fact true of them. The "accidental humanizing" in which identical inner states to those of man are ascribed to animals refers to an anthropomorphism which ethologists did not apply. Ethologists assumed that the animals they studied had mental characteristics, but not exactly those of humans.

Perhaps it was the very abundance of opportunities for the human observer to empathize with other primates because of similarities in their physiognomy that provoked such straightforward cautions against 'reading anything into' their expressed behaviour. Thus, Reynolds (1967) noted:

"We can draw deductions (about the emotional state of an ape) from observation of the animal's behaviour - the noises it makes, the expressions on its face, the way it moves its body. But such deductions are likely to be wrong, because they are usually not based on objective measurements of any kind. They may be based on the 'anthropomorphic' reasoning that similar expressions in ape and man indicate a similar emotional state" (pp.20-1).

Certainly this rather simple-minded type of anthropomorphism has been found to be seriously misleading in experiments carried out by Foley (1935), though it had been given important support in earlier days. Experimental support for an evolutionary or comparative view of facial expression which

culminated in Darwin's (1872) theory, had been provided by studies such as those of R. Owen (1830) and Macalister (1871) which showed that anthropoids have essentially the same facial muscles as man. Darwin and other early workers thought that the recognition or judgement of facial expression was an innate ability. However, Foley (1935) cited voluminous data that argued convincingly against any innate ability. He related that the recognition of emotion in facial expression is affected by training and practice in reaction to expressive criteria, suggesting names has a marked effect on judgement of emotional expression, and success in identifying emotional states in experiments is approximately what might have been expected by chance alone. Foley carried out an experiment in which 127 university students (31 male, 96 female) were asked to write one out of a possible sixteen listed emotions beside each of six photographs of a five year old male chimpanzee (belonging to Mrs. N. Kohts of Russia). The result was that all sixteen emotions were listed by the students and Foley thought that if the photo sample had been larger, probably all sixteen would have been included. The photos about which students were most in accord were not necessarily those judged most correctly, and the commonest direction of error was to judge (or misjudge) the facial expression of the chimpanzee as though it had been that of a human (an anthropomorphic tendency).

Obviously, the context in which the expression occurs is very important to an interpretation of its meaning. However, van Hooff (1967) criticized Bolwig's (1964) 'subjective approach' in identifying moods responsible for the occurrence of certain facial expressions. Bolwig felt that he was justified in doing so because, he thought, someone well acquainted with primates and who handles them daily can draw

conclusions about a certain condition or mood in an animal which shares a certain expression. However, most primatologists will not commit themselves to this procedure in print at least. Despite the criticism of an intuitive approach, the fact that primate ethologists do depend at least to some extent on an intuitive apprehension of the analogy between human and animal behaviour is revealed in a remark made by de Vore (1965) about the difficulties attending study of prosimians. He wrote:

"... the human observer in attempting to analyze behavior does not perceive the world of the animal he is studying; he cannot touch, smell or see in the same way. The prosimian's face does not show the kinds of expressions seen in monkeys and apes. To the observer the problems caused by these differences are profound" (p.12).

Some primatologists, such as Hinde (1974), feel that a total avoidance of anthropomorphism can give an over-simple view of behaviour. The various arguments about the use of anthropomorphic terminology and subjective versus objective approaches to behaviour discussed earlier have not been elaborated upon by field primatologists. They have in the main avoided explicitly attributing particular mental states (or specific anthropomorphism) to animals. Even given unspoilt surroundings MacKinnon (1974) complained that the forest conditions in which the orang-utan (Pongo) lived were not ideal for detailed observations; hence he could not "compile his data in a more rigorous and systematic fashion so that the functional interpretation of observed behaviour could be less subjective and anthropomorphic" (p.60).

Nonetheless, most field reports are imbued with a generic anthropomorphism, however closely backed by 'objective observation' and quantitative analysis. It is the purpose of the next chapter to explore why this is so.

CHAPTER FIVE

QUALITATIVE DESCRIPTION IN WESTERN PRIMATE STUDIES

5.1 Introduction

Qualitative description here refers to description of animal behaviour in ordinary language terms (see chapter four, pp.105-6). Ordinary language is distinguished from technical language in that the latter is a part of a language (like English or French) defined only by reference to some particular discipline, occupation or activity among practitioners of which it is current. Technical language consists largely, if not entirely, of vocabulary items that are not part of the related ordinary language; for instance, neologisms like 'meson' or 'apoblastosis' (Carpenter, 1942c) or terms not having the same sense in ordinary language as the sense given in a particular discipline (for instance, 'charm' in astrophysics) (Caton, 1963).

Qualitative description is also here distinguished from quantitative description of behaviour (though quantitative analysis is perhaps a more accurate characterization). The latter is based upon various quantitative tabulations of the observed stream of behaviour and expressed in, for example, statistical terms; whereas qualitative description, though at times based upon a quantitative analysis, is a vernacular rendering. Neither technical nor quantitative languages are ever totally separate from qualitative description in animal behaviour studies however, as in both clarification of what is meant is achieved through the use of ordinary language.

As noted earlier, anthropomorphism is in general eschewed by scientists describing naturalistic primate behaviour. Yet it regularly appears in these reports as what has been called generic anthropomorphism. This occurs at least partly by virtue of the nature of our language use. It can be shown to arise at a particular stage in the process of describing animal behaviour. To explain, there are different 'levels' of terminology common to primate behaviour reports, of which two - behaviour units and behaviour categories - form the starting point of the following analysis. Behaviour units are basically descriptions of movement patterns and vocalizations (such as 'stare', 'eyebrow flash', 'screech') and behaviour categories are a more inclusive class of terms (such as 'threat', 'courtship', 'appeasement') that are defined in terms of the behaviour units that comprise them. The behaviour units are grouped into behaviour categories according to various criteria (for instance, sequentially, morphologically, functionally, etcetera (Reynolds, 1976)), but the movement patterns and vocalizations are the terms of the definition. It is pointed out below that in the move from the descriptive level of behaviour units to the level of behaviour categories, an increment in meaning occurs over and above the meanings of the terms of the definition. Behaviour categories are not simply a shorthand for various movements or vocalizations grouped in one manner or another; they mean something more. That is, they imply more than can be ascertained from the movement patterns and vocalizations alone.

The nature of the expanded meaning is a generic anthropomorphism; that is, many of the behaviour category terms imply agency in the animals' behaviour. This occurs because the terms already have established semantic fields in ordinary human discourse in which we do normally wish to imply intentions and feelings to the performer. It is the purpose of this chapter to reveal the process by which this anthropomorphic increment occurs.

A preliminary discussion of behaviour units and behaviour categories or levels of terminology in primate ethology sets the basis for subsequent analysis. To distinguish between the nature of the activities described at each level, the notions of 'behaviour' and 'action' will be introduced (Weber, 1947; Harré & Secord, 1972; Purton, 1978, Reynolds, 1980a). The difference between 'behaviour' (e.g., 'vocalization plus eating' or 'eyebrow flash') and 'action' (e.g., 'saying grace' or 'threaten') provide a framework in which to describe the nature of the expansion of meaning in moving from one level to the next.

Primate ethologists have devoted much thought and care to careful definition of their descriptive terms, partly in order to avoid the charge of anthropomorphism as well as for good methodological reasons. Behaviour categories provide the terminology in which ongoing behaviour is described and on which decisions as to the kind of social organization and analysis of social processes are based. Thus, definition of these terms appears to be crucial to the picture we form of the animals' behaviour. Philosophical notions of definition itself are applied to show what kind (that is, nominal or real) and what method (that is, ostensive, analytic, denotative, and so on) of definition is used in primate behaviour reports. The term 'threat' as employed in a field report (Simonds, 1965) on bonnet macaques (Macaca radiata) is analysed as an example.

It will be argued that the definition of behaviour categories in terms of behaviour units is, however, not essential to the ultimate meaning that is attached to the terms. That is, 'definition' is not the source of anthropomorphism in the behavioural description. While the method of defining (analytic, synthetic, etcetera) can affect the meaning of the defined term, it is not in the process of definition that the anthropomorphic connotations of the terms arise. Rather, the meanings

are predetermined to some extent through the terms' associations with ordinary human activities. The implication of purposefulness in the animals arises through the operation of metaphor whereby our ordinary associations of intention and so on are applied to the animals. This is developed in the sections on metaphor.

Finally, quantitative description is often considered to be a means of avoiding the problems that attend qualitative description (for example, Bramblett, 1976a). A detailed treatment of quantitative description in primate ethology would require a thesis in itself and is beyond the scope of the present study. However, it is pointed out that the qualitative and quantitative realms of discourse are not mutually exclusive and that quantification does not provide a replacement for ordinary language terms.

5.2 Levels of Terminology

An ethogram or list of behaviour units with their descriptions is generally given at some point in primate behaviour reports whether in a specific table, in the course of the report, or by reference to previous publications on the species being described. A paper may be published solely for the purpose of giving an ethogram (e.g., Hopf et al., 1974), especially if several authors have made separate studies of a species. This section does not provide a review of what has been said regarding the identification of units and sequences of behaviour (often with reference, because essential, to quantitative analysis) but rather makes the point that many primate ethologists feel there is a semantic neutrality about behaviour units and that this should be carried over to the more inclusive behaviour categories which are defined in terms of the units.

The distinction between the level of behaviour units and the level of behaviour categories is commonly made. A further two levels of

terminology can also be identified. The most basic level, 'below' that of behaviour units, is description of the visible morphology of movement, spectrographs of vocalizations and, in principle but as yet rarely in practice, identification of physiological bases of behaviour (though some might consider the last named an even more basic level of description). This level is thought to provide the most 'neutral' record of what takes place. It is separate from the next level of behaviour units in that its various components make up individual behaviour units (e.g., Altmann, 1962; Strum, 1978).

The second level comprises the 'units' or a species' social repertoire which can be understood as the components of the classical ethogram, including such things as facial expressions, postures and named vocalizations. The third level is the more inclusive or general labelling of behavioural categories such as 'dominance', 'courtship' and so on, defined by grouping behaviour units according to various criteria. A fourth level of behaviour that has been suggested is that of social organization in that social organization does not refer to an inanimate object, but is derived from the behaviour, via the relationships, between individual animals (Asquith, 1978; Vaitl, 1978). This is the most inclusive level of behaviour and includes such terms as 'troop', 'harem', and so on. As it is in the move from behaviour units to behaviour categories that anthropomorphism arises, the following discussion focuses specifically on those levels.

A behaviour unit, variously called behaviour item, behaviour type, taxonomic element (Reynolds, 1976) or behaviour pattern (Altmann, 1962) has been defined as an essential or core movement (Kernbewegung) which can be accompanied by typical but dispensable accessory movements (Kummer, 1957). Wiepkema (1961) selected behaviour units to be (i) easily

measurable, (ii) not too rare in occurrence, (iii) biologically meaningful and (iv) not entirely correlated with other variables. Slater (1978) felt that a behaviour unit should be (i) species typical, (ii) made up of movements that occur together simultaneously and sequentially with a high degree of predictability and (iii) repeatedly recognizable.

An example from a table (Strum, 1978) that includes the first three levels will serve to illustrate various points. Only part of her list will be given. Strum named her table 'agonistic behaviours' and within that included aggressive and submissive behaviour. All three terms are behaviour categories, but agonistic behaviour is a more inclusive or complex term than the other two.¹ Under aggressive behaviour, Strum listed the behaviour units that occur in or make up aggressive behaviour, along with an accompanying list of behaviour movements, which she calls description (of the units). She also distinguished between categories of low, medium and high intensity aggression: the following is taken from the low intensity aggression category for Papio anubis.²

1 The same occurs at the level of behaviour units. Hopf et al. (1974) remarked: "... it is arbitrary to some degree at which level of complexity the units are defined" (p.227).

2 Strum, S. (1978) Dominance hierarchy and social organization. Strong or weak inference?. A paper presented at a Wenner-Gren meeting on Baboon Field Research: Myths and Models. New York, June 25-July 4. This is a prepublication paper; thus there is no page reference for the table.

Aggressive BehaviourDescription

A. Low intensity aggression

1. directed stare	obvious
2. raised eyebrows	sometimes accompanied by lowered eyelids
3. ears flattened	ears pressed against head
4. head bob	jerking head down and forward
5. yawn	mouth opened exposing canines to varying degrees depending on intensity -- oriented towards another individual
9. pant grunt	loud two-phased grunt towards another individual

Submissive Behaviour

1. avoid a stare	glancing away from another individual or fixation on the ground
2. fear face	grin or grimace
3. cough geck	single sharp sound with cough-like quality often accompanied by jerks or body twitches
4. tail up	tail is raised and held in a vertical position
8. active avoid: fearful	running away with combination of geck, scream, fear face and tail up
9. crouch	body lowered to the ground -- orientation to another individual
10. hide	avoid contact by hiding out of sight -- adult males frequently use pig-holes
12. approach: fearful	oriented approach with tail up and fear face, geck or scream

Hinde (1973) pointed out there are two basic methods for describing behaviour units: (i) physical description or in terms of patterns of limb or body movement (e.g., 'knee jerk', 'species-characteristic song') or

(ii) by consequence, which covers all patterns that lead (or could lead) to a specified result (e.g., 'picking up nest material', 'approaching'). Description by consequence provides a useful shorthand, but can also be subdivided into physical description (p.394). It will be seen in Strum's list that most behaviour units (for example, 'directed stare', 'head bob', 'tail up') are quite neutral in meaning though occasionally an interpretation as to the meaning of the behaviour units creeps in as purposive terminology (such as 'fear face', 'active avoid', 'hide'). This corresponds to the two kinds of description mentioned by Hinde above. At this level, this is usually easy to 'catch' and may be qualified at the time or enclosed in quotation marks to show that the author is aware of the implication. S. Altmann (1962) treated purposive units this way in his catalogue of rhesian behaviour. Thus, in his behaviour unit (35) "Looks 'apprehensively' (toward)", Altmann noted:

"While the term 'apprehensive' is anthropocentric [*sic*], it may convey best the impression of an individual who glances quickly around him every few seconds, seems to be tense, to have a low avoidance threshold, and so forth. These responses may or may not be directed toward another individual" (p.378).

Similarly, with behaviour unit (54) 'Ignores', he stated:

"It was sometimes obvious that a monkey saw, heard, or felt a behaviour pattern that was directed conspicuously toward it, yet 'ignored' the other monkey or monkeys involved, i.e., continued doing what it had been doing" (pp.379-80).

The neutrality of behaviour units is stressed. Box and Pook (1974) stated that:

"It seems to us that at least at the onset of a study of social behaviour, it is methodologically advantageous to be 'relatively neutral', and to record the behaviour of individual animals, rather than to start with the complex units of social inference (p.104).

The actual naming of behaviour units is not intended to give social meaning to the movement patterns, but rather to serve as a sort of mnemonic device. As Altmann (1962) stated:

"The titles and descriptions of the behavior patterns (units) are not intended as definitions, but are presented, rather, in the hope that they are sufficient to give the reader some sort of picture of the constituents of rhesian behavior and to enable others who work with members of this or related species of Primates to identify the behavior patterns when they observe them. Those behavior patterns that commonly precede or follow each behavior pattern have not been included always in the descriptions. While the justification for including any particular pattern in the catalogue is to be found in the social context in which the pattern occurs, this social context is never part of the definition of the pattern" (p.374).

Likewise, Hopf (1972) stated: "The names of the units should be regarded as short and handy labels, not as an a priori interpretation" (p.366).

Pruscha and Maurus (1976) extended this even to the level of behaviour categories. In their table of behaviours of the squirrel monkey (Saimiri sciureus), the behaviour units are not named, only assigned numbers for rationalization of data processing and described at the lower level of physical movement. "Class" in their nomenclature refers to behaviour category. An extract from their Table 1 (p.189): "List of behaviour units, occurring during agonistic interactions in squirrel monkey groups", reads:

Number of the class	Number of the behaviour unit	Description of the behaviour unit
91	05	Touching partner's head
	06	Touching partner's hip
	07	Touching partner's back
	09	Touching partner's tail
	11	Touching partner's extremities
	12	Advancing mouth toward partner's neck
	21	Mounting
92	14	Straightening body in front of partner
	15	Thrusting chin towards partner
94	08	Lolling, sprawling
	20	Back-rolling with presentation of ventral view
97	27	Running away from

They wrote:

"The following mnemonic labels can be given to the behavioural classes: Weak dominance gestures or weak agonistic signals to class 91, stronger dominance gestures to class 92, ... triumph gestures to class 94, ... and submissive gestures to class 97" (p.189).

The authors pointed out that the verbal labels are not derived from the 'meaning' of the behaviours in the usual sense, but from their function. They distinguished between 'communicative function' and 'communicative meaning' as follows:

"The term 'communicative function' is used here parallel to, but separate from the term 'communicative meaning'. The latter refers to the more subjective aspect of a behavioural event, namely its meaning for the recipient animal (see W.J. Smith, 1968); 'communicative function', on the other hand, refers to its objective aspect - that is, its significance in the modification or retention of the group structure which is brought about by the communication process in which the behavioural event in question appears" (p.186).

They elaborated upon this in their discussion at the end of their paper:

"Apart from this more subjective aspect - namely, the communicative meaning for the recipient - a signal also has an objective aspect in a communication process. Such a process does not exist for its own sake; it causes, retains or changes something in the structure of the group. In the experiments described here the communication process overcomes the disturbance in the group's state of balance caused by the electrical brain stimulation. This is brought about by the elements of this process, the behaviour units exchanged between the partners. We are therefore justified in attributing a communicative function to these elements" (p.206)¹.

Hopf et al. (1974) felt it was indispensable that behaviour units be defined in the sense of qualifying the terms' usual meanings in ordinary language: "It often leads to misunderstanding when words of everyday language are used for behavioral terminology without additional information concerning distinguishing criteria" (p.225). Marler and Hamilton (1966) stressed neutral description of behaviour units:

"In what terms should these action patterns be described? Needless to say they should be objective. Anthropomorphisms should be rigorously excluded. Rather than using such terms as 'afraid' and 'angry' which involve both observation and interpretation, every effort should be made to record the spatial coordination of limbs and body from which the action pattern is constructed. Sounds may be recorded or noted onomatopoeetically [*sic*], odors by analogy with other odors. To complete the basic description the temporal organisation of these elements should also be noted" (p.715).

Not only emotional terms such as 'angry' and 'afraid' are, however, anthropomorphic in this context. As Purton (1970) pointed out:

¹ In their 1979 paper (Maurus et al.) however, the authors "categorize discrete signal types according to their communicative meaning" (p. 48, my emphasis). The process by which they made this change is unclear to the writer.

"The more one gets rid of the guide-lines of purposive terminology the more one is likely to end up with an unorganised heap of observational and experimental data. On the other hand, if one is selective in choosing what to observe this selection is likely to be strongly influenced by one's awareness of what the animal is doing, in a sense of 'doing' which presupposes that the nature of the action is defined by the animal's purpose. It is not enough just to eliminate references to 'fear', 'anger', etcetera, since expressions such as 'jumping over the fence', 'looking up', 'picking up a seed', are equally 'anthropomorphic'. This is obvious when we consider human beings - there is a clear difference between a person jumping over a fence, and his body moving over the fence. The first statement implies the second, but the second does not imply the first: the body may move over the fence because it has been thrown, or because of a violent muscle spasm, perhaps. In such cases the moving over the fence is not something which the person does" (pp.152-3).

The difference in meaning implied by a person (or animal) jumping over a fence and a person's (or animal's) body moving over a fence is implied by the terms 'action' and 'behaviour' respectively (as, for instance, in Weber, 1947, Harré & Secord, 1972). These terms are introduced in the following section.

5.3 Behaviour and Action

The term 'action' has been used with a specific meaning in some primate behaviour catalogues. For instance, in a list of methodological definitions at the end of a study, Hopf (1972) defined 'action' as:

"Action (behavioral): a behavioral unit displayed by an actor (to a recipient if unit is partner directed) at a certain time; and for a certain duration.
Type of action: combination of a behavioural unit, an actor, and a recipient (if interactional), independent of actual occurrence; in a mathematical sense: the variable, while the action represents the value" (p.387).

Pruscha and Maurus (1976) defined 'action' as follows:

"... each behavioural event ... is classified according to 'who does what to whom': a sender animal (a) performs towards a recipient animal (b) a behaviour unit (u). We will call a behavioural event coded in this way by a triplet (a, b, u) an action (when emphasizing its temporal uniqueness) or action unit (when emphasizing the type of recurring event)" (pp.187-88).

The term 'action' as distinguished from 'behaviour' will be employed differently from the meanings given above. The utility of the different usage lies in the kind of distinction it provides. 'Behaviour' will refer to movement or physical patterns only and 'action' will refer to purposeful behaviour. Thus 'action' refers to another dimension in addition to the description of movement patterns which becomes significant in the discussion of the basis for anthropomorphism in behaviour reports.

Reynolds (1980a) has summarized Weber's (1947) distinction between 'behaviour' (Verhalten), 'action' (Handeln) and a third term, 'meaning' (Sinn), which links the two others:

"If we describe what people or animals do, without inquiring into their subjective reasons for doing it, we are talking about their behaviour. If we study the subjective aspects of what they do, the reasons and ideas underlying and guiding it, then we are concerned with the world of meaning. If we concern ourselves both with what people are, overtly and objectively, seen to do (or not to do) and their reasons for so doing (or not doing) which relate to the world of meaning and understanding, we then describe action". (Reynolds, 1980a, p.xxiii).

Harré and Secord (1972) add a third dimension to behaviour and action, which they name an act. They wrote:

"An action acquires its social meaning through being identified as a performance which, when completed, constitutes by convention an act. Acts are not to be identified either with the actions needed to perform them, nor with the movements involved in the action. There are many different ways in which the same act may be performed. All have the same meaning through their identity with respect to the act, of which they are the performance" (p.11).

As Reynolds (1980a) pointed out, the 'act' dimension is concerned with the social context of human action: how it is intended, by the actor, to look to others, and how others interpret it. The present study is confined to behaviour and the implication of action in ordinary language terminology; however, there is no apparent reason why, if actions

are attributed to animals, acts should not be as well, especially in the complex social lives of primates.

Harre and Secord (1972)¹ gave examples to illustrate the distinction between behaviour and action (p.39); (in each case, (b) is an example of an action):

- 1(a) His arm extended straight out through the car window.
- 1(b) He signalled a left turn.
- 2(a) Her arm moved rapidly forward and made contact with his face.
- 2(b) She slapped him angrily.

They made several points about action: action has significance and meaning; it occurs in a social, not a physiological context; it is inextricably bound up with the nature and limits of language (and the fabric of society), and, importantly, there is no way of reducing action to movement and so of setting it within a physiological context. To try to do so is to transform what was action into something else.

This has obvious implications for the definition of behaviour units and categories. If, when appearing in the body of a report, the categories become read or understood as action (which is what has happened when the terms are said to be anthropomorphic), the meaning the terms acquire cannot be translated into or defined in their apparently original form; i.e., of movement patterns. As Purton (1970) remarked, a description of animal 'behaviour' would not make sense.

To summarize, ordinary language terms are sometimes read as referring to animal action in primate behaviour reports. A transformation of meaning occurs when behaviour categories are removed from their tables and become part of the flow of description about ongoing activities in an animal group.

1 Several philosophers who have recently been interested in the distinction between action and movement are: Hamlyn (1953, 1964); Peters (1958); Melden (1961); Charles Taylor (1964); Richard Taylor (1966); A.R. White (1968) and Mischel (1969).

Very often, lists of behaviour units that make up the categories are not included in reports, and the reader is left to determine these units in the course of the report. Theoretically, one should be able to make a list of the categories and the (objective) behaviour units by careful reading or dissection of the text. However, two things become apparent in the course of such analysis. One is that the mode of definition (ostensive, analytic, etcetera) can affect the meaning of the terms, and the other is that the whole sense of the original report is not retained when the categories are reduced to their component units. To demonstrate this, some philosophical aspects of definition are considered next, followed by an analysis of the definition of 'threat' in a behaviour report that does not list its behaviour units.

5.4 Definition

There are two questions that can be asked of definition: (i) to what sort of entity does definition apply?, and (ii) by what methods is definition accomplished? This section is addressed to the first question and section 5.4.1 to the second question. R. Robinson's (1972) analysis of definition has proved most useful for present purposes as it reviews major points raised by several important authors about one or other aspect of definition in addition to his own.

The first question, 'to what sort of entity does definition apply?' asks do we define words, things or concepts? The definition of words (nomina) is called nominal definition. Definition of things (res) is called real definition. The idea that what we define is neither a word nor a thing, but a concept, has rarely been listed alongside the nominal and the real as a third sort of definition (Robinson, 1972) and will not be mentioned further here.

The habit of regarding definition as being primarily about things (real definition) has been common since Aristotle. It is a statement about the essence of things, what makes something what it is. For instance, a real definition of an emotion does not define the word for the emotion, but what constitutes that emotion. Thus, two real definitions that have been given are: 'Love is joy with the accompanying idea of an external cause', and 'timidity is the desire of avoiding a dreaded greater evil by means of a lesser one' (Robinson, 1972, p.150). These are not nominal definitions of the words 'love' and 'timidity'. The Concise Oxford Dictionary (ed. Sykes, 1976) defines the word 'love' as "warm affection, attachment, liking, fondness, paternal benevolence (especially of God)" (p.646) and 'timidity' as "easily alarmed; indicating fear; shy" (p.1214). Or again, what is given by a real definition of 'time' is not that the English use of the word 'time' means the same as the word tempus, or means 'duration' or anything of that sort, but that the thing time is of a certain nature. Real definition is a process of getting new knowledge of things. It can only be analytically defined, or show what parts make up the whole. That gold is made up of x, y, and z or that x, y, and z constitute what is called 'gold' is a real definition of the thing gold.

Robinson (1972) points out that the view that all definition is of this kind has lost its predominance. Some writers would even deny that real definition exists at all; that definition can only be of words. That debate is outside the compass of the present discussion. There is, however, a sense in which nominal definition is prior to real definition. Robinson wrote:

"There is no good in asking 'What is x?', meaning 'What is the thing x?', until the word 'x' means something to us, and means only one thing as opposed to many. There is no sense in saying that 'we don't know what x is' until we do know what the word 'x' means; for, if we did not know what the word 'x' meant, we should be uttering a meaningless noise in saying that 'we don't know what x is'" (p.192).

Definition of words, or nominal definition can be subdivided into two kinds, word-word and word-thing definition. Robinson explained:

"The purpose of all nominal definition being to report or establish the meaning of a word or symbol, word-word definition does this in the form of saying that one word means the same as another word, and word-thing does it in the form of saying that a word means a certain thing. If, for example, someone tells you that the German word 'rot' means the same as the French word 'rouge', while you remain ignorant what either of these words refers to, that is a word-word definition. If, on the other hand, he points to the cover of a book on his shelves and says that the German word 'rot' means that colour, he gives you a word-thing definition. Word-word definition correlates a word to another word, as having the same meaning. Word-thing definition correlates a word to a thing, as meaning that thing" (pp.16-17).

He further stated that:

"Every word-word definition necessarily implies a word-thing definition to those hearers who know the meaning of one of the words. If you say 'the word "rot" fulfils the same function in the German language as the word "rouge" in the French language', that is a word-word definition; but, to those of your hearers who know what either 'rot' or 'rouge' means, it implies a word-thing definition" (p.17).

The two kinds of nominal definition should, however, be distinguished as one simply points out that two names are equivalent and the other points out that a certain sign is a name of a certain thing.

In discussing the terminology of primate ethology, we are discussing word-thing definition. We are asking, to what does the word 'dominance' or 'threat' or 'appease' or 'court', etcetera refer in the behaviour report, or what is the meaning of the word in each case. In Robinson's usage, word-thing definition:

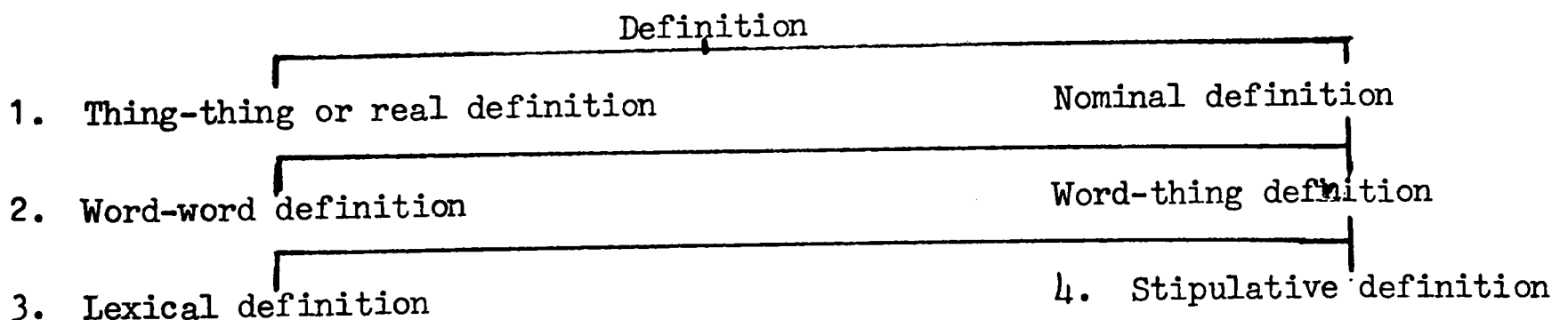
"... means ... any process, whether verbal or otherwise, by which any individual ... brings any individual, whether himself or another, to know the meaning of any elementary symbol, whether a word or other, and if a word whether a noun or an adjective or a preposition or any other sort of word" (p.27).

Word-thing definition can be one of two types: lexical or stipulative. Lexical definition is a report of the customary or dictionary meaning of a word. It explains the actual way in which a word has been used by people. It refers to the real past and is thus a form of history. Stipulative definition, on the other hand, involves establishing, announcing or choosing one's own meaning for a word. It often takes the form, 'By this word I will mean ...'. It lays down or stipulates what the word is to mean when it is first used. In a previous section (5.3) the definitions of the words 'behaviour' and 'action' were stipulated to have certain specific meanings for the remainder of this discussion. On the other hand, the examples used to contrast nominal and real definition of 'love' and 'timidity' were lexical, or dictionary (common usage) definitions.

Thus, a word-thing definition can now be defined as:

"... definition that is either lexical or legislative, which is equivalent to any kind of definition whose purpose is either to report or establish the meaning of a symbol" (Robinson, 1972, pp.20-21).

The breakdown of definition can be summarized in the following chart (ibid., p.19):



Two further terms are useful in talking about definition. In the statement 'X is ...', the subject, X, is known as the 'definiendum', and the predicative part of the sentence, or its meaning, is known as the 'definiens'. Thus, the statement, 'the definiens must be equivalent to the definiendum' is the same as 'the definition must be equivalent to what it defines'.

In primate behaviour reports, definitions of the behaviour categories are stipulative word-thing definitions. That is, words such as 'greet' and 'appease' are defined by means of physical movement patterns or vocalizations (behaviour units) which are grouped into larger categories according to different criteria (function, cause, sequence, and so on). The common or everyday meaning of the terms is not given; these definitions according to behaviour units occurring in certain contexts are stipulated definitions.

Certain other aspects of stipulative definition are relevant to the present discussion. One of the great advantages of stipulative definition is that it abbreviates language. Once a stipulative definition has been given, the thing can now be indicated by a single name, whereas formerly a descriptive phrase was required. However, abbreviation does not only shorten discourse, it also increases understanding. Robinson (1972) noted:

"We grasp better what we can hold in one span of attention, and how much we can thus hold depends on the length of the symbols we have to use in order to state it. Abbreviations often immensely increase our ability to understand and deal with a subject" (p.68).

Some primate behaviour reports only become understandable once the description of visible morphology has been shortened to description in terms of behaviour categories. However, an additional reason for its comprehensibility has been pointed out (Purton, 1970; Midgley, 1978): i.e., that the structure of the usual associations we make between behaviour types (e.g., threat and appease) are carried over to the animal case and serve as a guideline for what the constellation of movement patterns could mean.

Another characteristic of stipulative definition is:

"When we stipulate that a certain thing is to be the meaning of a certain word, the word may or may not have previously existed as a name for something else. ... A stipulative definition stipulates that, whatever the word may mean in other communications or even in earlier parts of this communication, it is for the rest of this communication to be taken as having no meaning whatever except the one now stipulated" (Robinson, 1972, p.60; his emphasis).

Ordinary language terms used in primate ethology are names for something else as well (i.e., human action). As will be shown, despite their stipulated definitions, their associated everyday meanings change the intended strict specification of meaning.

It has been determined that the species of definition used in primate behaviour reports is stipulative word-thing definition. It is now necessary to point out the methods by which this definition may be accomplished.

5.4.1 Methods of Word-Thing Definition

Robinson (1972) pointed out that:

"The most fundamental distinction that can be made with regard to definitions is the distinction between their purposes and the methods by which they achieve their purposes. One of the possible purposes of definition, indicated by the phrase 'word-thing definition', is to report that a certain word means a certain thing, or to secure that it shall mean that thing in future" (p.93).

The latter is stipulative word-thing definition. The methods Robinson outlines which will be listed below are in most cases applicable to both lexical and stipulative definition. Seven methods of defining words (or specifying the meaning of a word in this case) are distinguished:

- (i) The method of synonyms: this consists in telling someone that the word being defined means the same as some other word whose meaning he already knows. Examples are 'unhappy' means 'sad' and 'buss' means 'kiss'.
- (ii) The method of analysis: to indicate what object a word means, name a bigger class within which the object falls, then name something that distinguishes it from the rest of the class. For instance, the word 'octagon' means a polygon having eight sides. Another example is if **man** falls within the larger class, animals, and is distinguished from **the rest** of that class by rationality, we may define the word 'man' as

meaning the rational animal.

(iii) The method of synthesis: this indicates the thing meant by mentioning its relation to some other known things. For instance, 'feuillemorte is the colour of withered leaves in autumn'. A kind of synthetic definition is the causal or genetic, which indicates the thing signified by mentioning how it is caused or whence it arises. For instance, 'circle' may be said to mean the figure covered by a line moving in a plane with one end fixed. The synthetic and analytic methods of definition differ in that the synthetic defines by showing the thing meant as part of a whole whereas the analytic indicates the thing meant by showing it as a whole of parts.

(iv) The implicative method: This is used mostly in mathematics. This method defines by providing a sentence which implies that the word means so and so, or it puts the word in a context which determines its sense. An example is 'a square has two diagonals and each of them divides the square into two rightangled isosceles triangles'. A person knowing the meaning of all the words except 'diagonal' can learn from this what the word 'diagonal' means. This method does not rely on equivalence as do the other three types mentioned. It instead uses the word being defined rather than just mentioning it.

(v) The denotative method: this is definition by exemplification. For example, 'bird' means swans, robins, etcetera. Different sorts of birds are mentioned; or, the word 'ocean' means the Atlantic and the Pacific and things like them. Ocean is explained by mentioning particular things to which it applies.

(vi) The ostensive method: this involves defining by pointing. All the other methods so far mentioned define a word by using other words. All assume that the learner already knows the meaning of some words. The ostensive method may dispense with words altogether (except the

word being defined). Thus, one can point to a book and utter 'book' and the learner who has the idea that words are symbols for things can learn that this utterance is a symbol for book. Words can be used in ostensive definition, but it does not rely on words alone, but also more or less directly uses the learner's experience of examples.

(vii) The rule-giving method: The method of definition for certain words such as 'him', 'there', 'me', 'and', or words that are not appointed to always mean some one thing, is simply to state the rule of their employment. For instance, 'and' is to be used to express the conjunction of two sentences.

Some examples of definitions could be brought under more than one method head. This, Robinson (1972) felt, is probably because the various ways of defining words form a multidimensional continuum, so that between any two empirically distinguished methods there will be intermediate cases. Thus, the seven methods mentioned above are more or less outstanding points in the continuum. He noted that, for instance, a definition may be partly analytic and partly synthetic:

"In so far as where a thing is found is neither clearly included in nor clearly excluded from the meaning of some word for the thing, it is not clear whether a definition of that word is analytic or synthetic" (p.99)

For instance, 'mahogany', which the Concise Oxford Dictionary (6th edition) defines as "reddish brown wood from a tropical tree (especially W. Indian tree of genus Swietenia); ... yielding mahogany" (p.656), can be understood two different ways:

"(It) might be held by some to mean a certain type of wood wherever found, but by others to mean that type of wood only when found in certain species of trees; and then a definition which said that this word /sic/ was found in such and such a species would be regarded as synthetic by one party but as analytic by the other" (Robinson, 1972, p.99).

Another case in which the distinction between the analytic and synthetic is not obvious is the definition that 'colour is a certain wavelength'. To mistake which definition is being used leads to error. Robinson (1972) noted;

"If there is some red other than wavelengths, so that the definition of 'red' by wavelengths is synthetic, those who take it for analytic are overlooking a certain most important reality" (p.101).

In an analytic definition there is a definiens expression (the predicative part of the sentence) which means the same as the definiendum; but in a synthetic definition there is not. The analytic definition shows what parts the whole is made of, whereas the synthetic relates the definiendum to other known things.

These different methods of defining will be applied to an analysis of how the term 'threat' is used in a description of the natural behaviour of bonnet macaques (Macaca radiata) (Simonds, 1965). The analysis reveals that where the distinction between an analytic and synthetic definition is not clearly drawn, the stipulated meaning of threat is left unclear and that in the final analysis, the reader does not understand what threat is by the stipulated definition(s) alone.

5.5 A Definition of 'Threat'

A field study provides the sternest test for the adequacy of the primatologist's definitions because animal behaviour in the wild is more 'rounded off' within a richer context. The importance and usefulness of the complementary nature of carrying out both field and laboratory studies of behaviour is not doubted. However, the display of much more of the animal's social repertoire and effects of its richer social and physical environment give a fuller and at the same time less easily analysable picture of behaviour. Discrete definitions of behaviour

categories are less easily applied in the flow of behaviour. Albrecht and Dunnett (1971) remarked that the complexities of chimpanzee behaviour as observed in the wild made interpretation of the behaviour difficult. They wrote:

"The social behaviour of chimpanzees does not lend itself well to division into rigid categories. This particularly is true of sexual behaviour, which appears to be incorporated in a variety of social behaviour patterns apart from straight-forward copulation" (p.30),

and that,

"The division of behaviour which appears in the following subsections is therefore somewhat arbitrary. The material has been presented in what seemed to the authors to be the most natural fashion and the reader should therefore not be surprised if he finds in a certain subsection material which does not seem strictly to come under the title of that subsection" (p.31).

Behaviour categories are usually defined analytically as being made up of various behaviour units. Once in the field context, however, it becomes possible to employ other methods of defining as behaviour categories exist at different levels of inclusiveness. For instance, 'threat' can be part of 'dominance' and 'dominance' and 'submission' can be elements in the description of 'agonistic behaviour'. In the quote from Albrecht and Dunnett it is evident that observers must at times rely on intuition (i.e., "what seemed to the authors") rather than analysis to determine to which category some of the behaviour units or less inclusive behaviour categories belong.

Simonds's (1965) definition of threat is analysed below by taking every statement in which he used 'threat' and determining which of the methods of definition mentioned above was used in each case. A summary of what constitutes threat according to Simonds's paper will be made. This definition will be inserted into an instance in which Simonds employed the term 'threat' without qualifying it, to determine whether the definition fully describes the so-named behaviour. It can be noted

here that the ordinary language meaning of 'threat' is explicitly purposeful: i.e., "declaration of intention to punish or hurt"; and its verb form, 'threaten': "use threats toward; give warning of the infliction of (harm, etcetera), announce one's intention (to do), as punishment or in revenge, etcetera" (Concise Oxford Dictionary, 6th edition, p.1206). It is used only figuratively of inanimate things (e.g., clouds threaten (rain)).

Simonds studied Macaca radiata diluta on the edge of the Somanathapur Sandal Reserve in southern Mysore State, India, from October 1961 through Januray 1962 and from late April through early June 1962 (a five month study). The home ranges of the Somanathapur group and another, the Hangala group, overlapped, but Simonds focused on the Somanathapur group. His first use of threat occurred in his introductory background to the study:

(p.177) "The only threat behavior observed between the macaque groups occurred when a sub-adult male dropped out of a tree into the wrong group and was chased away".

This was determined by the present author to be a denotative definition (chasing away is an example of threat). The remainder of the examples of 'threat' occur in his sections on social behaviour, mostly with reference to hierarchy and less frequently in the contexts of play, female-young interactions and sexual behaviour. Simonds (1965) wrote:

(p.182) "Also, as the final gesture in a threat sequence, the dominant monkey may approach and embrace the subordinate monkey and chew on the subordinate's neck, apparently as a reaffirmation of the dominance relationship. Face-sniffing is used in the same manner".

If this is taken to be an analytic definition, (a whole analysed into its component parts), threat includes approaching and embracing a subordinate and chewing on its neck or sniffing its face. If a synthetic definition, 'threat' is a part of what dominance means. Simonds probably means to imply both interpretations.

(p.184) "They (highly dominant males) were active in the social interaction of the group, moving quickly toward most threat situations involving subordinate monkeys and terminating the threatening by their presence..."

This is an instance where no definition for threat is given and we only learn that subordinate monkeys may be involved in it.

(p.184, footnote) "... the monkey ... acted in a dominant manner toward the (other) monkey ... This includes causing the other to give way, face-sniffing, neck-chewing, slapping, stare threatening, eyelid threatening, open-mouth threatening, and growl threatening".

This shows threat to be part of dominance behaviour in Simonds's scheme, though it is not a definition of threat as such. He has described the physical movements and vocalizations associated with threat by writing 'stare threatening', 'open-mouth threatening', etcetera. A previous definition (p.182) showed that face-sniffing and neck-chewing are part of a threat sequence, leaving only the behaviour unit 'slapping' to distinguish threat from dominance in this passage.

(pp.184-5) "These central males were not threatened by subadult males and their presence was usually sufficient to terminate a threat sequence, or, conversely, on their approach a subordinate female or old male might begin to threaten a subadult male".

No definition of threat is given here, nor in subsequent statements such as "they tended to avoid threat situations when possible", or "they were often the target of threats by the subadult males" (p.185).

(p.185) "A single, very old, canineless male must be considered separately. He was subordinate to the central males and not very active in threat sequences or other agonistic behavior".

If synonymous, this simply says that 'threat' means 'agonistic behaviour'.

If taken to be a synthetic definition, threat is a part of the larger category of agonistic behaviour.

(p.186) "Only if they (subadult males) molested another monkey (female or infant usually) which screeched, did the dominant central males chase them or threaten them".

This is similar to the instance of synonymy in the previous example.

(p.190) "This (play) wrestling was like that of juveniles and subadult males. There were no threat gestures used, and no signs of attack, no biting to break the skin, no growling or screeching, nor the lunging and slapping that take place during a threat sequence".

This analytic definition of threat adds 'slapping' to the aspects included in threat; thus, returning to the footnote on p. 184, 'dominance' becomes indistinguishable from 'threat'.

(p.191) "Infants and juveniles might use low growling, eyelid threats, and other mild threat gestures fleetingly in their play, but subadult and adult males did not".

This gives an analytical definition of threat, i.e., of what mild threat consists in terms of behaviour units.

(p.191) "There was no question about the difference involved in the two kinds of behavior, threat and play. Threat behavior was violent and tense, and could result in the infliction of wounds. Play behavior was considerably more relaxed and none of the chewing was observed to result in wounds. And yet, in some respects, the threatening of number 10 male may have been an intensification of play behavior".

Chewing is shown to be a common unit to both play and threat here.

(p.192) "At the beginning of such a sequence a subadult male would usually be sitting with one of the old, toothless males in the same tree or within a few yards on the ground. The subadult would look about, then assume a threatening posture and begin growling and screeching with the appropriate gestures (eyelid threats, slaps, and lunges). In contrast, agonistic behavior on the part of the older males and the females was usually elicited by some incident".

This is an analytic definition of threat and again with the implication of synonymy with agonistic behaviour.

(p.195) "They would help a female chase a subadult male away if he solicited copulation and she threatened him, screeching...".

This may be considered a denotative definition, in which 'screeching' is an example of threat. Thus, according to Simonds's usage 'threat' includes:

- (i) chasing away
- (ii) a dominant monkey approaching and embracing a subordinate monkey
- (iii) chewing on a subordinate monkey's neck
- (iv) face-sniffing
- (v) staring, growling, doing 'something' with own eyelids, opening mouth in some gesture
- (vi) agonism
- (vii) a threatening posture, slapping, lunging, screeching
- (viii) biting to break the skin
- (ix) violent and tense behaviour which could inflict wounds.

Simonds's definitions leave unexplained a description of eyelid threatening, of open-mouth threatening, of the threatening posture, of what is involved in slapping (slapping what?), whether there are other reactions to threat besides moving away or giving up food or (in the case of an infant) drawing back chirping, what constitutes a 'mild threat' and what is the entire threat sequence. It may seem somewhat sterile to consider 'threat' out of the context of the whole report, but where it is linked with other behaviour categories, there is some confusion. We do not know if threat is equivalent to or only part of agonistic behaviour or exactly what its relationship to dominance is. Above all, Simonds's stipulated definition alone does not help the reader understand the following passage:

"The less dominant males were less active generally. And there was a personality difference, as well, which may have been a result of their subordinate position rather than the cause of it. For instance, one of the older and smaller males never initiated a threat sequence without the support of a more dominant male, but he would join any threat sequence in which other males threatened those immediately below him in dominance. After such a sequence he always chewed on the neck of the subdued monkey. He could be characterized most simply as a cowardly bully" (p.185).

Characterizing a monkey as a cowardly bully (even as a convenient shorthand) on the basis of when and how it performed its threatening sequences implies some meaning for threat other than the physical descriptions

listed above. Robinson (1972) commented on what is actually the semantic field of terms:

"A word has other dimensions besides its indicativeness. Besides indicating it expresses. A word for x indicates x and expresses the idea of x. When a man says 'grey', he indicates grey and expresses his idea of grey. Every word carries with it, in each speaker's mind in which it lives, certain associations other than its main association to what it indicates, associations to other things or associated emotions and attitudes ... often the same association holds for nearly all speakers of the language" (pp. 56-7).

The usual associations of ordinary language terms are not destroyed in stipulated definitions. Robinson (1972) made a very relevant comment about this:

"In stipulating a meaning for a word, a writer demands that his reader shall understand the word in that sense whenever it occurs in that work. The writer thereby lays upon himself the duty of using the word only in that sense, and tacitly promises to do so, and tacitly prophesies that he will do so. But sometimes a writer does not use the word only in the sense he has stipulated. Then his stipulation implied a false promise and a false prediction. ... We often find a writer evidently using a word in a sense other than the sense he stipulated earlier in the work ... It is not necessarily a case of dishonesty. Or at any rate the dishonesty may be in the words themselves rather than in the writer; for words often deceive their own utterers about what they mean as they are uttered!" (pp.64-5).

It is the purpose of the next sections to explain one characteristic of language, i.e. metaphor, that reduces the effectiveness of the primatologists' stipulated definitions of ordinary language terms in avoiding anthropomorphism.

5.6 Metaphor: Introduction

The use of ordinary language terminology to describe animal behaviour has been characterized as being metaphorical (e.g., Purton, 1970; Tinbergen)¹. That is because ordinary language terms carry with them associations of conscious agency which are not, in the context of scientific behaviour

¹ Personal communication, Oxford.

studies, meant to be applied literally to the animals' behaviour. Thus, anthropomorphism is generated. Purton (1970) wrote:

"These words (aggression, threat, courtship, appeasement, begging, and so on) have a decidedly anthropomorphic sound, but it is clear from any but a very superficial reading that most of the biological ethologists are not anthropomorphising. Their language of 'threat', 'appeasement', etcetera, is metaphorical, in the sense that they are not concerned with desire and action at all. The framework within which they work has no place in it for any notions that presuppose consciousness; it is a strictly biological framework" (p.110).

The application of the concept of metaphor in this context, however, is not quite as straightforward as it at first appears. For instance, though there would be no question that the terms were used metaphorically if electric toy animals were so described, there is some sense in which these terms are being used literally of living animals. Besides (and perhaps because of) the fact that many of us mean to ascribe intentions to animals in everyday life, we also use ordinary language terms in scientific discourse about animals because they are appropriate¹ for such description. Their suitability stems from the fact that living creatures are being talked about of whose behaviour we feel some intuitive understanding in everyday experience (based, perhaps, on a common biological heritage).

There is moreover an inevitability (or lack of any real alternative) about the overall use of ordinary language terms. Purton (1970) pointed out that these terms are heuristically useful in providing a ready-made framework in which to understand animal behaviour. But this has a price as the user is bound by the structure of the ordinary mental connections that are made between these terms. Due to our ordinary use of terms, a concept such as 'threat' must be associated with certain others such as

1 I am grateful to R. Harré for suggesting the notion of 'appropriateness' here.

'attack', 'appease', 'retreat', 'flee'. Thus, once the ethologist has named a behavioural item a 'threat', his naming of the reaction or preceding behaviour is predetermined from ordinary use. That is, we do not ordinarily associate 'threat' with 'grooming' (unless it is qualified as 'appeasement grooming') or with 'begging', and it is equally nonsensical in the scientific case. Nor would the description read sensibly if a realm of discourse other than ordinary language were suddenly employed in mid-sentence. In true metaphor, however, this sort of restriction on choice of words does not apply.

These qualifications by no means necessitate the abandonment of the metaphor concept as giving rise to anthropomorphism in ethology. They merely point to the fact that something may be occurring in addition to making a metaphor in ordinary language description of animal behaviour. Nor is it the case that ordinary language terms create only a simile, because by saying 'one dog threatened another dog', we are not in our minds simply listing similarities and differences between human threat and animal threat as would be the case in simile. Rather, there is an additional sense or meaning given to the description that would be absent in another possible kind of description, such as one in terms of movements. Thus, the description, 'one dog bared its teeth, pricked its ears and made a guttural noise in its throat in the presence of another dog' means something different from 'one dog threatened another dog'. The nature of the 'additional sense' and how it arises is the subject matter of metaphor.

It will be useful to describe a few notions of metaphor in some detail, both to formulate more explicitly the 'additional sense' that it generates and thus explain how anthropomorphism arises unsolicited in the special case of ethology, and to explain other important ways in which metaphor 'works' in primate ethology. The importance of metaphor as a

powerful tool of research in generating theories about 'second-order' behaviour (i.e., social structure) will be suggested.

5.6.1 Concepts of Metaphor

Those who have analysed metaphor¹ have posed various and overlapping questions about it, such as McCloskey's (1964) "What do we do when we use words metaphorically?" and "How does a metaphorical word function?" (p.215), and the several questions posed by Black (1962), among them: "How do we recognize a case of metaphor?"; "In what sense, if any, is a metaphor 'creative'?", or "What do we mean by metaphor?" (p.25). It seems however, that most of the important points about metaphor can be considered by addressing a paraphrase of McCloskey's questions: that is, "What happens when we use a metaphor?".

A distinction is generally made between the literal and metaphorical use of words. As Black assumes an intuitive grasp of what the literal use or meaning of a word is, it is worth mentioning one or two distinctions drawn by McCloskey because the literal and metaphorical meaning of words are basic to much of the subsequent analysis of metaphor.

The literal meaning of a word, according to McCloskey, is that which is agreed upon or conventional in a group with a common language. A literal meaning can only be right or wrong with reference to proper, that is, common or accepted usage. On the other hand, a word used metaphorically cannot be corrected by reference to proper usage, but can only be criticized as inappropriate or inept. There is no agreed upon or definitive rule for using a word metaphorically, but it will only be appropriate if the meaning of the 'metaphorical word' can in some sense be associated with

¹ Discussion of metaphor is here mostly derived from the writings of M. Black (1962), M. McCloskey (1964) and R. Boyd (1979).

the meanings of the other (literal) words in the sentence. That 'association' of meanings will be discussed more fully presently.

Another distinction drawn by McCloskey is that of the parasitic relationship between the metaphorical use and literal use of words; that is, the metaphorical use presupposes the literal one, but not vice versa. In other words, the force of metaphor is derived partly from the literal meaning of the word used metaphorically but no literal meaning is derived from a metaphorical one.¹

One further difference between the literal and metaphorical use of words is in the number of resemblances between a literal word applied generally and a metaphorical word so applied. The literal use of a word provides a clue to other resemblances (or characteristics) of the thing referred to, whereas the resemblance of a metaphorical word to a literal use of the word is superficial. Thus, in 'Love is a fire', the metaphorical meaning of fire does not resemble the literal fire as one fire resembles another. Rather, the metaphorical fire only resembles the literal characteristics of, say, the heat² and the likelihood of being hurt by coming too close to it. There are many more ways in which one literal fire resembles another literal fire than a metaphorical fire resembles a literal fire. The metaphorical word shares far fewer characteristics with the thing signified than do literal words for a thing. Thus, in the metaphor 'cotton-wool clouds', McCloskey explained:

¹ Except in the special case of catachresis, wherein a metaphor provides a meaning or sense that literal words do not convey. As defined by Black (1962), "... 'catachresis' (is)... the use of a word in some new sense in order to remedy a gap in the vocabulary; catachresis is the putting of new senses into old words. But if a catachresis serves a genuine need, the new sense introduced will quickly become part of the literal sense" (p.33)

² Even 'heat' here is somewhat metaphorical.

"Looking white and fluffy are striking characteristics of cotton-wool, which, when applying the literal word 'cotton-wool', we take as signs for all the rest of the characteristics of cotton-wool; but when we apply the word 'cotton-wool' metaphorically to clouds, we are no longer using them as signs. The things called by the literal word have the striking characteristics together with a lot more; whereas the things called by the metaphorical word, have only the striking characteristics" (pp.229-30).

McCloskey pointed out that it is the striking but superficial characteristics that the metaphorical use of a word calls to mind. How does this happen? In McCloskey's words: "A metaphor is a word for one sort of thing applied to a different sort of thing, so a metaphorical word is applied differently from a literal word: it is applied in virtue of different characteristics" (p.227). However, some gross characteristics (such as the heat of fire) may remain. McCloskey distinguished between two ways in which the metaphorical use of a word relates to its literal use: (i) the metaphorical use may be logically related to the literal use in being partially, but not wholly identical with it, or (ii) the metaphorical use may be logically distinct and only psychologically or contingently related to the literal use. This distinction is made in terms of the 'paradigm characteristics' of a word. The paradigm characteristics are those characteristics that justify the literal application of a word (what makes one fire like another fire). Some metaphorical words share in some of the paradigm characteristics of the word; others do not when the metaphorical meaning is entirely different from the literal one.

McCloskey gave an example of shared paradigm characteristics in the metaphor: 'A bright low ribbon of rainbow'. Here, the metaphorical use of 'ribbon' is similar to the paradigm characteristics of ribbons in being relatively narrow - a band - and being brightly coloured. An example in which no paradigm characteristics are shared is given by:

'The pond, I suppose from over-pressure when it was less firm, was mapped with a puzzle of slight clefts branched with little sprigs' (p.227). In this example, the metaphorical use of maps and sprigs recalls none of the usual characteristics by which we identify them as maps and sprigs. As McCloskey pointed out:

"Being made up of a mass of interlaced lines, or being of a certain shape, are not among the paradigm characteristics of maps or sprigs. Yet they are the characteristics in virtue of which the appearance of the pond resembles maps and sprigs, and in virtue of which the metaphorical use is made possible" (p.227).

Thus, the metaphorical is distinguished from the literal use of words in that the former is neither correct nor incorrect with reference to common usage; the metaphorical is parasitic¹ (except in catachresis) upon the literal use of words, and the metaphorical shares in some or none of the characteristics of the thing to which a word refers - characteristics that make the use of that word necessary in literal parlance.

A metaphorical word has a certain semantic relation to the literal meaning of that word and to the other literal words in a sentence. That association of meanings, or, more precisely, between what things the association is taken to hold, forms the basis of the three views of metaphor discussed by Black (1962). The quality and direction of the association goes some way towards answering the question of what happens when we use a metaphor.

1 We might ask how the metaphorical is parasitic upon the literal meaning in the case of unshared paradigm characteristics. McCloskey's statement concerning the 'pond' metaphor provides only a partial answer. The problem recalls Black's (1962) disagreement with the idea that a metaphorical use of a word must connote only a selection from the characteristics connoted in its literal uses. Rather, a reader is forced to connect two ideas - the literal meaning of each becoming slightly altered in the process. (This is the basis of his 'interaction view' of metaphor). Indeed, the alteration in meaning of the literal words in a metaphor seems to be more pronounced in those cases where no paradigm characteristics are shared.

In his analysis, Black distinguished between the 'frame' and the 'focus' of a metaphor. In the metaphor, 'The chairman plowed /sic/ through the discussion', our attention is drawn to or focuses on one word, 'plowed'. In this example, 'plowed' is the focus of the metaphor and the rest of the sentence comprises the frame. (In McCloskey's usage, the frame is the context of the metaphorical word). In calling a sentence a metaphor, Black wrote, "we are implying that at least one word (here, the word 'plowed') is being used metaphorically in the sentence, and that at least one of the remaining words is being used literally" (pp. 27-8). Given a particular focus, only certain frames produce a metaphor. In other words, the presence of one frame can result in metaphorical use of a word, while the presence of a different frame for the same word fails to result in metaphor. To call a sentence an instance of metaphor is to say something about its meaning, not its orthography or grammatical form. Thus, if a sentence that is a metaphor is translated word for word into a foreign language for which this is possible, we would say the translated sentence is the same metaphor. Any part of speech can be used metaphorically¹. Meaning, rather than grammar, is the relevant factor in metaphor.

Black presented three views of metaphor, based on the interplay between three meanings present in any metaphor; i.e., (i) the metaphorical meaning of a word, (ii) the literal meaning of a word that is being used metaphorically and (iii) the meaning of other

1 As in 'Scarves of rotten cloud billowing upward', 'The chairman plowed through the discussion', and 'Blotting-paper voices'.

literal words in the metaphor (the frame). The first is the 'substitution view' of metaphor. This view holds that a metaphorical expression is simply a substitution for an equivalent literal expression. So that in the metaphor, 'Richard is a lion' - 'lion' simply means 'brave'. The reason given on this view for the use of metaphor at all is either for catachresis or to give pleasure to the reader in having to solve a riddle or having a diversion to a concrete image (in this instance, a lion).

The 'comparison view' of metaphor maintains that metaphor consists in the presentation of the underlying analogy or similarity. In this view, 'Richard is a lion' is approximately equivalent to 'Richard is like a lion'. The comparison view is a special case of the substitution view. As in the substitution view, the metaphorical statement is taken to be standing in place of some literal equivalent, but the original statement is treated as a more elaborate paraphrase in that it is interpreted as being about, for instance, lions as well as about Richard.

A third view is the 'interaction view' of metaphor which is the one Black favours as offering insight into the uses of metaphor. He stated: "... when we use a metaphor we have two thoughts of different things active together and supported by a single word or phrase, whose meaning is a resultant of their interaction" (p.38). In the metaphor 'The poor are the negroes of Europe' an interaction view holds that our thoughts about European poor and American negroes are active together and interact to produce a meaning that is a resultant of that interaction. Thus, the focus 'negroes' obtains a new meaning which is not quite its meaning in literal use, nor quite the meaning any literal substitute would have. The context or frame

imposes extension of meaning upon the focal word. The reader must attend to both the old and new meanings together. Further, the literal words in the frame have their meanings altered somewhat. That occurs because the metaphorical word causes us to think of only certain characteristics normally associated with the literal words and so reorganizes our view of the literal meanings. Thus, in the example 'Man is a wolf', the commonly held characteristics of wolves will be applied, as far as possible, to the principle subject, man. Black wrote:

"But the implications will not be those comprised in the commonplaces normally implied by literal uses of 'man'. The new implications must be determined by the pattern of implications associated with literal uses of the word 'wolf'. Any human traits that can without undue strain be talked about in 'wolf-language' will be rendered prominent and any that cannot will be pushed into the background. The wolf-metaphor suppresses some details, emphasizes others - in short, organizes our view of man" (p.41).

Similarly, "if to call a man a wolf is to put him in a special light, the metaphor also makes the wolf seem more human than he otherwise would" (p.44).

Black also pointed out that the use of metaphorical language regularly produces shifts in attitudes. Thus a wolf is (or was) conventionally a hateful and alarming object; so to call a man a wolf is to imply that he too is hateful and alarming. Similarly, if a battle is described purely in terms of a game of chess (in which all expression of feeling is formally excluded), it excludes, by choice of language, all the more emotionally disturbing aspects of warfare.

The substitution view and comparison view of metaphor might suffice for quite trivial instances of metaphor, but they can be replaced by literal translations (except possibly in catachresis) with no loss of cognitive content. However, 'interaction-metaphors' require the reader to use a system of implications. A secondary subject (the metaphorical word) is used to give insight into the principal subject

(the literal word(s)). It demands simultaneous awareness of both subjects and is not reducible to any comparison between the two. A set of literal statements about the 'interaction-metaphor' will not have the same power to inform and enlighten as the original. For instance, in a literal paraphrase the implications, previously left for the reader to work out himself with a feeling for their relative priorities, are now expressed explicitly as though having equal weight. The literal paraphrase inevitably says too much, and with the wrong emphasis. Black stressed that this constitutes a loss in cognitive content - the weakness of the literal paraphrase is that it fails to give the insight that the metaphor did. Wheelwright (1954) may have been implying something similar in his observation that, "metaphor is a medium of fuller, riper knowing, not merely a prettification of the already given" (p.97).

An interaction view of metaphor is important to the analysis that follows. The way in which Black presented this view however, has been criticized by those who would reduce metaphor to a kind of simile and argue that metaphor does not add meaning to the subjects of the metaphor. A difficulty with Black's analysis is his principle that in the interaction view each metaphor has two distinct subjects, and it is the two subjects, or their systems of implications, which interact. Thus, his theory is made applicable primarily to those metaphors which involve two nouns, and inevitably suggests comparison. His particular theory cannot handle such metaphors as 'the eddying brink' in which two subjects are not even present to the mind. Nonetheless, the idea that the combination of meaning effected by a metaphor results in a new and unique agent of meaning is accepted by the majority of modern commentators (Martin & Harré, in press).

Although Black's scheme is adequate for the animal behaviour case, this criticism should first be met. The difficulty is overcome by reference to I.A. Richards's (1936) discussion in which the interaction view was originally put forward. Richards noted that, "when we use a metaphor we have two thoughts of different things active together and supported by a single word or phrase, whose meaning is the resultant of their interaction" (p.93). Black dismissed the notion of "two thoughts working together" as psychologistic. Martin and Harré (in press) pointed out however, that as the thoughts one is dealing with here are primarily couched in words, Richards's terminology is no less convenient than Black's "two present subjects". Richards emphasized that metaphor is an interaction of thoughts, not a mere shifting of words. His distinction between 'tenor' and 'vehicle' is based on the notion that two thoughts interact in metaphor. The tenor is the underlying subject of the metaphor and the vehicle is the terms which present it. In the metaphor, 'A stubborn and unconquerable flame creeps in his veins and drinks the streams of life', the tenor is the fever from which the man is suffering, and the vehicle is the flame which drinks his life. Martin and Harré (in press) pointed out:

"Here it is important to note that what Black would call the primary subject, 'fever', is not explicitly mentioned in the passage. We talk about fever by using the word 'flame' and its associations determine what we mean by so doing. Since 'flame' occupies the centre of a different semantic field from that occupied by 'fever', the use of the term 'flame' enables us to say things about fever, different from those we could say by using the word 'fever'. This supports Richards's contention that it is thoughts (associated commonplaces) and not words, which interest" (p.6).

Thus we are not dependent on two present subjects in a metaphor to get an interaction of meanings between their respective semantic fields. The tenor and vehicle may be co-present in one word or phrase (as in 'That wolf is here again'), since tenor corresponds to 'reference' and

vehicle to 'sense'. A full interaction theory is then also possible in a metaphor that has one true subject.

A number of these aspects of metaphor discussed above help illuminate the consequences of the metaphorical use of ordinary language terms to describe non-human primate behaviour.

5.7 The Metaphorical Basis for Anthropomorphism

Examples of metaphor of the kind suggested by Purton (1970) (see quote at the beginning of section 5.6) are quite ubiquitous in primate behaviour reports. His distinction between A-purposive behaviour (behaviour performed by a conscious agent) and O-purposive behaviour (nonintentional 'behaviour' of an organism), as outlined in chapter four (pp.132-3), provided a useful framework by which to describe two realms of discourse or ways to 'read' descriptions of animal behaviour. An O-purposive reading gives a functional account (which can be used to explain the behaviour's usefulness for survival of the species) whereas an A-purposive reading gives a psychological or anthropomorphic account.

An interesting paper by de Waal and van Roosmalen (1979) on 'reconciliation' and 'consolation' among chimpanzees provides a clear example of this. Part of their abstract described the purpose of their study as follows:

"After agonistic interactions among chimpanzees, former opponents often come into non-violent body contact. The present paper gives a quantitative description of such contacts among the chimpanzees ... in order to establish whether these post-conflict contacts are of a specific nature" (p.55).

1 My emphasis.

Their results showed that former opponents tended to contact each other relatively shortly after a conflict and that they showed special behaviour patterns during these first contacts. Contacts between the aggressed chimpanzee and a third party also occurred with greater frequency shortly after a conflict. Behavioural items characteristic of these contacts were 'kiss', 'embrace', 'hold-out-hand' (begging, p.64), 'submissive vocalization' and 'touch'. The relative ratios of these behaviours differed between contact of former opponents and contact with a third party. For instance, the kiss/embrace ratio for inter-opponent contacts was 23/19 and for third party contacts 5/37 (Table 1, p.60). The authors stated:

"As post-conflict contacts involve special behaviour patterns we may give them special names. First inter-opponent contacts will be called 'reconciliation', and contacts between the aggressed party and a third animal shortly after the conflict will be called 'consolation'. For reconciliation, 'kiss' is the most characteristic element, whereas 'embrace' is so for consolation" (pp.64-5).

The findings are based upon quantitative data and the authors noted that the terms 'reconciliation' and 'consolation' are objectively definable interaction types, as indeed they are. However, they also added,

"... the terminology clearly is functional rather than descriptive. These terms reflect our impression that such body contacts have a calming effect and serve an important socially homeostatic function" (p.65).

Thus, that reconciliation (or consolation) occurred between two chimpanzees can be read as an O-purposive statement, objectively defined and as serving a specific function. However, the A-purposive connotations of those particular words are not only present in the minds of the authors (who enclose the terms in quotation marks) and of the reader, but add a mentalistic interpretation of what is occurring between the animals: i.e., "These terms reflect our impression that such body contacts have a calming effect". The system of associated meanings in the

human experience of reconciliation and consolation are both a reflection of and exist by virtue of the choice of terms.

The metaphor thus reads, 'After a conflict, a reconciliation often occurs between two chimpanzees'. The authors have not included this particular statement in their report, but it would follow from their own choice and definitions of terms. A specific statement they did make which is another instance of this sort of metaphor is: "... the data seem to indicate that after an agonistic interaction many participants prefer contact with the opponent over contacts with other group members" (p.64).

For the purpose of explaining, through the concept of metaphor, the process by which A-purposive connotations slip in, a more simply stated metaphor will be useful. Thus, in 'A young chimpanzee greeted its mother', 'greeted' is the focus of the metaphor and the rest of the sentence is its frame (in Black's (1962) terminology). In its ordinary or literal use, 'greeting' connotes a complex set of meanings suitable to the various occasions, manners and purposes of greeting in human experience. In the metaphor above, 'greeted' means something more than, for instance, 'A young chimpanzee touched its mother on the thigh', etcetera. It can be asked if the language for human activities serves a catachretic function (fills a gap in our vocabulary) in description of animal behaviour. If so, we might ask why there is a lack in our vocabulary; why description in terms of movement or function only is not sufficient for understanding primate behaviour. This brings us back to the original point about the appropriateness of ordinary language terms and the fact that no other modes of description make animal behaviour as understandable to us. Further, the fact that the structure of connections we make between ordinary language terms, such as between

the concepts of 'threat', 'appease', 'attack' and so on, is necessarily carried over unaltered to the animal case, means that the metaphor is propagated throughout a report.

Certain characteristics of metaphor are illuminating on these points. The metaphorical use of a word presupposes the literal use and what the metaphor calls to mind are the striking characteristics of the literal use of the word (McCloskey, 1964). Evidently, one of the striking characteristics about the word 'greeted' and other ordinary language terms is their implication of a conscious agent performing actions, aware of what he is doing. That purposefulness is a striking characteristic of these terms is shown by the fact that people say they can be anthropomorphic when they are applied to animal behaviour.

McCloskey (1964) has pointed out that a metaphorical word will only be appropriate if its meaning can in some sense be associated with the meanings of the other (literal) words in the sentence, and it is the striking characteristics that are so associated. Thus, for the purposive ordinary language terms to be appropriate to their animal context, there must be some underlying feeling that the animals to which the behaviour is attributed are agents. This seems to be what is in fact implied, and the basis for the charge of anthropomorphism in the use of this terminology.

Another characteristic of metaphor is the tension it creates between the common or literal use of a word and the unusual or metaphorical use. McCloskey (1964) noted:

"Because the language is a common language commonly used, one always has in mind the common, literal use, against which the eccentric, the metaphorical use, is counterpointed. One tends to make the ordinary inferences and this tendency is checked, so that there is always a sort of tension within a metaphor.

"A metaphor together with its context works like an assertion followed by a quick denial of something you would expect to follow from it..." (pp. 220-21).

The context of the metaphor (the animals in this case) arrests the usual habits of inferring we have with the literal use of the word. Thus, on seeing the metaphorical word 'greeted', all that we would normally associate with greeting is suddenly arrested on seeing its non-human context. However, it is not the denial that we remember, or that affects our reading of the metaphorical statement. Rather, all that we normally expect (in the literal use) of the metaphorical word remains in our minds. McCloskey noted:

"The implicit denial of a great deal of what the (metaphorical) word asserts does not make nearly the impression that its explicit apparent assertion makes, so that at least the flavour of all those things the word apparently asserts, lingers on after they have been withdrawn" (p.221).

This is interesting in view of the fact that not one, but many statements in a primate behaviour report are so constructed (are metaphors) and there may be a cumulative effect on the reader to attribute the purposeful aspects of the metaphorical words to the animals.

As pointed out earlier, description of primate behaviour in terms of movement only, means something different from that described in ordinary language. Thus, the former sort of description is not a synonym for the latter, and some new meaning is created by the use of ordinary language terms. The notion of interaction-metaphor helps to explain this. The main point about the interaction view of metaphor is that the focus and the frame are active together and interact to produce a meaning that is a resultant of that interaction. The interesting outcome of this is that a change occurs in our concept of the principal subject (the chimpanzee in our metaphor). The metaphorical word 'greeted' causes us to think of certain striking characteristics normally associated with its literal use (human greeting) and so reorganizes our view of the animals to which it is applied.

To paraphrase an example that Black gives, all the human characteristics of greeting that can without undue strain be applied to chimpanzees, will be applied.

Earlier, a doubt was raised about whether the use of ordinary language in animal behaviour description makes a 'strong' metaphor. Out of the possible modes of description, that ordinary language gives the clearest picture of animal behaviour, raises the possibility that only a very weak metaphor has been created and that the terms may even sometimes be used literally. What determines the strength or weight of a metaphor? Black (1962) remarked that:

"There are, in general, no standard rules for the degree of weight or emphasis to be attached to a particular use of an expression. To know what the user of a metaphor means, we need to know how 'seriously' he treats the metaphorical focus. (Would he be just as content to have a rough synonym, or would only that word serve? Are we to take the word lightly, attending only to its most obvious implications - or should we dwell upon its less immediate associations?)" (pp.29-30).

It seems that how seriously a metaphor is intended in descriptions of primate behaviour has changed and will continue to change along with scientists' attitudes or opinions as to what we can justifiably suppose goes on in an animal's mind, and as to what are the interesting questions about animal behaviour. The proposers of cognitive ethology, for instance, would focus on mental phenomena in animals and probably tend to the literal rather than metaphorical use of ordinary language terms. In fact it is in just that sort of study where mental phenomena in animals are not assumed to be exactly like those of human, that the terms may serve a catachretic function and thus become literal terms again.

The use of metaphor is in fact closely related to attitudes. Black (1962) noted that metaphorical language regularly produces shifts in attitudes by virtue of the metaphor reorganizing our view of the

principal subject. Our acceptance of the literal application of ordinary language to animals may occur, if it does, partly through having had animals presented in a purposeful way in our ordinary language metaphors.

5.7.1 Metaphor and Theory Construction in Primate Studies

Metaphor has often been assumed to be out of place in scientific terminology. McCloskey (1964) and Black (1962) held that metaphorical statements are too imprecise to be useful in science, mostly because a metaphor lacks a specific referent. As McCloskey explained, a metaphor calls to mind the striking characteristics of the literal use, but these characteristics do not serve as signs for other characteristics. One cannot make new inferences from metaphorical statements (p.220). Contrary to this view is that of Boyd (1979) who contends that metaphor can be and is used in science for the formation of theories. He wrote:

"There exists an important class of metaphors which play a role in the development and articulation of theories in relatively mature sciences. Their function is a sort of catachresis - that is, they are used to introduce theoretical terminology where none previously existed. Nevertheless, they possess several (though not all) of the characteristics which Black attributes to interaction metaphors; in particular, their success does not depend on their conveying quite specific respects of similarity or analogy. Indeed, their users are typically unable to precisely specify the relevant respects of similarity or analogy, and the utility of these metaphors in theory change crucially depends upon this open-endedness" (p.357).

He noted that there are occasions when metaphorical expressions constitute, at least for a time, an irreplaceable part of the linguistic content of a scientific theory; cases where metaphors are used to express theoretical claims where there is no adequate literal paraphrase. These metaphors are constitutive of the theories they suggest, and Boyd calls them 'theory-constitutive metaphors'. Ordinary language terminology in primate ethology seems to also serve this catachretic function

and to some extent directs formulation of theories about social behaviour.

The way in which Boyd's scheme applies to primate behaviour studies is as follows. Traditionally, most Western primate ethologists have not wished to imply subjective awareness in animals through their descriptions of them. Their use of an ordinary language terminology with purposeful connotations has raised the problem of anthropomorphism in those reports. That terminology is, however, the best one to use. It is the best because it gives the clearest and most understandable presentation of animal behaviour. These points have already been raised. But to take it a step further and ask why this presentation is clearest, brings us to the point that ordinary language description of animals allows us to formulate connections not only 'between' behaviours (i.e., to break up the stream of behaviour as between 'threaten' and 'appease'), but also to formulate more general theories about 'second-order' behaviour, such as 'strategies', 'preferences' (e.g., Bachmann & Kummer, 1980) or social structure.

As mentioned, metaphorical terms do not correspond to precisely defined referents. Instead, in animal behaviour description, ordinary language changes 'behaviour' (O-purposive) into 'action' (A-purposive) and so generates a new universe of discourse about animal behaviour. Theories can then be (and are) generated about more complex aspects of social phenomena that may be occurring among the animals, such as reconciliation and consolation (de Waal & van Roosmalen, 1979) or assessments by unattached males of P. hamadryas of females' 'preference' for a particular male before attempting to 'kidnap' her (Bachmann & Kummer, 1980). These move primate behaviour description further into the realm of what we normally associate with human activities and it is an inevitable direction, given the human context of the initial metaphor. As Boyd (1979) stated: "Theory-constitutive metaphorical

terms - when they refer - refer implicitly, in the sense that they do not correspond to explicit definitions of their referent, but instead indicate a research direction toward them" (p.406).

In other words, the generic anthropomorphism or general purposefulness attributed to the animals' behaviour through metaphor is extended (as in words such as consolation) as more sophisticated analyses of social behaviour are made.

A final characteristic of metaphor that profoundly affects theory formation is that metaphor is culture-specific. Black (1962) stated:

"The important thing for the metaphor's effectiveness is that the system of associated commonplaces about the word used metaphorically are readily and freely evoked. Because this is so, a metaphor that works in one society may seem preposterous in another" (p.40).

McCloskey (1964) gave an example of a metaphor that would not travel:

if someone calls heaps of fallen leaves 'breakfast food', it is understood by the nation that eats Kellogg's Cornflakes for breakfast, but not by a nation that eats porridge. The implications of this for primate behaviour are considerable. What is associated by a particular observer or by scientists of a particular nation with a key term, such as 'dominance' or 'troop' can affect what he looks for in the rest of the animal group's behaviour. For instance, for a time, some workers who used 'troop' carried over its militaristic flavour to specific aspects of social organization using words like 'marching order', 'van', 'sentinel' (e.g., Bolwig, 1959; Washburn & DeVore, 1961).

5.8 Quantitative Description

It is sometimes suggested that the use of quantitative description is a means of avoiding problems such as anthropomorphism that attend qualitative description. In a very imprecise way, quantitative description is at times associated with 'objectivity' and qualitative description with 'subjectivity'. By the same token, quantification is vaguely apprehended to be more 'scientific' in its procedures and presentation of results. Against this trend, Konrad Lorenz (1975) remarked that,

"... it has become fashionable to assess the so-called exactness and hence the value of any scientific result by the relative amount of mathematical operations used in obtaining it ... quantification and mathematics have the last word in verification" (p.153).

Noel Cohen, a biologist, has called this attitude "physics envy" and found it especially true of disciplines such as psychology, anthropology and sociology (Barash, 1979, p.3).

These intuitions are however, far from the truth of the matter; nevertheless, they give rise to those kind of statements mentioned above. In answer to them, it will be pointed out that there is a place and a necessity for both kinds of description in primate ethology. It has often been noted that qualitative description is a prerequisite for the application of quantitative methods, and qualitative description is a long way from being phased out of ethological studies. In fact, to those knowledgeable in quantitative techniques, quantification in ethology has barely begun:

"Ethology is, however, still only on the threshold of utilization of quantitative methods in behavior analysis. This delay has resulted partly from a lack of familiarity with appropriate statistics among ethologists and partly from a lack of statistical methods for handling data of the type that observational behavior studies usually generate" (Colgan, 1978, p.vii).

It should be noted that the following comments are not a criticism of the usefulness of quantitative methods in primatology, but a response to the contention that qualitative description can (and should) be avoided.

At the time when field studies were proliferating, K.R.L. Hall (1965) recommended quantitative analysis:

"Although verbal, rather than numerical statements, - as, for example, that baboons are less tolerant of observers in one area than another - can give an impression of difference, these are quite inadequate scientifically. It is, perhaps, important, first and foremost, that field observers should be trained to think quantitatively, for this will affect the whole approach to their task and need in no way vitiate the accuracy of their qualitative descriptions" (pp.31-2).

Hall was proposing very elementary quantitative analyses at that time, such as duration and frequency measures of activities, counting the number of members in a group, analysis of group membership in terms of age and sex classes and statistical tests for significant differences in seasonal birth rates.

Quantitative techniques have increasingly been applied since Hall wrote and several aspects of quantitative description in primatology have been discussed in the literature; among them, kinds of recording devices (e.g., Hutt & Hutt, 1970; Hinde, 1973; Chamove, 1974); sampling methods (e.g., J. Altmann, 1974); statistical analysis of data (e.g., Slater, 1973; Bramblett, 1976a) and some conceptual bases of its application to recording animal behaviour (e.g., Bramblett, 1976a; Colgan, 1978, for ethology generally).

At times, the qualitative dimension appears to be forgotten altogether. In the introduction to a chapter on 'techniques in primatology', Bramblett (1976a) wrote:

"The scientific method begins with the rejection of authority. A statement is validated ... by a demonstration of accuracy and predictability. In primatology the scientific approach usually means the analysis of statistical data based on observations of natural phenomena. Such observations are tabulated or quantified, and then analyzed in a standardized manner" (p.261).

Before this can be done, however, qualitative definition of behaviour units is needed, as several primatologists have noted (e.g., Hall, 1965; Hinde, 1973; Pruscha & Maurus, 1973). W.M.S. Russell et al. (1954) remarked long before these studies that: "The progress of the quantitative study of behaviour depends on the use of concepts which are qualitatively precise" (p.199). Hinde (1973) elaborated in the following way:

"Because of the dangers of inappropriate selection of material, qualitative study is an essential preliminary for nearly every investigation. For most purposes, only by seeing (or perhaps reading about) the whole behavior in a natural or near-natural situation can the investigator hope to determine what is relevant to his problem" (p.394).

Even after quantitative methods have begun to be applied to the qualitative base Hinde noted that, "... some aspects of behavior will always be difficult to quantify, ... (and) qualitative data may continue to be valuable throughout a quantitative study" (p.402). One pitfall of the 'requirement to be quantitative' is that,

"... easy measures (may be) chosen at the expense of representing the complexly patterned nature of a phenomenon. All too easily the process of data collection becomes a trivial exercise in describing the obvious or the irrelevant" (Bateson & Klopfer, 1973, p.v).

This is the kind of problem that the contributors to a book such as Quantitative Ethology (ed. P.W. Colgan, 1978) are trying to remedy by educating ethologists in the correct use of more sophisticated quantitative techniques in the analysis of behaviour. However, as a contributor to that volume remarked in an earlier paper:

"... it is perhaps even more important that the questions asked should be framed with the nature of the behavior, rather than the nature of the mathematical tools available, in mind. It is, unfortunately, only too easy for research using sophisticated mathematical methods to give very little insight into behavior" (Slater, 1973, p.133).

A qualitative basis and a qualitative grasp of the ongoing behaviour is essential for effective use of quantitative methods.

Another pitfall of the desire for as much use as possible of quantitative description is the danger of narrowing the field of study to a few species on which continuous quantitative measures are taken. Speaking for ethology Lorenz (1975) remarked:

"... while experimental and analytical research has progressed ... the number of animal species which have been investigated has hardly increased at all. In other words, most of the experimental work is concerned with the same few kinds of animals which are relatively well known ... The preference for experimentation has simply strangled the indispensable growth of description. There is an immense amount of purely descriptive work still to be done" (p.165).

Primatologists have studied a fairly wide range of primate species and some of them quite intensively. It is of course necessary to focus on a species for certain kinds of experimental procedures and an example of this paying high dividends is found in the work of a group in the Max-Planck-Institut für Psychiatrie, Munich. Over the past decade they have observed captive squirrel monkeys (Saimiri sciureus) and developed a quantitative method for classifying behaviour units into behaviour categories (e.g., Pruscha & Maurus, 1973, 1975; Maurus & Pruscha, 1973). In a recent paper they (Maurus et al., 1979) concluded:

"This paper is only meant to demonstrate that our procedure for categorizing the social behavioural repertoire with quantitative methods operates effectively ...

"It will not describe naturalistic behaviour as it occurs in the field, but will find out the laws underlying social behaviour that will hardly change under conditions in captivity. In this case quantification is no end in itself but an aid to receive qualitative results" (pp.55-6).

That is, quantification is not, for them, a replacement for qualitative description.

It has been shown in the course of this chapter that anthropomorphism arises at the level of behavioural categories (or complex behaviour units that can in turn be broken down into movement patterns) named in ordinary language terms. Behaviour may also be represented in notations such as numbers and the use of ordinary language terms apparently avoided. Numerical notation is not, however, semantically neutral. The ascription of number to behaviour units presupposes that the stream of behaviour has already been broken up into units and thus given a specific meaning. Furthermore, in the final analysis, such notations are retranslated back into ordinary language terms as are explanations of graphs and so on employed in the course of the study. A fundamental reason for this is that the data becomes more intelligible in ordinary language terms and it is a natural translation for the human mind to make. Additionally, although qualitative description is not as precise as quantitative description in one sense, in another sense it gives a more accurate picture of what occurs in a group. That is because the behaviour of each animal is unique and qualitative description is not bound by presentation of behaviour as an average of several varying events. Lorenz once explained this in an interview with R.I. Evans (1975):

"We now know enough about the range of behavior patterns of normal geese to concentrate on the differences between individuals. ... And you find that what emerges from this study is something like a very simplified model of characterology. For two years now, one of my students has been studying communication patterns among four geese and counting behavior patterns evident among them as they relate to each other. By making histograms of how often one goose threatens and another goose escapes, you find there are quantitative differences; although the behavior patterns themselves are all the same, one goose may excel in bond behavior and in fearlessness but be very weak in

aggressivity. It's a placid goose. And it's a very likeable goose. To illustrate this, one goose has a very low threshold of both escape behavior and aggressive behavior. It's a funny combination - an aggressive coward - and this chap is what many normal persons would term vicious because he attacks suddenly from behind, bites and runs away and is very poor in bond behavior. He is a loner but he breeds. This combination of quantitative differences gives you a very clearly described character of a goose, but describing the character of this goose is confoundedly anthropomorphic" (pp.10-11).

5.9 Conclusion

This chapter set out to show that anthropomorphism arises in naturalistic primate behaviour reports partly by virtue of the nature of our language use. Description of primate behaviour was shown to proceed (at least implicitly) by identifying discrete movement patterns and vocalizations and giving them meaning by subsuming them under specific categories of behaviour according to principles chosen by the observer. The categories are often given in ordinary language terms such as 'threat', 'appease', 'dominance', and so on. It was contended that the everyday meaning of these ordinary language terms is not lost through the use of stipulated definitions based on behaviour units. Because ordinary language terms for social behaviour have most often been used to express human action, they connote purposefulness in the animals to which they are applied. This gives rise to generic anthropomorphism, or the treatment of animals as conscious agents.

The choice of definitional method for behaviour categories was shown to have an effect on the internal consistency of a report, rather than giving anthropomorphic connotations to words, though imprecisely defined terms are probably more vulnerable to imposition of everyday meaning. It was concluded however, that it is through metaphor - in

which a term normally used one way (i.e., to describe human action), is put into the novel context of animal behaviour - that the anthropomorphic connotations arise. The sophistication and applicability of quantitative description was argued not to replace our ultimate understanding of animal behaviour in terms of ordinary language. Thus it is concluded that in Western primate behaviour reports, a generic anthropomorphism arises primarily through metaphor.

Part Two of the thesis follows. It focuses on the basis for anthropomorphism in Japanese primate studies. In contrast to the Western case, anthropomorphism in Japanese reports appears to be a literal rather than a metaphorical use of language. Thus, a basis for use of anthropomorphic terminology can be sought in the underlying beliefs of Japanese primatologists that such terms are acceptable or suitable to the subject matter. It will be argued that this is so, at least to a far greater extent than has been the case among most Western primatologists.

PART TWO

ANTHROPOMORPHISM IN JAPANESE PRIMATE STUDIES

CHAPTER SIX

BACKGROUND TO JAPANESE PRIMATE STUDIES

6.1 Introduction

Japanese field studies of non-human primates began quite independently of those in the West. Their first studies were made of the Japanese macaque (Macaca fuscata) which is endemic to Japan. The initial development of those studies is traced in this chapter. When Western researchers first became aware of the Japanese studies in the late 1950's and early 1960's, differences between the two cultures' approaches were noted, though they were mostly of a pragmatic rather than philosophical kind. It will be seen that the Japanese practices of provisioning and long-term observations of monkeys and a few idiosyncracies in suggested terminology received most comment from Western scientists. Differences of a more fundamental kind were only alluded to and indeed the majority of English-speaking primatologists were not in a position to comment on the so-called 'Japanese spirit' of primate research. There is in fact very little written (in English) about the possible effects of the traditional Japanese view of nature on the modern science of primatology. However, the few comments on those effects that have been made by both Japanese and a Western primatologist who knows the Japanese people and language well (Jean Kitahara-Frisch) are consistent and interesting enough to

warrant further investigation. These comments are presented in the chapter. They refer to opinions about the possible effect of the 'Japanese spirit' or Oriental tradition¹ on Japanese primate studies. Aspects of that tradition are compatible with the use of specific anthropomorphism in descriptions of animal behaviour. It is the purpose of subsequent chapters to clarify what that spirit is and how it has affected the development of scientific research in Japan. This chapter will confine itself to presenting evidence for the acceptability of anthropomorphic description to many Japanese primatologists.

The primatologists whose work is discussed are on the whole followers of Imanishi Kinji's approach to the subject. Although there are likely to be other 'schools of thought' in Japanese primatology, what may be called 'the Imanishi school' has had an extensive enough effect on the general tenor of Japanese primate reports to have prompted the above-mentioned comments about the Japanese approach and the present inquiry.

6.2 Development of Japanese Primate Studies

Japanese macaques (Macaca fuscata, Blyth, 1875)² were the model for the Three Wise Monkeys - 'Hear no Evil, See no Evil, Speak no Evil' - which were thought to embody all the wisdom of Buddha (Frisch, 1959; Reynolds, 1967). Japanese monkeys occur all over Japan³ except on

1 Scholars of Chinese thought object to reference to an 'Oriental tradition' or 'Oriental thought' by Japanese scholars as it implies inclusion of Chinese traditions which is usually incorrect (G. Dudbridge, pers. comm., Oxford). Whenever reference to 'Oriental' is made in this study, it refers only to the Japanese.

2 M. Iwamoto, 1966.

3 Japan includes four main islands: Hokkaido, Honshu, Shikoku and Kyushu, as well as several smaller islands, including Iwo Jima and Okinawa.

Hokkaido. Their northern limit is the Shimokita Peninsula at the northern end of Honshu at 41.20°N and this marks the northern limit of all monkeys and apes in the world (Imanishi, 1963). They range down to Yakushima (Yaku Island) off the southern tip of Kyushu and are found usually in forested areas.

The Japanese macaque with its bright red face and short stump tail (less than ten centimetres) is the only primate species endemic to Japan (Imanishi, 1963). Two subspecies have been distinguished, Macaca fuscata fuscata and Macaca fuscata yakui, by Kuroda (1940; in Iwamoto, 1966), according to differences in geographical distribution and some superficial morphological differences. Kawai (1969) noted that M.f. yakui is smaller than M. f. fuscata with relatively short arms and legs. It also has more greyish than brown hair and a duller red facial colour than M. f. fuscata. Another morphological difference is an accessory cusp at the distal ridge of the third upper molar which occurs more frequently in M. f. yakui than in M. f. fuscata (Saheki, 1966). M. f. yakui occurs naturally only in Yakushima¹ and M. f. fuscata in the rest of Japan (i.e., Honshu, Shikoku and Kyushu) (Napier & Napier, 1967). The fact that the Yakushima monkeys differ from all other groups may reflect genetic drift caused by geographical isolation of this island group (Iwamoto, 1966).

Interest in the scientific study of primates arose through a small group of animal ecologists who were observing wild horses on the cape at Toi-misaki, at the southeastern extremity of Kyushu. Itani Jun'ichiro (1961) described their feelings when they first saw a troop of Japanese monkeys and his description hints at the nature of their involvement with the monkeys from the beginning:

¹ M. f. yakui type comprises the colony of the Japan Monkey Centre at Inuyama, but these monkeys were originally transported from Yakushima (Sugiyama, 1965b).

"We were observing the wild horses which live on the cape when, one day, on a sunny ridge with a clear view down to the Pacific Ocean below, we came across a troop of monkeys. They crossed to the ridge beyond the one where we were, chattering to each other in an astonishing variety of voices, and eventually disappeared from sight behind it. They made an indelible impression on our minds as they passed before us: monkeys with bright red faces, mother monkeys with babies on their backs, great males marching proudly with their short tails held erect - the very essence, one felt, of wild life" (p.421).

That was in 1948. In 1950 Professors Miyadi Denzaburo and Imanishi Kinji formed a small study group which they named the Primates Research Group (Itani, 1961). The early observations were fragmentary because the scientists could get only brief glimpses of the shy monkeys as they always retreated from man. They concentrated particularly on troops in Toi-misaki in Miyazaki Prefecture, Koshima Island, Takasakiyama in Kyushu, Mino'o near Osaka and in Arashiyama in the outskirts of Kyoto. After two years, however, they had only a general outline of what a troop of Japanese monkeys was like (Itani, 1961). Miyadi (1964) explained that before they could see much of the monkeys, Japanese primatologists were surprised at the variety of their voices that could be heard in the forests. They came, he said, to regard vocalization as one of the most important clues to their natural history. Their classification of vocalizations reveals an early interest in the emotional lives of the monkeys.

The vocalizations were classified as follows: (i) sounds which indicate emotional calls, (ii) defensive sounds, (iii) aggressive sounds, (iv) warning sounds, (v) sounds of estrous females and (vi) vocalizations of babies. A further distinction was made between 'calls' and 'cries'. Calls were for communication between individuals and the group; they were not accompanied by violent emotion and helped the troop stay together in the dense forest. Cries were usually

accompanied by strong emotions, by anger or sorrow on social contact with other individuals. Their function was to adjust social relationships.

The breakthrough in observations came in 1952 when researchers¹ set out sweet potatoes and barley on rocks in the forest on Koshima and the monkeys ate them. During that summer, food was placed at several points and it was evident that the daily route of the monkeys was influenced by this. Gradually, the number of feeding sites was reduced to one sandy beach at Otomari Bay, the only area that afforded a clear view of the monkeys on the island (Itani, 1961). Scientists began to supply food to the Takasakiyama group in 1952 (Russell & Russell, 1968) which accepted it in 1953 (Sugiyama, 1965b).

The difference made to observations by bringing the monkeys out into the open and gaining their tolerance of the presence of observers was, as Itani (1961) described, "... like the transfer from a hunting life to an agricultural life" (p.422). They had until then been 'hunters' of the elusive monkeys and restricted to making general surveys of group numbers, composition and routes. Once the monkeys were gathered in the open, however, intensive sociological studies became possible and through them, the unique Japanese approach to primate ethology could develop. Other wild troops of monkeys were then provisionized² at Arashiyama, Mino'o, Shodoshima and Toi (Sugiyama, 1965b). By 1961, more than twenty troops had been provisionized throughout the country (Itani, 1961).

1 J. Itani, S. Kawamura and K. Tokuda (Kawai, 1969).

2 The term 'provisionize' refers to the process of semidomestication of the monkeys (Simonds, 1962) whereby the monkeys accept food in the presence of man. Imanishi (1960a, 1963) proposed 'provisionization' to denote this "incipient stage of domestication (or acculturation)" where the monkeys are under no restraint but habitually appear at a feeding place. Once provisionization is accomplished, the continued supplying of food is called 'provisioning'.

In 1952, Miyadi and Imanishi formed the Kyoto University Anthropology Research Group (Frisch, 1959); its chief interest was the study of ecology and social behaviour. A few years later the Experimental Animal Research Committee was begun at Tokyo University. This group's investigations centred around the experimental use of monkeys for medical research. By 1956, co-operation between the two groups resulted in the formation of the Japan Monkey Centre (JMC). Its published objectives were as follows (Frisch, 1959, pp.584-5):

- "(i) To foster team research on primates.
- (ii) To study intensively ecology and social structure and work out methods for conservation and propagation of these populations.
- (iii) To establish and operate, in cooperation with several universities, a primate laboratory and to centralize the data obtained.
- (iv) To establish breeding colonies to supply the demand for experimental animals.
- (v) To open a primate zoo to study the problems connected with human origins.
- (vi) To publish books and journals on the study of primates."

In 1957 the JMC was also authorized as a museum under the jurisdiction of the Ministry of Education (JMC pamphlet, n.d.). The Centre publishes two journals: Primates, an international quarterly journal, and Monkey, a popular naturalistic science journal, published bimonthly. Primates has been published in English since the third issue (1959) (the previous two issues in 1957 and 1958 had English summaries of the articles) and was at first the source of most of the West's knowledge of Japanese primatology. Monkey contains most of the data on the development of the supervised colonies of M. fuscata in Japan (Frisch, 1959).

The JMC is situated in steep wooded hills near the Kiso River, near Inuyama, twenty miles north of Nagoya (Simonds, 1962). When it was established, about eighty Japanese monkeys were captured on

Yakushima and released near the Centre (Sugiyama, 1965b). A major part of the work is the study of free-ranging primates but studies and experiments in physiology, psychology and anatomy are also carried out. Of the provisionized troops throughout the country, in 1962 five were managed by the JMC and the rest by the cities near which they are located (Simonds, 1962). The JMC also introduced other species of monkeys, for instance, Formosan macaques (Macaca cyclopis) and crab-eating macaques (Macaca fascicularis) onto three islets in Mikawa Bay that the Centre owns. It has also sponsored various overseas expeditions to study primates.

The second centre for primate research, the Primate Research Institute of Kyoto University, was established in 1967. It is a national institute for the co-operative use of scientists. Its main objectives are to illuminate primate adaptations, the evolution of sociality in primates, and the origin and evolution of man (Primate Research Institute pamphlet, n.d.) and to that end has departments specializing in biological, behavioural and socio-ecological aspects of primates. The Koshima Field Laboratory troop is under its management. Observations of this troop began in 1948 providing the longest recorded history of any primate group in the world¹ (Primate Research Institute pamphlet, n.d.). Research projects have thus tended to be on the long-term genealogy and life history of this troop.

Recently, monkeys have proved themselves quite adaptable to being forced into new areas by human expansion and intrusion into their home ranges. Some groups of monkeys, however, have become totally dependent on man and a group near Kyoto has to be encouraged with apples to go back into the forest to sleep at night.² At Takasakiyama, monkeys are

1 On the contrary, Imanishi (1960a) says that the Takasakiyama group, observed since 1953, holds this status.

2 "Survival", ITV television programme, July 18, 1977.

fed by visitors to a 'fun-fair' area. Two of the least harassed groups are the famous 'Snow Monkeys' in the Nagano prefecture in Chūbu and at Tsugaru in Aomori prefecture, and the monkeys on Koshima Island.

The Tsugaru snow monkeys live in the 'Valley of Hell' so-called because of the hiss and steam caused by the contact of hot thermal springs with ice and snow there. The monkeys have retreated from human settlement and adapted ingeniously to their severe surroundings. They have learned to eat the bark of trees which provides some nourishment during the harsh winters when other food is unavailable and to warm themselves by bathing in the thermal pools. Furthermore, they get out of the hot water about one-half hour before sunset which ensures that their fur dries in the last rays of the sun; otherwise, they would soon freeze in the cold night air. The monkeys on Koshima Island, by contrast, have less severe surroundings with a warmer climate, sandy beaches, trees and no permanent human settlement. These were the monkeys which began to 'wash' sweet potatoes in the sea, throw barley grains on the water which separated the grain from the sand, and to eat caramels. The process of the adoption of new eating habits in this group was studied by Japanese primatologists with regard to the transmission of new behaviour within a group (e.g., Kawamura, 1954; Itani, 1957, 1965; Yamada, 1957).

6.3 Differences Between Japanese and Western Studies

The first decade of Japanese primate research was virtually unknown to the West. It was not until 1957 that a paper appeared in English on the social behaviour of Japanese macaques (Imanishi, 1957a). A few lectures were given by Japanese primatologists at international conferences (Imanishi, 1957b; Miyadi, 1959, 1961). At a seminar at

the University of Chicago, J.E. Frisch¹ discovered there were papers, books and a journal published in Japanese about primates. In an article submitted to American Anthropologist (Frisch, 1959) he described the JMC and its research and outlined what he considered to be original features of Japanese studies: namely, (i) identification of individual monkeys, (ii) intraspecific comparisons of behaviour and (iii) an historical or long-term study approach. He also raised a question about the possible effects of provisionizing on the monkeys' behaviour. Other articles appeared describing the JMC (Simonds, 1962) and the Japanese method of study: i.e., provisionization, individual identification and long-term observation² (Imanishi, 1960a; Sugiyama, 1965b) and stressing the future importance of intraspecific comparative studies (Sugiyama, 1965b). Thus, the Japanese included provisionization as a first step in their method, which Frisch appears not to have done in the beginning, though he did in a later article (Frisch, 1963). Intraspecific comparisons of behaviour were only of course possible after data on several groups had been collected. What was then known of the social organization and behaviour of Japanese macaques was described in some detail by Imanishi (1957a, 1960a, 1963).

Superficially, the questions posed by Japanese and Western primatologists about the social behaviour of non-human primates appear very similar. For instance, the table of contents of a Japanese book³ on monkey behaviour includes chapters on appearance, classification and

1 Originally a Belgian, Frisch became a naturalized Japanese in 1968 and changed his name to Kitahara-Frisch (Primates, 1968: 9(1-2), p. 165).

2 This approach was first applied by Japanese to other species of monkeys in India, on hanuman langurs (Presbytis entellus) and bonnet macaques (Macaca radiata) (Sugiyama, 1964a, 1964b; Sugiyama et al., 1965).

3 Kawai Masao (1969) Nihonzaru no Seitai (Life of Japanese Monkeys), Tokyo.

distribution, growth and development, home range and territory, nomadism, diet, social structure, regulation of group size and so on; headings which are familiar to any Western primatologist. Likewise, the original rationale for studying wild primate behaviour is to all intents and purposes the same for both groups. Imanishi Kinji explained the Japanese rationale as follows. After defining a 'subhuman primate' as "... a kind of ape just before the ancestor of man evolved into the human level" (Imanishi, 1965a, p.113), he wrote:

"Non-existence of such subhuman primates ... in the world today compels us to survey the societies of existing monkeys and apes instead and to discover the main trend of evolution of their societies after comparing them carefully, and then to extrapolate it to the limit of evolution attained by subhuman primates just before reaching the human level. This is an inevitable methodology which we call a primatological approach" (p.114).

Similarly, Itani (1961) stated:

"The object of these studies (of wild monkeys) of course, is to throw light on the society of the nonhuman primates close to man, and by so doing to trace the course that man himself has followed" (p.423).

So far as the Western rationale is concerned, E.O. Wilson (1975) has summarized it as the search for a human biogram¹ (Count, 1958; Tiger & Fox, 1971). Primate behaviour adds perspective and helps identify behaviours and rules by which individual humans increase their Darwinian fitness through the manipulation of society. Wilson stated:

"By comparing man with other primate species it might be possible to identify basic primate traits that lie beneath the surface and help to determine the configuration of man's higher social behavior" (p.551).

¹ The biogram is the characteristic 'way of living' or life-mode of an animal. "Culture is man's peculiarly elaborate way of expressing the vertebrate biogram" (Wilson, 1975, p.1049).

Those are, however, the extent of any important similarities in theory and method between the Western and Japanese approaches to primate behaviour.

The Japanese methodology was at first treated with caution by most Western researchers (Imanishi, 1960a; Frisch, 1959, 1963; Reynolds, 1976). A reason for this was the difficulty Japanese visitors had in making themselves understood in the West. For instance, a small study group that met together for nine months (September, 1962 to May, 1963) at Stanford, California, to discuss the description and interpretation of primate behaviour and out of which the book Primate Behavior (edited by S.L. Washburn, 1965) developed, included one Japanese primatologist, Mizuhara Hiroki. V. Reynolds who was a member of that group for some of the time reported that Mizuhara was never fully understood by the other primatologists (due to the language barrier)¹ and indeed there is no contribution from Mizuhara to the published volume. A primatologist who showed an early interest in the Japanese findings was Stuart A. Altmann, who had some of the early Japanese papers translated into English (Japanese Monkeys: A Collection of Translations, edited by K. Imanishi and S. Altmann, 1965), but did not expect there to be a large enough market for the book to warrant commercial publication. Altmann therefore had it copied and bound at his own university.² However, Western primatologists later seemed on the whole impressed by the results the Japanese had obtained (Imanishi, 1960a, 'Comments'; Russell & Russell, 1968).

1 V. Reynolds, personal communication, Oxford.

2 Letter: S.A. Altmann to Mr. Anders Richter, The University of Chicago Press, Chicago, Ill., Sept. 22, 1965. I am grateful to Professor Altmann for providing me with a copy of this letter.

A paper written by Imanishi and published in 1960 in Current Anthropology provided a forum for comments by both Western and Japanese primatologists on the Japanese approach to primatology. In the paper Imanishi both explained the Japanese methodology for the study of primates and described some aspects of the social organization of the Japanese macaque.

Imanishi's purpose in the paper was, "... developing theory in the study of social organization of subhuman primates in their natural habitat" (p.393). He traced the progress of primate field research from having been originally 'naturalistic' where "... the researcher entered the natural habitat, searched for his animals and recorded his experiences" (p.393), through to individual identification, a method already used by ornithologists and applied to primatology by Carpenter in 1942, and finally to the Japanese method. This method entailed individual identification of the monkeys, not by marking (tattooing) the animals as Carpenter had done, but by attracting them to feeding places (i.e., provisionization) enabling an observer to become familiar with the monkeys, to identify individuals and to carry out long-term studies. In the epilogue, Imanishi stressed the importance of individual identification for analysis of primate social organization. He pointed out that their knowledge of the exact pedigree of each monkey has yielded insights into the importance of kinship ties in the social organization of non-human primates which had hitherto received little attention.

Imanishi went on to suggest the term 'oikia'¹ to refer to "the minimum unit of social life found in any species of animal, regardless of the composition of that unit" (ibid., p.397). He proposed the term

¹ First proposed by Imanishi in 1950 (Imanishi, 1960a, p.397 footnote). It was explained further in Japanese articles (Imanishi, 1955, 1957c). At the same time, Imanishi proposed 'specia' to refer to the largest social unit, i.e., the total society of any species of animal over the whole distribution of the species.

as a means to achieve consistency in naming the social units (e.g., harem, family, band) of various species. Thus, the family in gibbons (Hylobates lar) or the harem in hamadryas baboons (Papio hamadryas) would be described as an 'oikia'. The large troops that, for instance, hamadryas baboons form at night would be an aggregation of 'oikiae' (harem units). An individual baboon would be an 'oikion'. He described the internal organization of the 'oikia' of Japanese macaques as comprising central males including leaders and subleaders, peripheral males and females together with dependent infants, and explained the dynamics of the dominance rank. In conclusion, Imanishi placed the Japanese studies in a wider theoretical context: that of illuminating the origins of human behaviour. He said that from kinship studies in primates there may eventually emerge an answer to the origin of the incest taboo or of the family in human societies. He felt that an experimental group created from individuals of two different groups of monkeys might reveal whether or to what extent behavioural characteristics are genetically or culturally based.

The comments of Western primatologists on Imanishi's paper of relevance to this inquiry centred both on terminology, such as his use of 'oikia' (Chance, Emlen, Washburn & DeVore, Zuckerman, 1960), 'subhuman primates' (Schultz, Emlen, 1960) and 'theory' (Carpenter, 1960), and on more general, cultural differences between the Japanese and Western approaches. Of those who commented on the suggested use of 'oikia', all except Zuckerman were opposed to it on the grounds that it might rigidify classification and obscure the fact that different social units may take different forms in the same species under an altered environment (Chance, Emlen, Washburn & DeVore, 1960), and suggested instead a more operational approach to defining social units (Chance, Emlen, 1960). On the other hand, Zuckerman (1960) thought that

as long as the basic social units are homologous in different species, a single standard term would be useful.

With regard to Imanishi's use of 'subhuman primates' to refer to monkeys and apes, Schultz (1960) found the term misleading as it implied a scale of evaluation for primate characteristics, with the human type as the most advanced. Emlen (1960) was opposed to its use where man was simply being excluded from consideration. He thought it reflected an anthropocentricity which should be avoided by anthropologists as well as biologists in the interests of objectivity.

Imanishi did not reply to criticism of his use of 'oikia', but he commented that as a social anthropologist interested in the origin of culture, his usage of the 'subhuman' level of primates was approximately equivalent to the 'subcultural' level of primates. As Carpenter (1960) pointed out, the heterogeneity of subject background of primatologists raised problems of interdisciplinary communication.

Carpenter's (1960) criticism of Imanishi's use of 'theory' revealed, in Imanishi's opinion, a fundamental difference between the Western and Japanese approaches. Carpenter disagreed with Imanishi's statement that individual identification of animals, provisionization, basic rank, dependent rank, 'oikia', etcetera were advances in theory, but considered them to be techniques or procedures and highly generalized terms for describing results of extensive observations over time. Citing his own study of howler monkeys (Alouatta villosa) Carpenter said that the approach of asking hundreds of simple direct questions about all characteristics of howler monkeys' behaviour and social and ecological interactions, while quite productive, was not primarily theoretical. Imanishi replied that of the two distinct but complementary scientific approaches, namely, the nomothetic and idiographic, Carpenter seemed to recommend

the former, while Imanishi preferred the latter in the long-term observation of Japanese monkeys¹. A cultural difference noted by Carpenter (1960) was that there were:

"... differences in traditions of criticism, so that (for example) Oriental scientists may think improper the skepticism and challenging criticism that Western scientists consider indispensable in a developing branch of science. Such differences may inhibit free criticism in both directions" (p.402).

Any problem with anthropomorphic terminology was only alluded to. Here, Carpenter noted that the "use of inferential, subjective and anthropomorphic language" (*ibid.*, p.402) arose because of different levels of sophistication in the biological and behavioural science theories used by scientists with different disciplinary or national backgrounds. It will be seen, however, that the basis for such language is somewhat more complex than that attribution.

6.4 Anthropomorphism in Japanese Studies

In the years subsequent to the early introduction of the Japanese work to the West, other kinds of differences were noted, especially in the area of attributing emotions and personalities to the animals. Whereas in Western reports description of the 'personality' of animals does not usually occur, unless offered between quotation marks, this question did not even arise for Japanese primatologists except where they were answering criticism from Western colleagues (e.g., Kawai, 1969). Familiarity with monkeys' personalities is in fact integral to the Japanese method of individual identification (Itani, 1961)².

1 The Supplement to the O.E.D., vol.2 (ed. by Burchfield, 1976) defines idiographic as: "concerned with the individual, pertaining to or descriptive of single and unique facts and processes (opposite to nomothetic)" (p.238). Nomothetic is defined as: "that pertains to or is concerned with the study or discovery of general (scientific) laws, especially as contrasted with idiographic study" (p.1226). Yoshida, a Japanese historian of science, has remarked that the Japanese perception of natural phenomena as being closely bound up with one's personal feelings and impressions makes nomothetic science impossible (Frisch, 1963, p.242).

2 See p.225.

Evidence for the acceptability of describing the animals' personalities is found in, for example, Frisch's (1963) observation that many Western scholars doubted that objectivity could be maintained when the Japanese provided food to lure the monkeys into the open as their natural behaviour would be modified:

"Japanese workers recognize the problem, but feel much less compunction about modifying the environment, at least to the limited extent of providing food. It is not impossible, as Umezao suggests, that the feeling of sympathy with the animals which they study makes them consider food provisioning as one element in the mutual relationship which has been established between the observers and the observed. In other words, while the Western scientist tends to regard the animals as objects situated in front of him, somewhat as bacteria under a microscope, his Japanese colleague tends to think in terms of a personal relationship with individuals who have a name and whose life stories are often familiar to him" (p.240).

Likewise, Kawai (1969) said of the Japanese primatologists' relation to the monkeys:

"We frequently say: 'I understand how you feel'. The 'feelings' we attribute to the monkeys' reactions are indicated by how we name the reactions. Of course, we do not use words like 'feelings' in publications; however, we often do understand the monkeys' feelings very well. We fuse ourselves with the monkeys' lives and become one and by having a feeling channel where feelings are mutually exchanged, we can actually sense their lives, which we believe is the most striking feature of Japanese primatology" (p.292).¹

Naming the monkeys' reactions is, quite simply, describing their behaviour and the anthropomorphic terminology found in many Japanese reports reflects this apparent empathy with the animals. For instance, Imanishi (1960a) cited an unusual case of dominance in

¹ Translated from the Japanese.

which a younger monkey (named 'Nemu') was dominant to his elder (named Buna'). Imanishi noted that the scientist (Kawamura) who observed this, "... considers this to be due to the timid personality of Buna" (p.401). Frisch (1963) felt that the Japanese primatologists' personal relationship with the monkeys, "... strongly increases the danger of critical [sic] anthropomorphism in the interpretation of non-human primate behavior" (p.241). He continued:

"Many an otherwise sympathetic Western scholar has been shocked by expressions used by the Japanese workers in describing the behavior of Japanese monkeys, expressions which, if taken out of context, would suggest that the writer is rather naive and unsophisticated in his subject" (p.241).

Reynolds (1976) attributed anthropomorphism in some Japanese studies to a reflection of particular social conventions:

"... some of the earlier Japanese works on primate sociology seemed (to me) to be informed by a sense of society that differed from my own and that coloured descriptions of behaviour. To be a little more exact, they seemed to be characterized by anthropomorphism of a rather status conscious kind" (p.137).

However, there appears to be something more fundamental than anthropocentricity occurring in Japanese descriptions of primate behaviour.

Very little has been written in English about the distinctive features of Japanese primatology and even less about how certain aspects of traditional Japanese thought bear on the scientists' methodology. However, Umesao (1960)¹, Frisch (1963), Sugiyama (1965b) and Kawai (1969) (Kawai's work is discussed in chapter ten) have discerned a 'Japanese spirit' in Japanese studies of primates.

¹ Although Umesao is spelled with a 'z' in Frisch (1963) the correct spelling is with an 's' (H. Kawakatsu, personal communication, Oxford).

Sugiyama (1965b) implied a different basis to the Japanese methodology in noting that the influence of traditional Oriental philosophy makes the grasping of the whole structure of the material more important than a detailed description of each phenomenon and that the traditional methodology is important for the theoretical study of primate evolution and the systematics of primates.¹ He did not elaborate upon the 'traditional Oriental approach' but he further stated that: "Through ... international exchanges of opinion (at conferences) we have to absorb excellent foreign methodology and to make our study understandable to foreigners" (p.460, my emphasis). As the Japanese journal, Primates, had been published in English for eight years when Sugiyama was writing, making their study understandable to foreigners did not refer to language difficulties so much as to differences in their philosophies of approach.² In an early statement about these differences, Frisch (1963) cited the following significant remarks:

"In a collection of essays, Professor Umezao³ of Osaka Municipal University, has described the kind of research conducted by the members of the Primate Research Group and remarks that the approach used in these studies has something original, not found in similar studies made by Westerners. While most of the research in natural sciences in this country has followed the tracks laid by European and American scientists, research on primate behavior has been conducted with new methods and in a different spirit. Umezao goes on to say that this new approach may well reflect the traditional Japanese way of looking at nature, where the distinction between man and other living things is not stressed nearly as much as in Western culture. In this view of nature the emphasis

1 P.460. This appears to be in direct contrast to Imanishi's preference for an idiographic approach (see pp.220-1).

2 Sugiyama wrote with regard to a proposed extension of the present study in Japan: "I, as well as my colleagues, are interested in her study ... The biggest problem which we can't write in our scientific articles in English is the basic way of thinking by the language barrier..." (Letter: Y. Sugiyama to V. Reynolds, 21 March, 1980) (my emphasis).

3 Umesao Tadao (1960) Nihon tanken (Exploring Japan), Tokyo.

lies rather on the affinity which all living things have with each other" (p.238).

Even so, when Umesao asked Itani to what he attributed the success and world-wide recognition of their studies, Itani pointed to its scientific character (Frisch, 1963). Kawai (1969) also noted the scientific nature of their studies in having, for example, introduced opportunities for experimental manipulation of conditions through the provisioning of the monkeys. Yet in Itani's own writings a frankly anthropomorphic content is readily observed. In a paper introducing Japanese primate studies to Western readers, Itani (1961) said of the method of individual identification:

"We ... decided to get to know each of them (monkeys) by sight, and gave them names instead of numbers. ... each of us knew the faces of at least two hundred monkeys. ... Recognition is possible ... through the over-all appearance or individuality. With monkeys, the individual character is quite clearly marked, and such individuality is better represented by a name than a number" (pp.423-4).

That the 'individuality' referred to the 'personality' of the monkeys is evident from his subsequent description, as is the emotional involvement of the observers¹:

¹ Western ethologists do not lack an emotional involvement with the animals they study. Tinbergen remarked on this aspect of observing animals in his foreword to Iain and Oria Douglas-Hamiltons' (1975) study of elephants: "The authors also show us how important it is to combine the purely intellectual curiosity of the scientific observer with an emotional, personal involvement. ... It is worth emphasizing that without the emotional involvement revealed by such remarks no man could have had the perseverance to carry out this type of study" (p.15).

F. de Waal related that a student who left the study of chimpanzees said he did not see any 'personality' in the animals, any individual differences, nor any reasons for distinguishing among their behaviours (personal communication, Arnhem).

"We were responsible for christening more than 1,000 wild monkeys in all. Some of them we shall probably never forget as long as we live. One of them in particular - a monkey on Takasakiyama called Jupiter - will always be remembered by all of us. He was a monkey of great spirit and valor. Always on the alert, he was strict at times to the point of cruelty. He retained these qualities all through the eight years that we knew him. When he died, on January 16 this year, he must have been over 30. ...

"Nevertheless, throughout the eight years that we knew him, Jupiter was the number-one leader of the Takasakiyama troop. To his dying day, he remained king of this especially large troop. Though we missed him, his death gave us a chance to study a number of exceedingly interesting problems involved in understanding the way troops of Japanese monkeys behave. The first of these concerns the life-span of the Japanese monkey; another the stability of the leader's position in the troop. It would not be possible for a single individual to retain the position of most dominant leader for as long as eight years if the troop did not have a firm framework.

"Yet Jupiter in his last years was quite feeble. Physically, he was no match for the younger and more energetic males in the classes known as subleaders and peripheral males. He could hardly have maintained his position without something other than the strength of his teeth and arms. Our numerous records convinced us that it had some connection with the individual's influence and achievements, and particularly with the confidence of the females who make up the center of the troop. Jupiter's life and death afforded valuable evidence in support of this view.

"After Jupiter's death Titan, the troop's second leader, took over quite smoothly without any chaos in the troop. Where Jupiter had been intrepid and adventurous, Titan was a sedate, dignified monkey. It will be interesting to study the effect on the troop as a whole of such a difference in the personality of the leader" (Itani, 1961, p.424).

Other reflections upon the monkeys' behaviour made by Japanese primatologists illustrate the attitude to the monkeys and to the performance of scientific investigation that Westerners have found anthropomorphic. One of the founders of Japanese primatology, Miyadi Denzaburo (1961), published an early paper (in English) about fission (or splitting) of Japanese macaque groups. In a

discussion of the mechanics of the formation of a new group that had split from a former group, Miyadi (1961) mused: "It is not clear how the 50 monkeys have chosen the separate group. Was there any secret plot among them?" (p.81).

The editorials in the journal Primates also reveal the Japanese use of anthropomorphic terminology. There are many examples throughout their descriptions and only two will be quoted at some length to give a clear indication of the character of the reporting which is being considered here. The passages are in fact a continuation of the story of the Takasakiyama group's leadership, six years hence. Itani (1967) related:

"Bacchus, the most dominant male of the Takasakiyama-A troop, has been missing since May 18, 1967. He is the oldest of the wild Japanese monkeys we have ever known, and has been known by many research workers since they succeeded in feeding the troop at the end of 1952.

"From 1952 to January 1961 the most dominant male of the troop was Jupiter, and after his death Titan took the leadership of the troop. After Titan died in June 1964, Bacchus, who was then the 2nd leader, took the leadership of the troop. His disappearance probably means his death due to old age. On the day before his disappearance a keeper saw Bacchus walking toward the mountain a little later than the other monkeys, and that was the last time he was seen.

"In the Spring of 1953 I named him Bacchus. Even in those days he was pretty old, being slow in motion, and his face was always red as if he were drunk. He was the 4th dominant male at that time; however, I thought that he was older than Jupiter. Recently the long hair of his haunch and back turned quite white. He was not as dauntless as Jupiter, nor as generous as Titan. Nevertheless, he possessed his own dignity, and dominated the troop. It may have been that he had, so to speak, the personality of a grandfather.

"Bacchus, as well as Jupiter and Titan, must have maintained the position of leader to the last in spite of senility. In the Takasakiyama-A troop from which Bacchus has disappeared, Boor, who was the 2nd male, is leading the troop instead of Bacchus.

"Bacchus, who has played an active part in our field notes must now be sleeping somewhere in Takasakiyama covered with beautiful young leaves.

"When the last proofs of this issue were about to be printed, I received a call from a keeper of the Takasakiyama National Park on July 7. He told me that he had seen Bacchus after fifty days' absence on July 6.

"Several days before they said that a white monkey sometimes appeared in a loquat patch at the eastern foot of the mountain. The keepers did not believe it true, saying that it was a ghost of Bacchus. But the white monkey proved to be really Bacchus.

"We want to make him come back to the status of leader, if possible. But it will probably be impossible, and Bacchus himself will not desire to make his comeback. It seems that in the society of monkeys there are still too many problems that we cannot forecast" (pp.89-90).

In the next issue of Primates, the editorial postscript is continued:

"On August 2, 1967, an unusual change occurred again in A troop of Takasakiyama; after Bacchus disappeared, Boor led the troop of over 700 head as the most dominant male; however he also suddenly disappeared. Some observations which seem to be related to Boor's disappearance have been made. On that day the monkeys of B troop were feeding at the feeding ground, while those of A troop were resting above the ground. Then Boor went down toward the feeding ground with a male of A troop to drink water. Boor must have probably forgotten that he was in the expanse of B troop. At that time he was suddenly attacked by the males of B troop and was bitten by some of them. He barely fled from there to the expanse of A troop. Mr. K. Kawanaka, who observed the scene, says that Boor seemed not to be fatally wounded; nevertheless, Boor has not been found in A troop since.

"If he has not died from the wounds, how should the relation between the above-mentioned occurrence and Boor's disappearance be interpreted? I suppose that a special psychological balance is necessary for a monkey who is placed in such a special status as 'most dominant male', and that the loss of this balance may make it difficult for him to maintain status. Some people will say that this is a too anthropomorphic idea, but such a type of 'power-loss' may occur in a society of monkeys.

"The six leaders that I named in 1953 after individual identification, have all disappeared, Boor being the last. Dandy, Saruta and Aome, who were once sub-leaders, are leading the troop in place of Boor; however, monkeys of the lower classes are partially lacking because of the desertion from the troop or troop fission. Therefore it can

be said, from the view of the social composition, that A troop has fallen into a very insecure state. At present, dynamic relations among A, B and C troops are very delicate, and as a result there are many sociologically interesting problems. For example, a tendency can be seen, from observations so far made that the dominance of a troop does not always depend on the size of the population, but rather the troop which keeps good social integration becomes dominant over a troop which is not well integrated. We research workers want to keep watching in order to determine how the monkeys will acquire a new equilibrium by means of their social intelligence" (Itani, 1967, pp.187-8).

Anthropomorphism in description such as that above does not interfere with the formation of testable hypotheses about the dynamics of social behaviour in the group; at the least, it seems merely gratuitous, but more serious criticism than that has been made. Frisch (1963) wrote:

"... the real weakness in some of the interpretations proposed by the Japanese workers ... lies not so much in their use of anthropomorphic concepts, probably unavoidable, but rather in their failure to perceive clearly the nature of the distinction between human and non-human behavior. A philosopher would say that they have no adequate grasp of the relationship of analogy that both unites and separates the human from the animal world. ... The lack of such distinction may, by evoking feelings of sympathy with and closeness to the animal world, provide valuable insights for the understanding of non-human behavior. But it also tends to obscure important differences and makes it more difficult to appraise the true originality of non-human and human behavior respectively" (p.242).

In writing about the practice of identifying all the monkeys by becoming familiar with each monkey's face and general appearance Frisch (1963) noted:

"This seems hard to imagine for Western scientists. I remember an American scholar, with a long experience in the study of wild monkey populations, telling me his amazement in finding out that the worker supervising the colony of Takasakiyama (several hundred strong) knew most adult animals by face. He could have added 'by name', for Japanese field workers, after starting to give a number to each animal, soon replaced these by names expressing the particular personality of each individual. Umezao is probably right in seeing in this

practice the expression of a feeling of personal attachment for each individual animal and it is equally probable that this feeling contributed largely to the success of the identification process" (p.238)¹.

Frisch called this a "quasi-personal acquaintance" with all members of a group. He continued:

"To what extent the originality of their method reflects the feelings of closeness to nature and sympathy with animals characteristic of Japanese culture may be a question open to debate. ...Theirs is more than a scientific interest in the common sense of this word. The closest comparison that comes to mind is that with a cultural anthropologist participating in the daily life of the people he wants to understand.² To somebody who has had personal contacts with these workers and who is at all familiar with Japanese cultural history there can be little doubt that the intellectual and spiritual tradition of this country constitutes a most favorable environment for the development of the science of non-human primate behavior" (1963, pp.240-1).

Since the time of Frisch's writing, at least one Japanese primatologist has said that their feelings of closeness to nature and sympathy with animals do have an important effect on the Japanese approach to primatology (Kawai, 1969). These cultural aspects are identified by Kawai as a fourth method in their approach (in addition to provisioniza-

- 1 Another possible explanation for the Japanese ability to remember dozens of monkeys is given in Markino Yoshio's My Recollections and Reflections (1913). Markino was an artist who lived in London early this century. He remarked on the difference between the Eastern and Western ability for visual memory, proposing that the memory of the Easterner is stronger than a Westerner's due to their respective educations in reading and writing. The Western alphabet of twenty-six letters is quickly learned and after that words are made up of different combinations of the same letters and learned aurally rather than visually, i.e., 'How do you spell...?'. By the time Western children are studying other subjects, they are memorizing facts and making interpretations; they do not think of the shapes of the letters at this stage. By contrast, a Japanese has to learn thousands of Chinese characters, some taking over thirty brush strokes to make, as well as the Japanese syllabries. Attention must continually be paid to the shape of each character as each denotes a different word. Markino felt that this imparts a tremendous visual power of memory for detail, greater than that of most Western people (p.143).
- 2 This is very reminiscent of Jane van Lawick-Goodall's (1967) statement that, "I must say that throughout the six-year study of the chimpanzees (Pan troglodytes) at the Gombe Stream, I have often felt like an anthropologist taking notes on a tribe of people, for chimpanzees can seem so human" (p.38).

tion, individual identification and long-term observation). It is called the kyokan method ('feel-one', 'feel-together') or sympathetic method. As Frisch (1963) remarked, "Going deeper into this matter may yield some insights on a topic seldom talked about: the cultural anthropology of scientific research" (p.238), is the route to be taken in this inquiry. Anthropomorphism in Japanese primate studies is held to reflect a particular underlying attitude to animals and approach to their study. In particular, the philosophical bases for feelings of closeness to nature and the retention of those traditional elements in the face of the influx and adaptation to Western science are necessary background to a fuller understanding of the kyokan method. This is provided in chapters seven, eight and part of nine to enable a full analysis of the basis for anthropomorphism in the Japanese approach in chapter ten. It hopefully provides a more enlightening approach to this characteristic of the Japanese studies than two previous approaches: namely, (i) suspicion of and disregard for Japanese data because of their anthropomorphic flavour (Frisch, 1963, pp.239-41) and (ii) later admission by Western scientists that the Japanese data are accurate (e.g., Reynolds, 1976), but with reservations about their method (Bourlière, 1960; Carpenter, 1960). A slight alteration of a common saying: 'They find the right answer in the wrong manner' might summarize the second attitude to the Japanese work.¹

¹ For instance, Reynolds (1976) noted that with the increasing acceptance of accuracy of Japanese findings, "... both 'sides' have modified their positions, styles and usages" (p.138).

CHAPTER SEVEN

THE JAPANESE INTELLECTUAL HERITAGE

7.1 Historical Periods

To facilitate the introduction of the aspects of Japan's intellectual history that will be discussed, a brief outline of Japanese historical periods is given below. The Japanese past is divided roughly into four ages:

Kodai	(Ancient Times)	(to 1185)
Chusei	(Middle Ages)	(1185 - c.1600)
Kinsei	(Pre-modern)	(1603 - 1867)
Kindai	(Modern)	(1868 - present)

Each age is subdivided into the following periods, although there is still controversy about the detailed divisions:¹

Kodai	{	Yamato or Kofun	(?)
		Asuka-Hakuho	(592 - 710)
		Nara	(710 - 784)
		Heian	(794 - 1185)
Chusei	{	Kamakura	(1185 - 1333)
		Nambokucho	(1333 - 1392)
		Muromachi	(1392 - 1573)
		Azuchi-Momoyama	(1573 - c.1600)
Kinsei		Edo	(1603 - 1867)
Modern	{	Meiji	(1868 - 1912)
		Taisho	(1912 - 1926)
		Showa	(from 1926)

¹ Yamakawa Nihonshi Shi-Jiten (1965); Kasahara (1966, 1974).

Before the middle of the sixth century A.D., knowledge of Japan's past is very sketchy and authentic historical records only begin with the entry of Buddhism and Chinese civilization.¹ Mythology, however, gives some sort of background to later recorded history. According to the legends contained in the Kojiki (Record of Ancient Matters) of 712 and Nihon Shoki (or Nihongi) (Chronicles of Japan) of 720, the Japanese islands were born of the god and goddess Izanagi and Izanami. From Izanagi came the deities of the Sun, Moon and Storm. The deity of the Sun was the goddess Amaterasu. Her grandson, Ninigi-no-Mikoto, was commanded to rule Japan. The first earthly emperor was Jimmu Tenno, his great grandson, who could thus trace direct descent from the deity Amaterasu. Belief in the divine ancestry of the emperor was held in Japan until modern times. Jimmu established his capital south of modern Kyoto where he built a palace. This was, according to tradition, in 660 B.C., though Jimmu Tenno probably lived about the beginning of the Christian era.

In the middle of the fourth century the Japanese established a colony on the tip of the Korean peninsula. For over two hundred years Japan played an important part in the internal politics of southern Korea, but the connection also had momentous consequences for the Japanese. Korea served as the intermediary for the introduction of Chinese script, of Buddhism and many cultural and political aspects of Chinese life. Chinese script was probably known to some people in Japan in the first century A.D., but it was not officially adopted until the beginning of the fifth century. Buddhism appeared in Japan in the

¹ Much of the historical background is derived from Eliot (1935), Storry (1976) and Reischauer (1978).

middle of the sixth century. There was at first opposition to it on the grounds that it would endanger the worship of the natural gods (Shintō). However, at the end of the sixth century, Prince Shotoku Taishi (574-622)¹ promoted Buddhism on an extensive scale in Japan. It did not ever supplant Shintō and most Japanese were (and are) both Buddhists and Shintōists (in belief, if not in practice). During or some years after Shotoku's rule, the 'Constitution of 17 Articles', a set of ethical maxims, showed not only Buddhist, but also Confucian influence.

Prince Shotoku ruled for his aunt, the Empress Suiko, from 593 to 622. Under him, envoys began to be sent regularly to China.² Beginning in 607 twenty-two parties of envoys, not all of which arrived safely, were sent across the four hundred and fifty miles of open sea to China. When Shotoku died, the Soga clan increased its power and showed signs of preparing to usurp the imperial throne. In fact, Shotoku was the last in the line of emperors to have direct control of power in Japan. After 645 the Fujiwara family held the real power for four hundred years. After the Taika Reform³ of 645 borrowing of Chinese technology and institutions went ahead with increased vigor. Just before Shotoku's death China had entered an age of particular splendour with the

1 Kawade shobo (1964) Nihon-Rekishi-Dai-Jiten, supp., p.16; Reischauer (1978). Storry (1976) sets the date of his death at 621.

2 Ono-no-Imoko was the first envoy sent in 607. In 614 Inugami-no-Mitasuki was sent as kenzuishi ('Japanese envoy to China in the Sui Dynasty'). The Chinese Sui Dynasty gave way to the T'ang Dynasty in 618 and Inugami-no-Mitasuki was sent in that year under a new system called kentoshi ('Japanese envoy to China under the T'ang Dynasty'). The envoys included students, priests and scholars numbering anywhere from one to five hundred.

3 In 645 Fujiwara Kamatari overthrew the Soga clan. Fujiwara was a China enthusiast and he instituted his reform programme to make the system of Japanese government like that of China (Storry, 1976).

establishment of the T'ang Dynasty (618-906). The T'ang capital was at Ch'ang-an.

In the eighth century, Heijo, or Nara as it was later called, was built in emulation of Ch'ang-an. It was the first city to have much permanence, but was home of the government for less than eighty years (710-784). The second permanent capital, Heiankyo, was founded in 794, and was an even more ambitious attempt to construct a Japanese reproduction of Ch'ang-an. This city later became Kyoto.

The founding of Heiankyo marks the beginning of the famous Heian period in Japanese history (794-1185). The ninth, tenth and eleventh centuries saw the completion of what many consider to be the first novel in the world, the Genji Monogatari (Tale of Genji, a story about court life), written by Lady Murasaki in the newly adapted Chinese ideographs to a phonetic form called the kana syllabry; the greatest early poetic collection, the Man'yōshū (Collection of Ten Thousand Leaves,¹ or Collection of Myriad Leaves²), comprised of 4,516 native Japanese poems compiled mainly by Ootami Yakamochi (?717-785) between 771-790, though it included material of a much earlier date¹, and the period epitomized in general the perfection of an elegant style in art, architecture and manners. During this period, there also developed a clear distinction between borrowed and native elements in Japan. By the beginning of the tenth century China was experiencing political and cultural decay. However, the last envoy had already been sent to China in 838 and the system of sending envoys was officially abolished in 894.

¹ D. Keene (1955), p.33.

² B.H. Chamberlain (1971), p.284.

During the Heian period, the emperors had declined in power and the Fujiwara governed first as regents and then as civil dictators. By 1192 the military clans took over power, having been useful as peace-keepers in the capital where armed followers of Buddhist temples and Shintō shrines caused trouble. Power fell to the military clans because of political squabbling within the Fujiwara family. In 1192 the head of the Minamoto military clan was given the title of Sei-i tai-shogun ('barbarian subduing great general') or shogun, by the emperor. This title became associated with a permanent office. Minamoto set up a system of national administration called Bakufu ('camp office') at Kamakura. The line of emperors continued and the theoretical right of this family to rule was not disputed, but they were mere figureheads. The Kamakura Bakufu lasted about one hundred and fifty years. Another internal split, as had occurred in the Fujiwara, moved power from Minamoto to the Hojo family. They ruled as regents for the shogun and the government was, almost inconceivably, run by the deputy of a deputy. The Hojo family held power from 1205-1333. Peace was broken by a dispute over the succession of the emperor. In 1331 the Hojo deposed and exiled the emperor but after two years he returned and the Hojo were overthrown. Again there was fighting among the military clans for the office of shogun and in 1339 Ashikaga Takauji became shogun and established his government in Kyoto, in a district known as Muromachi. Thus, the period lasting from 1339 to 1573 is known as the Muromachi age.

In 1542 the Portugese arrived and with them Christianity. At this critical time, real power was successively in the hands of two soldiers, Nobunaga and Hideyoshi, but both died without attaining the position of shogun. This was filled by Tokugawa Ieyasu who founded the Tokugawa dynasty of shoguns who ruled at Yedo (or Edo) from

1603 to 1867. Yedo was renamed Tokyo (Eastern capital) in 1869.

The Edo period marks the beginning of Japan's two centuries of enforced isolation (sakoku). The arrival of Europeans was the main reason for the closing of Japan, both to immigration and emigration. The first Europeans in Japan, so far as is known, were Portuguese sailors who had been shipwrecked off the coast of Japan in 1542. A few years later, in 1549, the Jesuit missionary Francis Xavier arrived in Japan. The first accurate information about Japan to reach Europe was the Jesuit Luis Frois's Historia do Japão, containing a description of the events of 1549-1578 (Sansom, 1967). The missionaries were at first able to go about with relative freedom. By 1600 there were seventy-five thousand converts to Catholicism (von Siebold, 1973). However, when interest in the alien religion spread among the commoners (originally, most converts were daimyos or feudal lords), the shogunate became alarmed. There were suspicions that the Jesuit missionaries were the vanguard of a Spanish colonization attempt. Furthermore, Catholic doctrine was antagonistic to Shintōism, Buddhism and Confucianism, which beliefs were at the core of Japanese life. The Protestant Netherlands and British, arriving later and who were in turn antagonistic to their Catholic trade rivals, fuelled the suspicions of the shogun. The Japanese government saw Christianity as an internal threat to the country and moved to proscribe it altogether. The shogun also forbade any Europeans to live in or trade with Japan. Thus, foreign trade was eliminated except by way of the Dutch port at Deshima¹ at Nagasaki (von Siebold, 1973). Japan's two centuries of isolation (1638-1853) from the rest of the world began. A few Western scientific books did enter Japan through the Dutch during this time however, and the effect of this first exposure to Western science on

¹ Deshima (literally, 'outside island') was man-made and fashioned in the shape of a fan. During the period of isolation, Dutch residents who came to Japan were confined to the island.

Japanese thought is discussed in chapter eight.

In the eighteen forties and fifties, pressure from Russia, Great Britain and the United States culminated in the re-opening of Japan in 1854 to the Americans. The re-opening foreshadowed the great changes that were about to take place in Japan. The shogun Tokugawa Keiki surrendered his power to the Emperor Meiji in November, 1867 and the emperor formally took office in January, 1868. The Meiji period had begun (1868-1912). The event is known as the Meiji Restoration as the daimyos surrendered their fiefs to the emperor, nominally restoring the land that the sovereign's family had owned and governed in ancient times (Storry, 1976).

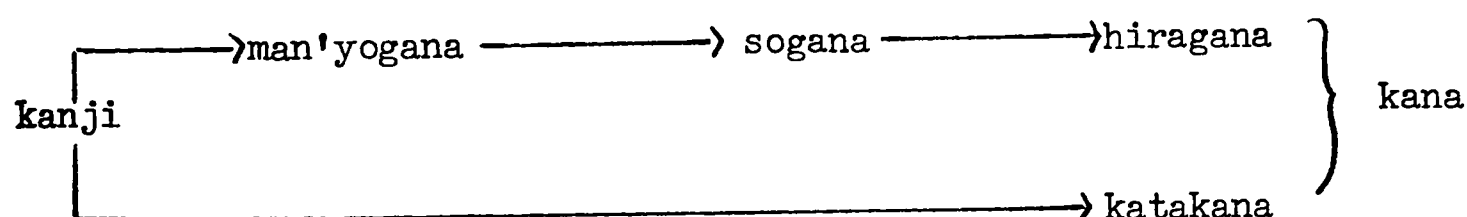
The Meiji period was crucial for the introduction of Western science to Japan. Among the biologists who came to teach was Edward Morse who introduced evolutionary theory to Japan. Imanishi Kinji was born near the end of this period at a time when Western knowledge was taught in schools alongside traditional Japanese subjects. However, it should be remembered that the country was re-opened only under duress. Whilst the Japanese were impressed by the West's superior technology, they made only superficial, though dramatic, changes to Western ways. It is true that traditional Japanese life was radically changed by Western technology, among other things, and some of the accoutrements of a Western lifestyle were adopted; however, certain essential differences between Japan and the West remained. This period is discussed in chapter nine.

7.2 Japanese Language and its Relation to the Japanese Mode of Thought

Japanese was originally written entirely with Chinese characters or kanji. Chinese script was at first slowly introduced to Japan through a Japanese colony established on the tip of the Korean peninsula in the fourth century which lasted two hundred years. The official adoption of Chinese script dates from the beginning of the fifth century (Storry, 1976). Chinese characters of course expressed the Chinese spoken language. Thus, when kanji was used to write Japanese it expressed only the original Chinese meaning of the ideographs. The need for a written notation to express Japanese thought brought about the modification of Chinese ideographs to represent phonetic symbols rather than complete ideas. The new notation, kana, included two forms of syllabry, katakana and hiragana. In katakana, the original character was abbreviated by selecting some elements in it. In hiragana, the whole Chinese character was written in an extremely cursive, abbreviated form.

The creation of kana made the Japanese infinitely freer to express themselves in a more colloquial fashion. New words could be created to express new meanings. By the middle of the ninth century the last of the Japanese envoys to China had returned. The Japanese began to create their own literature and in this environment kana was developed. Hasegawa Nyozeikan (1965), a journalist and philosopher, discussed this development. In trying to create a Japanese literature, he explained, people first tried giving Chinese characters Japanese readings. From there they tried using the characters as purely phonetic symbols. He suggested that the fumibe (the naturalized foreigners who kept records for the Court) were responsible for this. The final creation of the kana syllabry, however, rested with the women of the Court. The Genji Monogatari was written in the kana script about the year 1000.

The two kana syllabries, hiragana and katakana, developed separately. Hiragana developed from two intermediate forms of the source kanji. The intermediate forms were man'yogana and sogana. Man'yogana was the form of the first phonetic rendering of Chinese characters to express the Japanese language. It was used to write the Man'yōshū (the collection of native poems, 771-790). Man'yogana developed into a cursive, running form known as sogana which was further simplified into hiragana (Yamakawa, 1965, p.658). The origin of katakana, the second kana syllabry, was traced to the transcriptions by Buddhist monks of Buddhist sacred texts written in kanji. The monks simplified a side or the body of the ideograph and this form eventually became katakana (Walsh, 1969). Both syllabries only became fully standardized in the nineteenth century (Reischauer, 1978). The development of kana is represented schematically below:



These two sets of kana each contain forty-eight phonemes plus two diacritic marks (Reischauer, 1978). Usually, hiragana is used in general literature and to form grammatical endings and katakana to write foreign proper names and words (much as we use italics) (Walsh, 1969; Reischauer, 1978). Japanese vocabulary is derived from three sources. One is native Japanese which gives most conjugable and declinable words. The second is Chinese which forms a large part of the vocabulary, borrowed over fifteen centuries. The third, modern borrowing from foreign Western languages (mainly English), constitutes a small part of the vocabulary.

The kana syllabries provided the means with which to create new words to record Japanese ideas and feelings. The importance of this

development cannot be overstressed. As Hasegawa (1965) pointed out:

"... purely intellectual works can be produced by the imitation of foreign characteristics or by the pursuit of logic, but works of art are also the unconscious products of self-revelation. Thanks to the appearance of the kana phonetic syllabry the Japanese at last acquired a means of expressing their own feelings and emotions almost as freely as in speech" (pp.21-2).

Kawai Masao (1969) has stated that the unique Japanese methodology grew partly on the basis of a Japanese manner of expression (p.293). Both a way of thinking and the presentation of that thought are implied by this. Several people have commented on both. For instance, Nakamura (1964) has pointed out that the thinking of most Japanese tends to be intuitive and emotional and that, "The original Japanese language had a rich vocabulary of words denoting aesthetic or emotional states of mind. There is a lack of words denoting intellectual, inferential processes of active thought" (p.532). Similarly, G. Young (1969) has remarked that, "The Japanese are at the opposite end of the intellectual spectrum from us. Throughout their history they have remained completely 'unintellectual' in the European sense" (p.28).

By this Young meant that whereas the Western mind conceives of the world as object and himself as subject, making an objective frame of reference necessary, the Easterner's frame of reference is within himself. Young explained that this inner core is identical with the impersonal centre of the universe to which all Eastern thought gravitates, so preserving the necessarily subjective character of his world (p.10). (This metaphysic is developed in the discussion of Chu Hsi Neo-Confucianism in chapter eight in which it is shown that the inner Principle (ri) of man is the same as the ri of the universe. If one comes to understand the ri of any other thing, he will understand the ri of himself). Maruyama (1974) said of the pursuit of ri:

"If a person devotes his energies to the investigation of Principle ... and finally understands it in a sudden flash of illumination, he will be able to comprehend the external and internal, the minute and broad aspects of all things " (p.25).

This comprehension is intuitive and such an understanding of things is partly the result of the subjective way of looking at the world. This is at the core of Japanese thought. Young (1969) wrote:

"If the world is held to centre in man as well as in everything else, both subject and object of thought will neutralize each other out peacefully ... Since the world and all that it contains are regarded as akin to man, they remain entirely subjective while relations will continue to be immediate and thus instinctive" (p.19).

Nishida Kitarō (1870-1945), a modern Japanese philosopher, also considered the attainment of knowledge of the world to be knowledge of the absolute that is common to both ourselves and all else in the world. Nishida (1958b) wrote of this in connection with why Japanese thought has been considered unscientific:

"Logic in its most fundamental sense ... must synthesize and unify the demands of all things given into one world, and must give or rather must find an objective expression sufficient to that world in its oneness. That is true, concrete intelligence. Formal logic is no more than an abstract form of this intelligence. Even what we call science cannot come into being without such concrete intelligence. However, (natural) science is thoroughly external or environmental. Art, on the contrary is subjective.

"... This is the reason why the Japanese spirit, identifying the subject and world, is thought to be artistic and unscientific. However, a spirit which goes to the truth of things must be one which has something in common with the scientific spirit. One who does not recognize a noetic aspect even in art does not understand art" (p.870).

With regard to the distinction between the Western and Eastern views of science, Shimomura (1960) noted that in Western philosophy, "... idealism and materialism are opposed, but in the East there is the tradition of insentience (no-mind)¹ which makes of matter, naturally, and even of spirit itself nothingness" (p.216). He continued:

1 This and those that follow are Shimomura's italics.

"In the East nature is not objectivity. In Japan's traditional verse form of the haiku¹ the 'season' (ki) is an element which must not be lacking. This suggests that we sing of the spirit which has become one body with nature. In Japanese poetry spirit itself which is independent of, or in opposition to, nature, has never been expressed crudely and directly. This way of feeling, this way of thinking, and this way of life are the everyday experiences of Easterners. The Eastern concept of 'spirit' is indeed unique" (p.217).

The seeking of an intuition about and empathy with the world has meant that a view of the world from an individualistic point of view has not developed in Japan. Another modern philosopher, Maruyama (1974), has remarked on this:

"... Japanese intellectual life lacked the tradition of individuals as independent subjects or autonomous minds, confronting the objective world, and through a logical process extracting from it significant concepts that could be raised to the level of transcendent ideas" (p.ix).

He also said, "... nonconceptualized, felt or immediately apprehended truth as the guidepost of life (is) a tendency that is widespread in Japan" (p.x). Nakamura (1964) supported this: "... the Japanese in general have not traditionally given enough consideration to the importance of theoretical reasoning. Owing to the neglect of abstract reasoning they have been used to depending chiefly upon the senses..." (p.575).

One result of this tradition is the absence of a generally accepted, formalized style in which to present subjects involving abstract or

1 The haiku is a seventeen syllable epigrammatic poem. Young (1969) pointed out that as the Eastern frame of reference is the 'One' within man himself, their attitude is necessarily receptive rather than creative as in the West. There is thus the careful avoidance by the East of structure in thought so as to keep the world in a fluid state and allow man at any time to return to the 'Source'. Young cited as examples Chinese scrolls which are left incomplete and must not be framed and the Japanese haiku which aims at being merely suggestive and indeterminate (p.72).

speculative thought. In his introduction to Hasegawa's The Japanese Character Bester (1965) remarked:

"... modern Japanese is not yet a very flexible or precise medium for speculative writing. Experience in translating all kinds of Japanese has left me with the feeling that the thinker who tries to express something too original or too abstract is faced with the task of forging his own language with which to communicate to the reader" (p.xii).

Bester called this 'personality writing'. It results in a narcissism in Japanese writing. Authors invent their own words to formulate new concepts, but sometimes also just to make a change from using generally accepted words. This circumstance may be responsible for the large amount of word invention found in a Japanese technical work. To even a Japanese reader this can prove at least irritating and at worst incomprehensible.¹

Exclusiveness in writing also occurs at the group level. Nakane (1973), a Japanese sociologist, discussed the social origins of this in academic groups' writings:

"The formation of groups occurs not only at the occupational level but also at various minor levels; again, smaller groups may be formed within a minor group. Among scholars, specialists in a particular field may be formed into groups divided according to school loyalties; these may be segmented into smaller subgroups which come together on the basis of more intimate relations. It is this smallest group that has the significant function; its core may consist of several scholars who share a common view and style of approach, derived from a single ruling theory. A group normally has its central figure to whom the other members attach, often emotionally, on the basis of former professor-student or classmate relationships... this group structure has drawbacks in the development of science, for instance; group members meet very frequently, but rarely do they discuss issues with persons outside their group. In the course of time each group devises and promulgates its own peculiar styles of expression and parochial terms, not understandable to the outsider even though

¹ Y. Ishikawa Brush found this to be so of some of Kawai's (1969) passages that she translated (personal communication, Oxford).

he works in the same field of specialization. Such obstacles to productive discussion make it difficult for scholar groups in Japan even to reach mutual understanding" (p.138).

The intuitive, emotional and sensual way of seeing the world is also reflected in the style of writing, or the presentation of ideas. In speculative writing, the Japanese are conveying a feeling about what is being said, as well as specifics. Bester (1965) remarked:

"Nor is the Japanese feeling for the organization of an argument always the same as ours. In some Japanese writers, particularly of the old school, a digression embarked on quite casually may lead to another, and then another, and the main argument is skittering away out of sight before the dismayed reader really realizes what is happening. Then there is the tendency of Japanese logic to effect what I can only describe as a spiralling movement. This is not the same as going around in circles. The reader does not find himself back where he started - there has been progress, though not necessarily in the direction in which he appeared to be travelling at any given moment...

"The river of its argument may flow at a leisurely pace, it may have its whirlpools and backwaters, but the river is still there, and the reader who lets himself be carried along on it is likely to find his outlook on the subject at hand subtly changed, whatever reservations he may have about specific conclusions or the methods by which they are reached" (pp.xii-xiii).

Hasegawa (1965) pointed out that the Japanese 'spirit' or intent in writing begins to be understood only at the very last minute, if at all. In other words, one must have read the whole to understand where the particular points were leading. In Western treatises, the whole gives a richer context to each point, but each point should usually be self-explanatory. The Japanese conveyance of the sense of the subject under discussion is an important part of the informational content of the writing. It reflects very clearly the writer's mode of approach to the subject.

Thus, we see a way of thinking or of understanding the world that is subjective (or goes beyond subjectivity (Nishida, 1958a)) to ultimately reach the absolute that is common to all things. This

understanding of the absolute is ultimately intuitive and in stark contrast to the Western Cartesian inheritance. The concept of the absolute that is present in man and all else exists in Buddhist, Shintō and Confucian thought. It is fundamental to Eastern thought. A description of the absolute in these systems of thought will help to elucidate the Japanese view of nature.

7.3 Japanese View of Nature

Belief in the continuity between things in nature is common to the three major systems of thought in Japan - Shintō, which originated in Japan, and Buddhism and Confucianism which were imported from China to Japan. All three systems of thought¹ held that everything in nature sprang from the same thing, and that as all things had this absolute at their basis, the clue to comprehending the world lay in understanding this absolute.

In Confucianism, the absolute is ri (Principle); in Buddhism it is ku, or "the absolute, unbounded world of truth attained by transcending the relative, hypothetical, the conceptual and all ideas of existence and nonexistence. Kutai perception comes closest to an

1 The question of whether or not to consider Shintō, Buddhism and Confucianism religions has not been clearly determined. Shimomura (1960) felt that Buddhism and Confucianism, though philosophical in a high degree, are in themselves neither philosophy nor science. He considers them to be religious and moral thought. Eliot (1935) considered Buddhism to be religion but in a wide sense as devotion to something beyond individual existence. He pointed out too that in Japan there has survived the pagan spirit which identifies religion with government, law, family duties and festivities. These things are not regulated by religion; they are religion. Reischauer (1978) noted that Shintō referred to existing 'religious practices' in Japan to distinguish them from the newly imported Buddhism, but pointed out that the same words were used for 'religious worship' and 'government' and for 'shrine' and 'palace' (p.42). Confucianism provided a moral code, especially in Tokugawa (Edo) Japan, but it was also a sophisticated metaphysical system.

These three systems of thought were guides to behaviour, though Shintō had no objectified code of ethics. However, the beliefs on which these moral guides were based constitute in some sense a philosophy. As the particular aspect under discussion is the Japanese view of ~~man's relation to nature~~ (animals), I shall refer to that thought as Buddhist, etcetera, philosophy.

understanding of the essential nature of the universe and of life" (Ikeda, 1974, p.34). In Shintō there is the basic concept of musubi. Musubi is translated, literally, 'the sun', which begets or germinates. Its intangible meaning is "the spirit of birth and becoming; birth, accomplishment, combination; the creating and harmonizing powers; it embraces everything" (Herbert, 1967, p.67). These concepts of ri, ku and musubi are not exactly synonymous and the philosophical systems from which they are derived are in most ways very different.¹ However, the concepts do relate to a similar conviction in all three systems: that of the unity and commonality of all life wherein understanding nature does not imply an objective study of things, from which the self is divorced. Herbert (1967) has characterized this aspect of Shintō as,

"... a strong instinctive conviction of a deep underlying unity, both biological and psychical, between all men (living, dead or yet to be born), nature, and whatever beings were not visible to the naked eye and should be held in reverence" (p.43).

Confucianism of the Chu Hsi school in which the study of natural science in Japan had its beginnings, posited that all things in heaven and earth originate from the same source (i.e., ri or Principle) (Maruyama, 1974). Though primarily a moral code, Confucian metaphysics included directions about how to reach true understanding of ri, by meditation or by active pursuit of knowledge. Both modes of approach involved understanding the ri of oneself simultaneously with the ri of anything else.

1 However, when Buddhism was introduced to Japan, it was made compatible with existing Shintō beliefs. This compromise was known as Ryobu-Shintō or two-fold Shintō. Under this arrangement, the Shintō gods were recognized as incarnations of Buddhas or Bodhisattvas and control of most Shintō temples was handed over to Buddhist priests. Shintō was not particularly altered by this intimate association, however, and Japanese Buddhism was obliged to sanction the veneration of ancestors among other local beliefs and customs (Eliot, 1935, p.182).

Buddhism does not distinguish between what is generally called animate and inanimate. The distinction between sentience and insentience is only provisional. Ikeda (1974) explained that trees are nonsentient forms of life. Man and other animals are sentient, though in the lower orders of animals it is sometimes difficult to establish sentience or insentience. Such things as trees, mountains and rivers, though insentient, are thought to possess the latent potentiality of manifesting sentience. Sentient beings can contain insentient parts, such as the hair and nails of the human body. Ikeda (1974) wrote:

"Consequently, though the English words emotions¹ and consciousness used to describe the state known as ujo suggest that the difference might depend on the presence or absence of a brain or nervous system, such is not the case. Ujo can comprise hijo; that is, sentient beings contain insentient elements. And hijo can manifest sentience; though their emotions and consciousness are dormant, given the right conditions, insentient beings can evolve into sentience" (p.28).

The Buddhist distinction between sentient and insentient is only provisional because the same essential life flows through beings in both categories. The sentient form represents life in action; the insentient form, life in a latent condition.

1 Ikeda's emphasis.

The view that continuity in nature is based upon a kind of continuum of blood (which is Kawai's view, 1969), recalls the Shintō belief that gods (kami), men and the whole of nature were born of the same parents and are therefore of the same kin. Herbert (1967) related that in Shintō belief, after some preliminary stages when creation came to the stage of solid matter, a pair of kami, Izanagi and Izanami, procreated all the existing universe, including both what we see and what we cannot perceive (p.21). He wrote:

"Everything and everybody being Kami-born therefore has a Kami-nature and is a potential full-fledged Kami, which may come to be acknowledged as such ... From (this belief) arises respect for all that is, a consciousness of unbroken continuity both in time and space, a high sense of duty, and a feeling of security and resultant fearlessness - features which later were accentuated rather than attenuated by Buddhist and Confucian influences.

"... Man is indissolubly bound up with Kami by both biological and spiritual ties. They share one and the same divine blood which flows through animals, plants, minerals and all other things in Nature.

"In their relation to Nature, this means that the Japanese are ... capable of feeling vividly a consanguinous kinship with plants and animals. For them, the so-called inanimate universe is in reality instinct with sentient life. One of their key phrases is mono no aware, sympathy with all creatures" (p.21).

Herbert (1967) further remarked that Shintō is accepted as evident truth by practically every Japanese, just as every Christian believes that the world has been created by God. He said:

"The fact that a Japanese also belongs to some sect or other (Shintō, Buddhist or even Christian) does not affect that fundamental belief according to which the Kami, the Emperor, the Japanese people and the Japanese islands have the same ancestors and are therefore of the same kin" (p.57).

A similar idea of origins is found in Confucianism. Kaibara Ekken (1630-1714), a Confucian scholar and the founder of medicinal botany in Japan, believed that man and nature were allied and inseparable and that an understanding of nature was indispensable to an understanding

of man. He wrote:

"All men may be said to owe their birth to their parents, but a further inquiry into their origins reveals that man came into being because of nature's law of life. Thus all men in the world are children born of heaven and earth, and heaven and earth are the great parents of us all ...

"Man surpasses all other created things in his indebtedness to the limitless bounty of nature. It will be seen therefore that man's duty is not only to do his best to serve his parents ... but also to serve nature throughout his life to repay his immense debt.

"As men mindful of their obligation constantly to serve nature in repayment of this great debt, they should not forget that, ... they should manifest to the full their benevolence toward nature. Benevolence means having a sense of sympathy within, and bringing blessings to man and things" (Tsunoda et al., 1958, pp.376-7).

This is a moral injunction to be in harmony with one's surroundings. It stresses too, man's continuity with nature in the Confucian framework.

Direct results of Buddhist teaching were the reluctance to kill animals and the general use of a diet restricted to fish and vegetables (Eliot, 1935). Although the rebirth of a human being as an animal does not seem to be a common idea in modern Japan, nevertheless animals are believed to have future lives. By the time Eliot was writing, eating meat had become quite common and butchers' guilds apparently had masses said regularly for the souls of slaughtered cattle (Eliot, 1935, p.191). In Shintō too, it is believed that not only animals but many entities of the vegetable and mineral kingdoms have tama (soul) of their own (Herbert, 1967).

The strong belief in the unity of all life and the effort to reach a state of oneness with one's surroundings runs through all of traditional Japanese thought. Writing a century after Kaibara Ekken, Miura Baien (1723-1789) (in Tsunoda et al., 1958) noted that: "Man cannot be understood except in terms of nature, and that nature can only be understood if man divests himself of his anthropocentric point of view" (p.469).

In this century, Nishida Kitarō (1958b) commented on how the effort to reach the state of being at one with nature and the universe is reflected in more day-to-day perception of things. He drew a clear distinction between the Oriental and Western ways of viewing the world:

"... in our human activity there are always two directions standing opposed to each other; that is, the opposition between the direction from subject to environment and the direction from environment to subject. Culture always consists in the contradictory self-identity of these two directions. Thus although culture always consists in the contradictory identity of these two directions, Occidental culture on the whole, may perhaps be thought to move from environment to subject. Oriental culture, in contrast to this, may perhaps be thought to move from subject to environment.

"As for the characteristic feature of Japanese culture, it seems to me to lie in ... moving in the direction from subject to object (environment), ever thoroughly negating the self and becoming the thing itself; becoming the thing itself to see; becoming the thing itself to act. To empty the self and see things, for the self to be enmeshed in things, 'no-mindedness' (in Zen Buddhism) or effortless acceptance of the grace of Amida (the Buddha of Boundless Light) - these, I believe, are the states we Japanese strongly yearn for ... The essence of the Japanese spirit must be to become one in things and in events. It is to become one at that primal point in which there is neither self nor others" (pp.868-9).

A Japanese historian of science, Yoshida Mitsukuni (1955) remarked that a Japanese pays attention not to nature itself, but to the reaction that nature evokes in him, and that the object of his attention is not nature as distinct from man but the fusion and harmony of both. The claim that traditional attitudes may still affect the Japanese in their approach to primatology is reinforced by the reported comment of a Japanese primatologist, Professor Nogami, who said, "The Japanese have never made the distinctions that Westerners have between men and animals".¹

¹ Jonathan Kingdom, personal communication, Oxford.

7.4 The Philosophy of Nishida Kitarō

The question of how far the Japanese primatologists can be said to be philosophically different from their Western counterparts can in part be adjudged by the Japanese handling of Western philosophy. It has been noted (p.246) that the three systems of thought of Japan, Shintō, Buddhism and Confucianism, are not strictly considered either complete philosophical systems or religions in themselves. The history of the development of a true Japanese philosophy also highlights the sort of differences between the Western and Japanese approaches to science of which Kawai (1969) writes (chapter ten).

It was not until the second half of the nineteenth century after the end of sakoku (isolation) that Japan first knew of philosophy and science in the Western sense (with the exception of a few works that earlier had arrived by way of the Dutch port at Deshima). Even then, only a superficial understanding of Western philosophy was achieved and only crude eclectics of Western and Eastern thought emerged (Shimomura, 1960). However, from about the beginning of this century an original, systematic philosophy began to be established in Japan. The man most responsible for developing Japanese philosophy in the Western sense was Nishida Kitarō (1870-1945) and his work has had a great influence on Japanese philosophy generally¹ (Shimomura, 1960). Nishida developed a Western-type analytical framework for Japanese thought.

1 Imanishi was influenced by Nishida's philosophy (Ueyama, 1941). T. Watsuji, well known for his philosophical study in A Climate (1961) about the character of the Japanese, dedicated his earlier Ethics (1934) to Nishida (H. Kawakatsu, pers. comm., Oxford). Nishida was the first to be decorated, as a philosopher, with the cultural medal (Bunka Kunsho) by the Japanese government (Shimomura, 1960).

The pioneers who introduced Western philosophy to Japan were Nishi Amane, Fukuzawa Yukichi, Katō Hiroyuki, Nishimura Shigeki and Nakamura Keiu (Shimomura, 1960). These were members of the Meiji Six Society¹ who almost all first studied Western learning abroad through the Dutch language. Nishi first coined the word 'philosophy' in Japan, (tetsugaku)². The first Western philosophy to be introduced to Japan was nineteenth century French positivism and English utilitarianism (Shimomura, 1960).

Toyama Shōichi became the first professor of philosophy at Tokyo University, established in 1877. Toyama had studied at the University of Michigan in the United States and introduced the thought of Spencer to Japan. Working with E.S. Morse and E.F. Fenollosa who introduced the thought of Darwin and T.H. Huxley, Toyama gave great stimulus to the study of Spencer. The theory of evolution became the central thought of the time (1880's) but as social, not biological, evolution.³ In the 1890's German philosophy became important, especially the thought of Schopenhauer, Hartmann, Wundt and Green (Shimomura, 1960). At that time there was a wave of nationalism and a desire to revive Japanese traditions. The Imperial Rescript on Education of 1890 called for a return to Confucian moral values. The slogan 'Eastern spirit; Western technology' reflected the tenor of the time. In philosophy, scholars worked on 'the unity of Eastern and Western thought' and 'the rolling of all things into one' (Shimomura, 1960, p.194). Japanese philosophy

1 'Society for Enlightenment'. The 'six' of Meiji Six refers to the sixth year of the Meiji period, i.e., 1873.

2 Tetsu originally meant 'sudden inspiration' and now means 'recognition of life', 'comprehension', 'be spiritually awakened', 'intuition'. Gaku means 'science' or 'learning' (H. Kawakatsu, pers. comm., Oxford).

3 This will be seen in chapter nine.

at that time had as its goal no more than an eclectic synthesis of Western and Eastern thought. At the same time there was an interest in the 'enlightenment' of Buddhist thought. The motivation for this revival in the Meiji period (1868-1912) was to understand the philosophical significance of Buddhism, which, for reasons of the Japanese way of thinking, had never been done.

After the beginning of the Taisho period (1912-1926), the contemporary thought of America, England, France and Germany was introduced. Confucian and Buddhist learning became diluted so that genuine understanding of Western thought correspondingly increased (Shimomura, 1960). Pragmatism, neo-Kantianism, Bergson and Husserl's phenomenology flourished in Japan. From about the turn of the century, Japanese philosophers had begun to systematize their own thought through their own speculation but by means of the methods of Western thought. The development of a philosophy possessing an Eastern, or Japanese, uniqueness in addition to a grasp of the methods and concepts of Western philosophy is, Shimomura (1960) related, a very recent phenomenon. The first and most representative result of this effort was Nishida's A Study of Good, first published in 1911.

Nishida's work is revealing as a conscious modern effort to develop a philosophy through 'Western-type analysis'. Ultimately, the endeavour incorporates Western philosophy within an Eastern framework. The argument for the retention of a basically Eastern outlook in modern Japan is reinforced. Only a résumé of Nishida's philosophy can be given here and in particular those aspects dealing with the idea of the unity of subject and object. Much of the following is based upon Shimomura Toratorō's (1960) review of the development of Nishida's thought.

Shimomura commented that Western philosophy began from 'wonder' (Aristotle) whereas the philosophical thought of the East began from the 'pathos' of human life. This life is not objective or objectified life, but life such as the self itself. The traditional Eastern idea of the human being, Shimomura stated, is not life as opposed to death, but life of the type where life and death are one and the same (shōji ichinyo). This kind of life is not the object of science but is basically a religious problem. For Nishida, religion was the ultimate philosophical problem. Nishida also intended his thought to be philosophical in the Western sense. Thus he always emphasized logic and attempted to found his 'philosophy of life' on the Western rational (scientific) approach, and to make it a philosophy that included science.

In Nishida's philosophy, 'experience' is not opposed to thought and intellect, but lies at the base of all oppositions; it precedes all oppositions and establishes them in itself. Shimomura (1960) wrote:

"Modern Western philosophy posits the distinction and opposition of subject and object, or mind and body, and proceeds from there, but Nishida, without considering this opposition to be ultimate and basic, proceeded from what is prior to those oppositions, and by that attempted instead to comprehend these oppositions themselves" (p.201)

In A Study of Good (1911) Nishida called this ultimate fact 'pure experience' or 'direct experience' which later he called 'place' or 'the world of historical reality'. Pure experience is the basic concept of A Study of Good. It is a state "wherein subject and object are not yet separated, or a state of unity of subject and object, ... or the consciousness yet in a state of unconsciousness, or simply an event without meaning" (p.202). Nishida considered it to be much deeper than matter and spirit or their opposition, and he attempted to understand the latter as a development and differentiation of the

former. He attempted, moreover, to develop the problems of epistemology and the basic principles of morality, art and religion from this pure experience. The pure experience where subject and object are undivided is not something mystical for Nishida, but is an immediate event. It is an event which we realize immediately when we are not thinking about it, but are experiencing it. It is what we actually experience every day. In the East the religious world does not lie in any transcendental other side but on the contrary lies at one's feet on this side.

The limit of his first work was that Nishida did not distinguish between the unity wherein subject and object are not yet divided or are still identical and the unity wherein subject and object are no longer divided or once again identical. After making this distinction, the fact that the pure experience of both states are identical needed a firm foundation. A Study of Good is a psychology of pure experience which stops at the point of direct experience where subject and object are united. Nishida's main problem thereafter lay in the development of a logic which would provide the foundation for the basic distinction between the identity of subject and object which are not yet divided and the identity of subject and object which are no longer divided. and the self-identity of both these through that very distinction.

Nishida refined his concept of pure experience through contact with some Western philosophy, in particular, with Bergson's idea of pure duration with which he felt like-minded. Nishida was dissatisfied with restricting philosophical problems to epistemology, however, and investigated metaphysics through a critique of science. Religious philosophy was the ultimate concern of his thinking. The foundation of his entire thought and his basic motive was Zen intuition, or the Eastern way of thinking which is idealized through it, and he endeavoured to develop this method of thought logically as a philosophy linked with

Western tradition (Shimomura, 1960, p.206).

In work subsequent to A Study of Good, Nishida developed the concept of pure experience into 'self-awareness' or consciousness of the self. Nishida's self-awareness is the consciousness wherein that which knows and that which is known are together identical as the self. He attempted to explain such self-awareness as a truly concrete and ultimate thing and all things as various aspects and developments of it (ibid., p.208). He saw the ultimate character of self-awareness as 'absolute free will'. That is, he considered 'the consciousness of the self' (jikaku) as a more basic and ultimate thing than subject and object and their opposition, but he considered the basic substance of that 'self' as absolute free will.

In Nishida, the will is that which determines everything and nothing determines the will. The will is not controlled by cause and effect, for since it is that which composes cause and effect it is absolutely free. "The will came from creative nothingness and returns to creative nothingness" (Shimomura, 1960, p.209). Here is the point of Nishida's philosophy of nothingness. One knows everything through the self (wherein that which knows, or subject, is identical with that which is known, or object, and both are identical with the self), yet not self-consciously or subjectively as 'the self' implies in the West. The basis of the self was absolute free will. To arrive at creative nothingness, Nishida aimed for a position which transcends both subjectivity and objectivity. However, even 'absolute free will' is not totally without a psychological, subjective character. Nishida's solution was the idea of 'place' (basho). Shimomura (1960) paraphrased Nishida thus:

"Since 'absolute free will' is will of the kind that 'comes from creative nothingness and returns to creative nothingness', it itself should possess the character of 'nothingness'. If not, one cannot yet establish it as truly absolute free will. Therefore, absolute will itself must further be taken as being in its foundation 'a certain place wherein' everything else exists. Nishida caused this to transcend subjectivity completely and named it 'the place of nothingness'" (p.210).

In the idea of 'place' an Eastern character is plainly expressed.

Nishida stated:

"In contradistinction to Western culture which considers form as existence and formation as good, the urge to see the form of the formless, and hear the sound of the soundless lies at the foundation of Eastern culture" (in Shimomura, 1960, p.211).

Nishida wished to give a philosophical basis to this goal.

'Place' is neither objective existence nor subjective existence, since it is that wherein both worlds 'are placed'. Or, since it is that wherein all existences - objective and subjective - 'are placed', then 'place' is not existence. It is nothingness. This, however, is not nothingness in opposition to existence, i.e., relative nothingness, for since it is that wherein all existences appear as determinations of it, it is absolute nothingness. Shimomura wrote:

"To consider nothingness as the base of existence is a traditional idea unique to the East, and even though it is considered as mystical as far as Western thought is concerned, for Eastern thought rather it has even become a commonplace way of thinking" (p.212).

Ultimately, Nishida's philosophy is based on an Eastern motive (Zen intuition) and incorporates some of the methods and ideas of Western philosophy. However, Western assumptions about the distinction of subject and object (with profound implications for the performance of science) are seen to be for Nishida one of the possible developments from the basic assumptions of Eastern thought. However, the conclusions of Western philosophy cannot be those of the East, based as they are on a logical development from different initial assumptions.

The parallels, or at least applicability of ideas from Western philosophy to Eastern ways of thinking will be seen to have been an important factor in determining the way in which Western science was understood in Japan. The Japanese emphasized what they saw to be similar to their own thought in Western thought, or simply ignored the incompatible aspects.

The chapter has presented evidence for the fact that the intuitive or immediate apprehension of things and stress on the unity of all life or absence of the subject/object antithesis characteristic of Western thought is pervasively present in Japanese language, traditional views of nature as contained in Shintō, Buddhist and Confucian thought, and the work of an important modern philosopher. How far these characteristics can be said to have been retained in modern Japanese science, originally imported from the West, is the theme of the next two chapters.

CHAPTER EIGHT

JAPANESE NATURAL SCIENCE AND THE INTELLECTUAL BASIS FOR THE ASSIMILATION OF WESTERN SCIENCE

8.1 The Formative Years: Tokugawa Japan

Tokugawa Ieyasu became shogun of Japan in 1603, having won a decisive battle among the daimyos at Sekigahara in 1600 (Storry, 1976). This marked the beginning of the Edo period (1603-1867)¹, Edo being where he set up his administration (Eliot, 1935; Reischauer, 1978). The Japan that first confronted Western science appears to have been quite different socially, politically and to some extent philosophically, from the Japan subsequent to the Meiji Restoration of 1868. However, the intellectual trends in Tokugawa Japan are of importance to the discussion as they embody the beginnings of a Japanese natural science. This was imported initially from China within the philosophical framework of the Chu Hsi school of Neo-Confucianism. Chu Hsi Confucianism had been adopted to some extent as state orthodoxy by the Tokugawa shogunate as it espoused the idea of a natural hierarchy which could be readily applied to the Tokugawa feudal state. The philosophical basis of natural science was a search for ri or Principle, which in Confucian metaphysics was the absolute that is present in everything. To understand ri in any one thing was to understand the unity of all things. Thus, the study of animals and plants was ultimately a study of what man had in common with everything in nature.

¹ Also referred to as the Tokugawa period or Tokugawa Japan.

As against this background, Western science was absorbed, though not without profound implications for Confucianism. It in fact contributed to make Chu Hsi Confucianism unacceptable to Japanese scholars of the time, by changing the character of the fundamental concept of ri. However, the underlying approach of the Japanese to science was not transformed into a Western logico-deductive approach. Rather, progress in science was progress in language without a union of empiricism and theory. The observation of a spokesman for Chu Hsi orthodoxy, Yamagata Bantō (1748-1821), that Japan was lucky to be able to reap the benefits of Western science without working for them (Craig, 1965, p.149), remained true of the Japanese mode of acceptance of Western science into the twentieth century.¹

The evolution in Confucian philosophy that occurred with reference to the ethical foundations of the feudal regime and the effect of acquaintance with Western science on the basic structure of Chu Hsi Confucianism have been closely studied by, respectively, Maruyama Masao (1974)² and Albert Craig (1965). An outline of traditional Japanese science and its place within the Confucian philosophical framework is given below. Maruyama's analysis of the evolution of the concept of ri in Tokugawa Confucianism is followed by Craig's analysis of the effects of Western science on that concept. Finally, the intellectual stage is set for the re-opening of Japan and the large-scale importation of Western science in the Meiji period.

1 For instance, Erwin Baelz (in Watanabe, 1970) who taught in the Medical School of Tokyo University for twenty-five years (1876-1901) remarked: "The Japanese people are content only with receiving the most recent developments (in science) and do not care to learn the basic spirit which has yielded these results" (p.135).

2 First published in 1952.

8.2 Traditional Japanese Study of Nature

Japanese natural studies of the Edo period included honzōgaku ('pharmacognosy') and wasan (indigenous Japanese mathematics).¹

Honzōgaku is the precursor to Japanese natural science (Ōya, 1974).

Intellectually, it was begun in, and sustained by, a specific philosophical pursuit;² practically, it was an aid to understanding the Chinese classics and an identification of medicinal herbs. Two official policies of the Tokugawa government influenced the development of honzōgaku. One was government encouragement of learning, which meant studying the Chinese classics; the other was the official backing of Chu Hsi Neo-Confucianism as the moral justification for a feudal state.

In order to understand the Chinese classics, a knowledge of the flora and fauna they referred to was essential.³ The Japanese also wished to identify the counterparts of Chinese flora and fauna in their own country. To determine these, it was necessary to collect and examine specimens, and this marked the beginning of zoological and botanical research in Japan (Ōya, 1974). Eventually, large reference works cataloging all records of the flora and fauna in Chinese and Japanese

1 Wasan flourished in the 17th century in Japan. The Japanese had studied Chinese algebra which was done on the counting board. Seki Takakazu (1640-1708) invented a written notation to replace the counting board, giving a unique character to Japanese mathematics (Ōya, 1974). Seki discovered the value of π ($\pi = 3.14159$) independently of the West.

2 The study of ri or the essence of things. One part of the Confucian pursuit of the natural order states that if one understands the essence of things in the world, one can understand one's own essence.

3 Pharmacognosy was one of the fields of science the Chinese organized in the course of conceptualizing the phenomenal world. In China it was the study of materia medica and incorporated a large part of the early knowledge of natural history and approaches to biological classification. Joseph Needham and Lu Gwei-djen refer to it as 'pharmaceutical natural history' (Nakayama & Sivin, eds., 1973, p.xix).

classics were compiled. As the name implies, 'pharmacognosy' simultaneously filled the research needs of pharmacology in the identification of medicinal herbs. Domestic production of such herbs was begun. By the late seventeen hundreds, the isolated Japanese, looking for novelties, began to breed exotic plants and unusual animals. The wide variety of plants and animals were the object of 'biological' research by specialists, but honzōgaku was popular among amateurs as well.

The second and more profound basis on which study of natural phenomena rested in Japan was the Chu Hsi school of Neo-Confucian thought. To place Neo-Confucianism in the scheme of Japan's scientific development, Confucianism will be briefly considered.

8.3 Chu Hsi Neo-Confucianism and Its Moral Evolution

Confucius lived around 551-479 B.C. and Confucianism (a Western appellation; East Asians call it 'the teaching of the scholars') (Reischauer, 1978), originally stemmed from ancient Chinese philosophy. It stressed a rational natural order, of which man was a harmonious element, and a social order based on strict ethical rules, headed by men of education and superior ethical wisdom. There was no concept of deity, no priesthood, and very little religious ritual. There was no worship, only right thinking and right living shown by loyalty to the ruler, filial piety to the father and strict observation of the proper social etiquette (Reischauer, 1978).

It is generally believed that Confucianism first entered Japan in 405 A.D., during Emperor Ōjin's reign, but was overshadowed by Buddhism until the beginning of the Tokugawa government. Chu Hsi (1130-1200) provided the doctrines of Confucianism with a new philosophical basis under the Southern Sung Dynasty in China. These Neo-

Confucian doctrines¹ provided a moral justification for the demand for loyalty and obedience to the Tokugawa shogunate. Thus, from the seventeenth century, Confucian schools of philosophy dominated Japanese thought and social attitudes until the fall of the shogunate in the nineteenth century.

To appreciate how deeply ingrained Confucian doctrines were in the minds of educated people at this time, it should be remembered that Tokugawa Japan was a feudal state, maintaining a strict hierarchy between people. The subordination of son to father was the basis of the Confucian moral code. The specific human relationships between lord and subject, husband and wife, elder brother and younger brother, were compared to that between father and son. Confucianism linked them in relationships of high and low, noble and base, and taught the necessity of rigidly maintaining the distinctions (Maruyama, 1974). The social and political structures of Tokugawa Japan were comparable to those on which Confucianism had been based in China. The people were divided into four classes in Japan, from higher to lower: samurai, peasants, artisans and merchants.

Previously, Confucianism in Japan had been an academic pursuit of the imperial court and scholar families. In Tokugawa times, Neo-Confucianism became more of a general educational discipline. The men who laid the foundation in Japan for Chu Hsi Neo-Confucianism were Fujiwara Seika (1561-1619) and Hayashi Razan (1583-1657) (Maruyama, 1974). The following description of Chu Hsi Confucianism is based on Maruyama's (1974) analysis.

1. The Northern Sung (Pei Sung) Dynasty lasted from A.D. 960-1127. In 1127 it was destroyed by the Mongolians, but revived in the same year to become the Southern Sung (Nan Sung) Dynasty (1127-1279) as the capital was moved to southern China.

In orthodox Chu Hsi philosophy, all things in heaven and earth consist of a metaphysical Principle and physical Ether. Principle determines the nature of a thing and Ether its form. In so far as all things originate from the same source, (i.e., Principle), they are equal. They acquire different characteristics however, because of Ether. Man and other things in nature are endowed with the same Principle, but man is superior to all other things because he is endowed with the highest Ether. This relation of equality and distinction holds not only between man in general and other things, but also between one man and another. Thus, a moral basis to a hierarchy among men is established.

Craig (1965) and Maruyama (1974) use different terms for Principle and Ether in their analyses of Chu Hsi metaphysics, but the terms are equivalent. Thus, Craig explained that the ultimate Principle, or that which makes all things what they are, is designated as ri. Though ri is primary in a logical and moral sense, it could not produce the world by itself. It is in conjunction with ki, a psycho-physical force or substance, that the world is formed. Some usages suggest that ki is in itself the primeval swirl or chaos, organized by ri to form the universe. Ki is also identified with yin and yang (in Japanese, in and yo). In Maruyama's text, Principle is li and Ether is ch'i.¹

Maruyama's analysis is concerned with tracing the change in Chu Hsi Confucianism through the Tokugawa period with reference to the social and political situation. Thus, the moral implications of Chu Hsi Confucianism are highlighted in his work, and the question of the moral

1. These are the Chinese terms which Maruyama's translator chose to retain. In the present discussion the Japanese terms, ri and ki will be used throughout.

state of man's Original Nature is important.

In Maruyama, the ultimate Principle, or ri, is present in everything, but when endowed on man, becomes his Original Nature. Ri is good, and therefore man's Original Nature is good. Ki determines whether a person is wise or foolish. The Specific Ether (ki) of a sage is pure and clear and so his Original Nature appears in its entirety. An ordinary person has more or less turbid Specific Ether, giving rise to various human desires which conceal the Original Nature and produce human evil. The impure tendencies of the Specific Ether can be removed however, and the Original Nature restored in anyone. The question of how this restoration is to be achieved is the starting point of Chu Hsi Confucian practical ethics.

A person is able to free himself from human desires and return to the Principle of Heaven by (i) prizing virtuous nature and (ii) pursuing learning. Craig (1965) described the Neo-Confucian system in the following manner. As man's essential nature is ri, man is basically good. He is alienated from knowing his ri (inner goodness) by bad or coarse ki. Ascetic discipline and intellectual activity will allow the ri to shine forth: "... intellectual advance and ethical cultivation are the same process. This is the locus of the identity of ethics and knowledge in Chu Hsi Confucianism" (Craig, 1965, p.138). This equivalence of ethics and knowledge is important to Craig's analysis of the effect of Western science on Neo-Confucianism in that ethics and knowledge were split and were no longer part of the same concept (ri). Maruyama, too, noted a split between virtue and knowledge as Confucianism changes, but his analysis is directed to the ethical side of things and not, as in Craig, with respect to knowledge.

In Maruyama's analysis, there are two ways to pursue virtue and knowledge in order to discover the ultimate Principle that is contained

in each person (as his Original Nature) and in all things. The first, moral cultivation, or 'preserving the heart', is purely subjective introspection through which a person is able to perceive intuitively the Original Nature within himself. The second, pursuing knowledge, involves "the extension of knowledge through the investigation of things" (Maruyama, 1974, p.24). As Principle is present in everything, if a person investigates Principle in each individual object, he will be more able to understand his own Original Nature. The second method is more rational and active; however, it also involves a sudden flash of understanding or intuition following a rational investigation:

"If a person devotes his energies to the investigation of Principle for a long time and finally understands it in a sudden flash of illumination, he will be able to comprehend the external and the internal, the minute and broad aspects of all things" (Maruyama, 1974, p.25)¹.

The ultimate objective of man's moral endeavours is to eliminate human desires and return to his Original Nature. This is an absolute precondition for the realization of all political and social values:

"The extension of knowledge consists in the investigation of things. When things are investigated, knowledge is extended; when knowledge is extended, the will becomes sincere;² when the will is sincere, the mind is rectified; when the mind is rectified, personal life is cultivated; when personal life is cultivated, the family will be regulated; when the family is regulated, the state will be in order; and when the state is in order, there will be peace in the world" (Wing Tsit-chan, 1963, p.784).

In Chu Hsi orthodoxy, everything was subordinated to morality, including all nature and even history. Principle (ri) is inherent in all things, governing the active principle of the universe (yang) and

1 Maruyama's original source of this method is the Confucian classic, the Great Learning (I.J. McMullen, personal communication).

2 At this point, knowledge and virtue meet.

the passive principle of the universe (yin). It is thus the law of nature. When endowed on man, it becomes his Original Nature and the normative standard for human conduct. Principle is a moral and physical law. However, physical principle is subordinate to moral principle, natural law to moral standards. History, too, was seen as, "... a moral lesson, a mirror, a way of 'maintaining proper relationships between people of different statuses'" (Maruyama, 1974, p.27). The independent value of historical fact was not recognized. It is this moral limitation that changed under pressure from scholars of the schools of Ancient Learning and National Learning in the Edo period. This change in the moral basis of Confucianism, hence for the Tokugawa government, is traced by Maruyama.

There are, roughly, four periods in the development of Tokugawa thought as follows:¹

- (i) Yamazaki Ansai (1618-1682), founder of the Shikoku school,² and Fujiwara Seika (1561-1619) and Hayashi Razan (1583-1657) of the Kyoto school, established Chu Hsi Confucianism in Japan and separated it from Buddhism. Neo-Confucianism was established as the official philosophy to legitimize the Tokugawa rule.
- (ii) Its full development in the latter half of the seventeenth century. Individual philosophers such as Nakae Toju and Kumazawa Banzan in the Wang Yang-ming tradition and Yamaga Sokō (1622-1685), Itō Jinsai (1627-1705) and Ogyū Sorai (1666-1728) in the School of Ancient Learning tradition who altered the social and metaphysical structure of Chu Hsi Confucianism by creating social system potentials that had not previously existed.
- (iii) Disagreement among the different schools of Chu Hsi Confucianism and the attempt to unify them. The revival of pure Chu Hsi Confucianism in which Nakai Chikuzan (1730-1804), a teacher of Yamagata Bantō,³ was prominent.
- (iv) Beginning in 1790, the government's prohibition of heterodox teaching and the unifying tendencies of the third period re-encased within Chu Hsi orthodoxy.

¹ Craig (1965), pp.155-6.

² Maruyama (1974).

³ Yamagata is the scholar on whose work Craig (1965) focuses.

Maruyama traced the changes that occurred in the second period. Both Craig and Maruyama considered the split that occurred within the concept of ri between ethics (morals) and nature (knowledge). Maruyama saw the differentiation in the writings of Yamaga and Itō and later Ogyū, directed to the ethical side of things.

Yamaga Sokō and Itō Jinsai brought about the shift from Chu Hsi philosophy to the School of Ancient Learning. This was the transitional stage between Chu Hsi orthodoxy and Ogyū's thought. Yamaga was in favour of active learning (kakubutsu) rather than quiescent meditation. He said the 'nature' of things was not good or evil in itself, and that human nature is not inherently good. Good and evil result from the motion of nature. The fact that human hearts prefer good to evil is a function of the Specific Ether, not of (human) nature independently.

This marked the beginning of an attack on the supremacy of Principle over Ether. For Yamaga, human desires are inevitable. Orthodox Chu Hsi Confucianism had said that the aim was to be rid of desires; that Original Nature was free from them. Yamaga maintained that there was not a being who does not have desires. Human desire is at the base of good as well as bad. The measure of goodness is not within human nature itself, but outside it. The standards of measurement are given by the sages.

This last statement emphasized the unnaturalness of linking morals or norms with human nature. Moral standards were devised by the sages who wrote about the way to behave. In this, the negative character of human desire was transformed into a positive one ("there is no being without desires") by establishing the independence of nature from morals. This also weakened the link between personal moral discipline and government, which, predictably, the government sought to prevent (stage iv).

Itō Jinsai took the argument further. He confined yin and yang as categories of the natural world belonging to the Way of Heaven. Benevolence and righteousness were moral categories belonging to the Way of Man. Nature was of heaven and morals were of men. Cosmology, therefore, was made independent of a theory of human nature. Where before there was a rational explanation for everything (everything being viewed as the natural ri of heaven and earth, which Yamagata emphasized in the revived orthodox Chu Hsi philosophy), now there was a nonrationalism. Itō opposed the extension of Principle (ri) to every domain. He was against the supremacy of Principle going beyond a logical supremacy to become a supremacy of value. He sought a nonrational ultimate origin. His nonrationalism took the form that things near one can be known through personal experience; further things can be known through other things, but the ultimate reason for the nature and shape of things cannot be investigated or known.

Ogyū Sorai epitomized the culmination of the trend toward separation of morals and nature, and of personal morality (in hierarchical principles of Confucianism) and government. He politicized Confucianism. In taking historical circumstances into consideration to show that arguments are used to meet the problems of their age, he made history relevant, not a mere 'moral lesson'. He was a nonrationalist in saying that there are no absolute truths; heaven was unknowable, both to men and to sages.¹ The Way is simply the way of the sages. The sages were interested to bring peace to the world and

1 Craig (1965), it seems, disagrees. Ogyū, he said, felt that things are what they are because of their ri. Only sages could know ri and they received their knowledge from Heaven, not by study. The knowledge of sages was therefore absolute (p.159). However, the point is not crucial to the argument here.

created institutions for it (Maruyama, 1974, p.78). The complete break between personal morality and government comes in Ogyū where he argued that a ruler could justifiably act against just (moral) principles so long as he was pursuing the political goal of maintaining peace among the people (Maruyama, 1974, p.82).

Though these thinkers had radically altered Confucian philosophy, simultaneously dealing a blow to the legitimacy of the feudal regime, there was in the latter part of the Edo period, a return to Chu Hsi orthodoxy. The return occurred at a time when modern (post-Baconian) Western science was becoming known in Japan. Yamagata Bantō is representative of that return and his work will be discussed next. Even as late as 1890, after two decades of importing Western educators, the Imperial Rescript on Education of that year stressed the need for a return to traditional mores as emphasized in orthodox Confucianism and pointed out the dangers of losing sight of those mores by following Western learning. The Rescript has been described as a purely Confucian document, and as marking the end of a school of thought made obsolete by changing circumstances (Reischauer, 1978); however, the numbers of foreign educators were dropping from 1880 and thereafter most teaching posts in Western subjects were filled by Japanese (Watanabe, 1970), albeit Japanese trained in the West.

Maruyama considered the return to orthodoxy (revival of the theory of a natural order (iv stage, beginning in 1790)) as due to Western technology not having been accepted with an understanding of first principles in Japan. Inventions were seen as queer utensils and novel objects. Japan had not yet reached the stage of using industrial goods in everyday life. For instance, Nakamura Seisho's Chimeiki (an account of knowing one's destiny, written during 1827-1844), stated that:

"To employ all one's intellectual faculties ... for the manufacture of useless utensils and to invent trivial crafts, thus losing sight of one's spirit and fixed purpose, are matters motivated by caprice. They should be intensely despised" (Maruyama, 1974, p.302).

Another reason for its resurrection was the need for national unity in the face of foreign threat. Yamaga, Itō and Ogyū's arguments to separate personal morality from government weakened the shogunate's position and internal strife was especially dangerous for Japan at the crucial time of threatened invasion in the mid-nineteenth century. Japan ultimately had no choice but to open her ports 'voluntarily' to foreign ships, but old values remained. The Tokugawa government fell in 1867 after two hundred sixty-four years of rule, no doubt partially weakened by the intellectual revolt against orthodox Chu Hsi Confucianism and hence the moral basis of the feudal regime. However, orthodox Sung philosophy was about when Western science was introduced and the latter's contribution to the fall of Confuciansim from official status is analysed by Craig.

8.4 Chu Hsi Neo-Confucianism and Japanese 'Science'

The impetus for collecting, analysing and recording natural specimens stemmed from the Tokugawa government's encouragement of learning and reading of the Chinese classics. Besides the fact that educated people who pursued honzōgaku would have held Confucian beliefs, there was a more direct link between natural 'science' and that philosophy.

The Confucian statement that the nature (ri) of things lies beyond their form (ki) was developed from the question of why a thing had to be what it was. W.J. Peterson (1980) has pointed out that ri originally meant 'organization' or 'principle of organization' in

Confucian metaphysics. By the end of the eleventh century it meant in addition, the pattern or Principle inherent in all phenomena and as such was taken as the basis of moral values. Chu Hsi in the twelfth century adopted this usage and consolidated the role of ri as an explanatory concept; it was thereafter referred to as "that by which things are as they are" (p.28). Grass grows and wood rots according to their ri. There is a ri for human consciousness and a ri for fog and rain. A son's obedience to his father is also due to ri. Ri always guaranteed order. This led, first in China and eventually in Japan, to inquiries into nature (Craig, 1965).

It will be recalled that in Neo-Confucianism there were two ways in which to seek ri: i.e., passive meditation and active observation. There were a number of phrases used by Chu Hsi to indicate the pursuit of ri, among them: kakubutsu kyūri (investigate things and penetrate the ri); chichi kakubutsu (gain knowledge and investigate things) and sokubutsu kyūri (look into things and penetrate the ri) (Craig, 1965, p.139). Craig felt that such phrases referred to both an active observation of nature and a passive contemplation of the essences of things, judging from the writings of the time, though the active elements were ultimately subordinate to the passive in orthodox Neo-Confucianism. Nevertheless, "... a good measure of active observation was permitted, rationalized and even encouraged by this intellectual framework" (ibid., p.139).

Nevertheless, Peterson (1980) pointed out that although ri was present in all things and the doctrine of 'investigate things' was stressed by Chu Hsi, Neo-Confucianism did not provide a (scientific) method for discovering knowledge about the phenomenal world. The active observation of nature or the active mode of seeking ri was a form of self-enlightenment.

The founder of medicinal botany in Japan was an important Confucian scholar. Kaibara Ekken (1630-1714) wrote in the introduction to his book, Yamato honzō (Medicinal Herbs of Japan),¹ that from his childhood he had been interested in reading books on herbs and in pursuing the ri of things. He had been trained as a physician and may have acquired the objective approach that distinguishes him from most Confucianists of the day from this (Tsunoda, et al., 1958). Another writer on medicinal herbs, Matsuoka Joan (1669-1747) said that his text was not solely for doctors, but "... is truly a part of kakubutsu kyūri" (Craig, 1965, p.140). In the early nineteenth century, virtually all the nonmedical scientific works were written within the framework of Chu Hsi Confucianism.

McMullen² has pointed out that in Confucianism there is no tradition of 'radical empiricism'. Animals were looked at empirically only as examples of the Confucian ideal (and mutatis mutandi for botany). For instance, the observation that otters put fish on ledges was used as evidence that they make sacrifices. In certain birds with different days for hatching of eggs in a clutch, the relations between hatchlings were seen as a reflection of the hierarchy as it exists in Confucian ideas. Thus, Japanese 'science' stopped short of verification. Things in nature were looked at as confirmation of Confucian truth that was already known.

1 In Ekken zenshū (1911) Collection of Kaibara Ekken's writings. vol.6 First published 1710.

2 Personal communication, Oxford, 10 November, 1980.

8.5 Western Science and Confucian Philosophy: The Division of Ri

Western science had reached Japan during the century before the Tokugawa government was formed. The response of the Japanese to the first importation of subjects such as medicine, astronomy and geography, and items such as firearms, clocks and glasses brought by the Portuguese in the sixteenth century had been immediate and enthusiastic. Japan was then closed to foreigners in 1639,¹ but in 1720 the shogunate decreed that foreign books, except those dealing with Christianity, could be imported. Marine almanacs and fragments of Aristotelian cosmology were already known in Japan in the seventeenth century (Watanabe, 1970). Western learning introduced into Japan during the latter part of the Edo period was called yōgaku. In 1774 Kaitai Shinsho (Anatomy) appeared. This was a Japanese translation by Sugita Gempaku and others from the Dutch version Ontleedkuninge tafelen (1734) of a book on anatomy by a German, J.A. Kulmus (Yuasa, 1965). In this way, the contents of Vesalius's Anatomy became known in Japan and it marked a monumental achievement in the history of the introduction of Western science to Japan (Watanabe, 1970). This work was quickly followed by the introduction of Dutch versions of European astronomy, physics, chemistry and botany. Western learning was also known as Rangaku or Dutch studies as most of it came through the Dutch (Goodman, 1967), they being the only Westerners allowed in Japan.

1 The closing of Japan to all incoming foreigners and outgoing Japanese except for the Dutch port at Deshima was the culmination of a more gradual isolationist movement. In 1612 Christian priests were expelled from Japan. In 1624 Spanish trade was prohibited. In 1633 overseas trade was prohibited except for 'official' ships. In 1635 the Japanese were forbidden to go overseas and those already overseas could not return. In 1639 sakoku or isolation was imposed and the only foreigners allowed, the Dutch, were confined by 1641 to Deshima, an island in the port of Nagasaki especially built for that purpose (H. Kawakatsu, personal communication).

The basis of modern Western science was introduced to Japan through the following works (Yuasa, 1965):

- (i) Copernicus's heliocentric theory in De Revolutionibus Orbium Coelestium (1543) through Motoki Ryoei's Taiyō-kyūri Ryō Kai-setsu (1791)
- (ii) Newton's dynamics in the Principia (1687) through Shitsuki Tadao's Rekishō-Shinsho (1798)
- (iii) Linnaeus's Systema Naturae (1735) through Ito Keisuke's Taisei Honzō-mei-so (1829)
- (iv) Lavoisier's Chemical Revolution¹ (1789) through Udagawa Yōan's Seimi Kaisō (1839)
- (v) Dalton's atomic theory (1802-1808)² through Kawamoto Kōmin's Shinsho (n.d.)
- (vi) Darwin's Origin of Species (1859) through Ishikawa Chiyomatsu's translation of Edward Morse's Evolution of Animals (1883)³

The meeting of traditional Japanese science and early Western science took place at the time of the revival of orthodox Neo-Confucianism. It occurred when the general level of education was advancing rapidly and its effect was far greater than with earlier intellectual trends (Craig, 1965). Among educated Japanese, society was understood largely from the assumptions of a Chu Hsi natural social order. Craig cites Yamagata Bantō as representative of the revival of Chu Hsi thought during the latter part of the Tokugawa rule.

Man's position in the cosmos, according to Yamagata, is at the top, although everything derives ultimately from the same place. However, though man leads and hence uses the other created things, they are not created for him and he must not covet them for his selfish use: "All things are the same. It is merely that one is in the highest position" (Craig, 1965, p.137). The order in natural things is not

¹ This is mistitled. The title is Traité élémentaire de chymie.

² Foundations of the atomic theory.

³ Morse does not appear to have written a book of this title according to The National Union Catalog of Pre-1956 Imprints. Ishikawa possibly translated Morse's First Book of Zoölogy, publ. in 1875 by the American Book Co., New York, and in 1882 by D. Appleton & Co., New York.

achieved by a god, or by men, but by their intrinsic nature. Ri in man is his nature (sei) and this ri is the same as that in everything.

As Craig pointed out, the philosophical position deriving from this view, while grossly unscientific, is very rationalistic; even inexplicable things can be rationally viewed as being the natural ri of heaven and earth. The identity of the ri in man and the ri of the universe is central to Yamagata's thought and is one of the dual identities of ri. The other dual identity is that intellectual (active) and moral (contemplative) cultivation are part of the same process of reaching ri.

As mentioned earlier, there are two ways in Chu Hsi Confucianism by which man can know his ri or nature. One is by intuition, by directly grasping the ri within himself through meditation. Yamagata wrote little about the search for ri through contemplation and was more concerned with active inquiry, the second way that man can discover ri. The three expressions of pursuing ri: kakubutsu kyūri, chichi kakubutsu and sokubutsu kyūri, allowed for active observation. (p. 273)

The intellectual response to Western science in this philosophical framework took place in two stages. The earliest work introducing Western science to Japan, Mukai Kenshō's Kenkon bensetsu (An Explanation of the Cosmos) (1658), presented a round but geocentric world and viewed Western science as concerned primarily with ki, the psycho-physical stuff and not with the ethical ri. This position was continued by Arai Hakuseki (1657-1725) who opened the way for Dutch studies in Japan. He argued that Western science was concerned with ki, that it lacked knowledge of the ri beyond the forms of ki, but that it was useful as practical knowledge (Craig, 1965). This view typified the first philosophical reaction to Western science.

The second reaction, already beginning in Arai's time, was the view of Western science as a branch of the study of ri. It became more prevalent in the eighteenth century and Motoki, who introduced Copernicus's theory in 1791, spoke of Kepler and Galileo as establishers of the basis of the study of kyūri (penetrate the ri) and Udagawa Yōan, who introduced Lavoisier's work in 1839, completed the change from the first stage. He said that the East has only herbology (honzō) and the West has botany, which is truly the study of kyūri (Craig, 1965). Nishi Amane (1829-1894), one of the first Japanese to be sent abroad to study, wrote from Holland in 1862 that Western philosophy was better than the Chu Hsi teachings at explaining the ri of man's nature. Yamagata represented the tide of opinion that saw Western science as the study of ri at the turn of the eighteenth century.

Western astronomy was considered one of the most important sciences as all things were derived from heaven in Neo-Confucianism. Yamagata also believed in a natural social order. The ri of the universe are the ri that govern all aspects of human conduct. One's obligation to the universal ri can only be fulfilled by performing the particular familial and social duties of one's station. The view that society was an embodiment and not a distortion of the natural order was opposite to that of the eighteenth century philosophes in Europe.

Yamagata assumed that other worlds were in general like our own. His was a theory of continuous and progressive evolution: he thought that conditions on other planets "vary only according to their size and their proximity to the sun" (Craig, 1965, p.144). Under these conditions,

"... grass and trees will appear; insects will develop; if there are insects, fish, shellfish, animals and birds will not be absent, and finally there will be people too" (ibid., p.144).

Yamagata felt that this theory was quite different to the creation myths and 'metaphysical fantasies' of other schools and was an extrapolation from what we have on earth.

There were two parallel changes happening with regard to the status and meaning of ri and ki. One just discussed concerned the 'status' of Western science which rose with the change from being considered as dealing only with ki, or the form of things, to being thought of as pursuing the ri, or essence of things. The other change in thought which undermined the Chu Hsi orthodoxy, concerned the separation of science and ethics, which, it has been shown, were both embodied in ri as the active and passive contemplation of things. A person is able to find ri by (i) prizing virtuous nature and (ii) pursuing learning. Kaibara's study of nature was the pursuit of ri. Prizing virtuous nature, or morals, is the passive contemplation of ri; scientific endeavour is the active pursuit of ri.

In the second period of Chu Hsi Confucianism (in the second half of the seventeenth century), Itō and Ogyū were more concerned with the ethical side of ri and nature or science was to all intents and purposes a dead category. With the import of Western active pursuit of knowledge of things (especially by the time Nishi Amane wrote, i.e., mid-nineteenth century) the concept of ri not only split, but the active contemplation of things dominated the intuitive or passive contemplation of them.

Nishi was concerned with freeing science from ethics as well as with freeing ethics from nature. He took the universe to be an object of knowledge as well as an object of respect. He had studied abroad and his distinction between ethics and science was borrowed from Western philosophy and did not come from within the Chu Hsi tradition. The view of the universe as knowable was quite unlike the earlier position

of Itō and Ogyū who said that knowledge of heaven could only be reached by the sages ¹ (through contemplation) and was beyond the reach of ordinary men. Nishi's idea arose from the value placed on science rather than on ethics in the West and constituted a return to rationalism.

Craig noted the 'sponge-like' character of Neo-Confucian rationalism. Everything was ultimately derived from the ri, a relatively undifferentiated concept, but providing a world-view in which nothing was beyond the limits of reason. There was no source of resistance to the results of science:

"... its organic character permitted the substitution of Western theories for Chinese theories, or ... (their)... juxtaposition, without basic shifts in the concept of the organism itself" (Craig, 1965, p.150).

A process that was only completed in the Meiji period in the writings of the Meirokeisha (the Meiji Six Society, 1873)² was the acceptance of Western science as a study of ri (Craig, 1965). Initially, that acceptance began a process by which the basic concepts of the Tokugawa world-view were reinterpreted and subverted by reading a Western content into them. In Yamagata's time, little was known of the science of the West and any tension between foreign elements and the total Confucianist conceptual scheme was minimal. As noted earlier, even at this early stage, the tendency to imitate and not create in science is seen (i.e., Yamagata wrote that Japan was lucky in that it could reap the benefits (of science) without working for them) (Craig, 1965, p.149).

In Craig's opinion the fall of Chu Hsi Confucianism was due to the ethical emphasis of ri giving way to the experimental or scientific

¹ This is according to Craig. Compare to the footnote, p.270.

² See footnote 1, p.253.

side of ri. Contemplative implications of ri subsided, where contemplation had earlier been a dominant emphasis in the Chu Hsi position of a moral hierarchy extending from man to the political order. The question arose: was the ri of the natural world the same as the ri of ethics? As some philosophers came to know more about the West, they wondered how the West could have such a great knowledge of the ri of science and so little of the ri of ethics. It became obvious that the ri of the West was different to that of the Sung philosophers, destroying the fundamental premiss of the Chu Hsi synthesis (Craig, 1965).

With the Meiji Restoration (1868), Confucianism as an accepted body of thought died out. The Confucian moral values were associated with a society and government that were unable to cope with the Western military menace (Reischauer, 1978). Another reason for the abandonment of Confucianism suggested by Reischauer (1978), was that its concept of the cosmos was inaccurate when compared to the Western scientific discoveries. Craig (1965) however, felt that Confucianism was not simply confronted by a new and better knowledge from the West, but that it fell because the acceptance of Western science created the tension within the metaphysical system of Neo-Confucianism discussed above.

Orthodox Chu Hsi Confucianism had allowed a rationalistic (non-mystical) understanding of the world. Within Chu Hsi philosophy, two dual identities for ri have been identified: i.e., the identity of the ri in man with the ri in the universe ("... the ri in man is the same as that in all other things") (Craig, 1965, p.138) and the ri of ethics with the ri of knowledge ("... intellectual advance and ethical cultivation are the same process. This is the locus of the identity of ethics and knowledge in Chu Hsi Confucianism") (Craig, 1965, p.138). In tracing the response to the importation of Western

science, Craig has found, firstly, a separation of ri in ethics from ri in knowledge, with the West seeming to know only the latter part of ri; to active pursuit of knowledge superseding contemplation as the main means of discovering ri, to an unrecoverable breakdown of Chu Hsi orthodoxy wherein the discovery was made that the Western study of ri which had been accepted as superior to that of the East (e.g., Nishi Amane, Udagawa Yōan) was a different sort of ri altogether from that of Chu Hsi orthodoxy.

Japanese observation of nature in the Neo-Confucian framework was not science. The Tokugawa encounter with Western science did not show signs of having assimilated the accompanying approach to science, however - they had tried instead to make it fit into the Confucian framework. Nevertheless, the breakdown of Chu Hsi Confucianism had a far-reaching effect. Craig (1965) stated:

"The leavening effect that this had on Tokugawa thought was such as to produce among some individuals in early nineteenth century Japan intellectual orientations singularly different from those of China in the same age" (pp.133-4).

Subsequent development in Japan was very different from that of China and Japan went ahead to import Western science on a large scale in the first half of the Meiji period. The intellectual setting for this importation is outlined in the next section.

8.6 Intellectual Setting for the Major Importation of Western Science

The intellectual environment of Tokugawa Japan was a peculiarly uniform one, with the general moral code of conduct for the individual and the intellectual foundation for study of nature based upon the same Confucian philosophical framework. Though the original impetus for a natural science stemmed from study of Chinese classics and from the rationalistic framework of

Chinese Neo-Confucianism, yet the reactions of the Chinese and Japanese to Western science were completely different. Western science was not always viewed by the Japanese as totally alien to Tokugawa thought. It was allowed into the central concept of ri in Chu Hsi orthodoxy. The consequences of its acceptance was a progressive view of knowledge and even the acceptance of a foreign country (Holland) as a Confucian moral model before the Japanese had travelled abroad (Craig, 1965). The reasoning was that if the West was better at finding ri, it must also be morally superior (when the ri of science and ri of ethics were still part of one concept).

Reasons for the success of the Japanese and failure of the Chinese to adapt Western science and technology to the existing society shed some light on other aspects of the intellectual climate in Japan around the end of the Edo period. The supposition that the West was morally superior to Japan (a relatively short-lived supposition) gave rise to a fairly astringent critique of Japan (e.g., Yamagata Bantō) while the Chinese always remained aloof in their dealings with all foreign nations (Reischauer, 1963; Storry, 1976). The aloofness of the Chinese as compared with the open-mindedness of the Japanese toward foreign ideas is one reason for the failure of the Chinese to progress in modernization and the success of the Japanese.

With the re-opening of Japan to the world and entrance into the Meiji era, there are additional factors to account for the different success of China and Japan. Factors that have been suggested are social (Reischauer, 1963; Nakayama, 1965), historical (Yuasa, 1965) and psychological (Ōya, 1974).

Reischauer (1963) suggested that whereas China's bureaucracy was monolithic and resistant to change, Japan by contrast had small feudal kingdoms which had individual responses to the West, some of which succeeded.

Nakayama (1965) felt that recognition of Western countries by developing countries was divided into four stages (pp.342-3):

- (i) Recognition of military superiority of Western countries.
- (ii) Recognition of Western military techniques as the basis of military superiority.
- (iii) Recognition of the necessity to train native people in Western military techniques.
- (iv) Recognition that military techniques were only a part of general Western science and technology and that to reach a parallel development, importation of pure science and general technology was needed.

Japan recognized the first three steps simultaneously and later other sectors of the culture, besides the samurai, recognized the fourth.

The leading class in Japan consisted of the military samurai, who were impressed by the threat of the military strength of Western powers.

China¹, on the other hand, had a physiocratic bureaucratism (i.e., government according to natural order). Civil officials held the superior positions in the ruling system. Military threat was not a primary concern for them and the impetus to compete with Western military superiority did not arise.

¹ Russell and Russell (1961) do not compare China and Japan, but suggest that science failed to develop in China because she had empirical rather than systematic science. In empirical science, discoveries of practical utility are made in a dissociated way through experience. In systematic science discoveries are based upon a unified and integrated system of hypotheses. China's empirical science allowed her to develop quite an advanced technology but she could not develop it further without knowledge of underlying natural laws. The Chinese had a conservative bureaucracy with stress on reverence for the past in which there was no place for study of natural laws. Radical progress was an impious impossibility. This contrasted with Western science which began in the context of non-social, non-human phenomena with study of stars, gases, etcetera. God had laid down laws and if we could understand these we could control the natural environment. As Peterson (1980) remarked: "There was a shift in 16th and 17th century Europe from the idea of a law-giving God to God-given laws, with no tinkering or miracles allowed" (p.25). While the West explored for regularities in laws, the Chinese dealt with the inanimate, plant and animal environment in terms of their own social interactions. Their world was human through and through (Russell & Russell, 1961, pp.443-6).

The fourth stage, the recognition of the necessity to import pure science and general technology, was recognized in Japan by three groups. One group included the teachers, technical officials and military officers who had worked at the Information Centre of the Shogunate. Another was comprised of the physicians and scholars who held views in favour of science and engineering. The third group was the class that had fought for the Shogunate in the Restoration War, in which the shogunate fell. They could not now advance politically and took refuge in science and technology where political influence was less powerful. Thus, Nakayama places emphasis on the concern of people in a position to direct government policy about foreign military threat. The result of that situation was that steps were then taken to modernize.

Another opinion is given by Yuasa (1965) who cited historical reasons: for him, the important factor was that a large scale assimilation of foreign culture had already occurred during the centuries when Japan was borrowing from China (seventh to ninth centuries). The nineteenth century assimilation therefore was not a new phenomenon for the Japanese. A second suggestion he gave is that the circumstance of the presence of a foreign power (the Dutch) which had successfully been kept under close control and through which foreign ideas had been introduced, had perhaps made the Japanese less fearful of colonization¹ with the importation of Western ideas. The Chinese had no such precedent.

Ōya (1974) gave evidence of "a strong trend toward self-reliance" (p.63) on the part of the Japanese in adopting foreign expertise. As an example, he compared the methods of the Chinese and Japanese in

¹ This second point is not borne out by the evidence, however. Being colonized by a foreign power was precisely what the Japanese feared as a result of the Russian and American presence in her waters in the nineteenth century (e.g., Storry, 1976).

translating foreign texts. In China, translations were done by a team of two persons; one, a foreigner fluent in Chinese, who read the text aloud, and the other, a Chinese who wrote down the dictation in Chinese. This method of translating foreign texts continued unchanged for about eighteen centuries. Such translations were from the outset fluent, but the Chinese developed no cumulative skills in translating. They were, as a result, consistently poor in independent translations. On the other hand, the Japanese did not have a system of working jointly with foreigners and it was common for the Japanese themselves to do the translating. Thus, initial attempts were clumsy and often inaccurate, but they improved with time and translations became fluent and accurate.

In conclusion, it can be said that the Japanese at the time of the Meiji Restoration were impressed by foreign science and technology and saw the need to modernize in order to protect themselves from foreign invasion. That meant developing equivalent (or better) technology to be able to compete on the same terms in future. This point is developed more fully in the next chapter. At the same time, the Japanese had a very different cultural and philosophical background to that of the West. Reischauer (1978) observed that Japan's geographical isolation and a strong sense of self-identity have always made the people very conscious of the distinction between 'foreign' and 'native'. This, he noted, has made the fact of cultural borrowing a major theme in their history, and "What distinguishes (the Japanese) is not their imitativeness but rather their distinctiveness and their skill at learning and adapting while not losing their own cultural identity" (p.33). Evidence for the retention of aspects of the Japanese cultural identity in modern science is presented next.

CHAPTER NINE

MODERN JAPAN AND THE IMPORTATION OF WESTERN SCIENCE

9.1 Introduction

In the previous chapter, the practical and philosophical foundations for Japanese study of the natural world were discussed. Practically, the Japanese began to collect plant and animal specimens to identify those referred to in the Chinese classics. Philosophically, close observation of nature or science (knowledge) was a means to seek ri, or that essence common to man and all other matter. The Japanese have not had a tradition of objective science in which the observer attempts to remain a neutral factor or removed from his subject of study or to take account of any effect he may have. The basic assumption of the honzōgaku naturalists was of the unity of all things in nature and the desired end of their studies was to experience (i.e., to intuit) their affinity with all things in the world.

Evidence is presented in this chapter to show that the assumptions basic to Western science were not assimilated by the Japanese when they imported the ideas and technical innovations of the West from around the 1860's. The circumstances surrounding the decision to import Western science, its progress in Japan, how it was understood after the Meiji Restoration (1868), and the consequent development of institutions for scientific research in Japan are discussed. This is a period of great importance to the general inquiry of the basis for anthropomorphism in primatology. The theory of evolution was introduced to the Japanese by

Edward Morse in 1877. The response of the Japanese encapsulates the trend of fitting Western ideas into a Japanese intellectual context wherever possible. It also provides some explanation for evolutionary theory not apparently having as much impact on Japanese primate studies as on those of the West.

The appellation 'modern Japan' does not denote any universally agreed upon dates among Japanese historians of science. Nakayama et al. (1974) consider the entire period from 1860 to be "Japan's modern century" (p.xvi). This is divided into two phases, namely, the initial eighty years of emergence as a modern state and its collapse in World War Two (i.e., 1860-1940's) and the current three and one-half decades of postwar economic recovery and expansion. For Itakura and Yagi (1974) the real beginning of 'modern science' in Japan dates from the Taisho period (1912-1926). Exactly to what 'modern' refers is not the main concern here. For the purposes of tracing the prevailing intellectual climate and the development of institutions for scientific research in Japan, Nakayama et al.'s (1974) designation of modern Japan including the years from just before the Meiji period to around the beginning of primate studies in the late 1940's is convenient for the present discussion. This period may be divided into three phases which roughly correspond to the changes of emperor in Japan: Meiji (1868-1912), Taisho (1912-1926) and Showa (1926-present).

9.2 Reasons for the Re-Opening of Japan

With the re-opening of Japan to foreigners and to foreign travel by the Japanese, a second¹ major phase of importing a foreign culture began. The first had taken place between the seventh and ninth centuries

¹ To some historians, for example, R. Storry (1976), this is the third cultural invasion, the second being that of the Portugese in the 16th century. However this was, as Storry himself suggests, not substantial (p.19).

When China provided the cultural example. The impetus for such deliberate borrowing had been the rising popularity under Prince Shotoku of Buddhism and its attendant philosophy and art and the example of a thriving and sophisticated culture under the T'ang Dynasty (A.D. 618-906) (Storry, 1976). By that dynasty had begun to decline, borrowing in the form of envoys to China had ceased. The stimulation for a second great borrowing was again the example of more advanced foreigners, but this time the improvement was sought in the spheres of technology, especially military technology, and science. The Japanese were under heavy pressure to improve themselves in these areas, not in order to merely emulate the West, but in order to be on an equal footing militarily and scientifically to protect their very Japaneseness. This was the spirit in which Western science was learned, and for the most part only the end products were assimilated.

When the Americans first arrived in 1853 the Tokugawa government was already weakened from internal strife. There was a strong party in favour of purely Japanese institutions as opposed to institutions borrowed from China. European and American interference coincided with this movement. The result was one of the most sudden changes known to history (Eliot, 1935).

American interest in Japan arose mainly through commercial aspirations. By the mid-nineteenth century, America was carrying on a fur trade with China (von Siebold, 1973) and using steamships for ocean travel (Watanabe, 1970). There were also American whale fisheries off the coast of Japan (von Siebold, 1973) and the opening of California increased trade interest with the East (Storry, 1976). Together, these factors necessitated a coaling station in the area of Japan and some guarantee of refuge and restocking facilities for sailors. There was,

however, a more sinister reason hinted at in the records of Commodore Perry, who played a major part in the re-opening of Japan. In the first chapter of the Narrative of Perry's Expedition to Japan,¹ the following passage appears:

"Another inquiry presented itself; With what far-distant eastern nations should we trade? China was in some measure opened to us; but there was, beside, a terra incognita in Japan which, while it stimulated curiosity, held out also temptations which invited commercial enterprise... By some, indeed, the proposition was boldly avowed that Japan had no right thus to cut herself off from the community of nations;² and that what she would not yield to national comity should be wrested from her by force" (in Watanabe, 1970, p.116).

The so-called 'black ships' under Commodore Perry arrived in Yedo (Tokyo) Bay in July, 1853 (Watanabe, 1970). Japan was helpless to defend herself against them and the letter delivered by Perry from President Fillmore requested the opening of trade relations and warned that the Americans would return the next year with a larger squadron (Watanabe, 1970; Storry, 1976). That the Japanese opened the country reluctantly is shown by the flurry of activity in Yedo Bay which, in five months, produced five islands (about four to five hundred feet square), surmounted with forts and some with cannon (Morse, 1936). However, the Japanese were well aware that the disparity between Japanese and American military power would ensure Japan's defeat if she went to war and that Perry's ships could easily starve out Yedo as most of the food for that city arrived by sea. Some Japanese daimyos (feudal lords) were of the opinion

1 Narrative of the Expedition of an American Squadron to the China Seas and Japan, performed in the Years 1852, 1853 and 1854, under the Command of Commodore M.C. Perry, United States Navy, by Order of the Government of the United States (Washington, 1856).

2 R. Storry (1976) also imputes this attitude to the British: "And it was widely believed that it was positively immoral, as well as contrary to all ideas of progress, for the Japanese to continue to shut themselves off from the world. This was the age in England ... of confident and aggressive Victorian capitalist expansion..." (p.84, footnote).

that Japan should remain firmly closed to foreigners; others thought that the country should be opened to enable her to compete on equal terms in future (Storry, 1976). When Perry returned, the first of a series of treaties that progressively opened Japan to foreigners was agreed. In the end, Japan wholeheartedly set to learning Western science and technology, but not the philosophy behind the science, nor even the methods of scientific research (Watanabe, 1970).

9.3 Importation of Western Science

Some knowledge of Western science had filtered into Japan through the Dutch during Japan's period of isolation. From the end of the eighteenth century, Dutch studies (Rangaku) (Goodman, 1967) had been added to the study of the Chinese classics (Watanabe, 1970). Study of the English language began at Nagasaki in 1809 (Yuasa, 1970). Thus, the classics of Western science and some of Aristotle's cosmology were known in Japan by the 1850's, but the innovations of the technological revolution of the nineteenth century were not. Under the Tokugawa regime, of course, most schools taught the ideas of Chu Hsi Neo-Confucianism. Western studies were not officially recognized until 1857, three years after the re-opening of Japan, in the creation of Yōgakusho, renamed Bansho-Shirabe-sho¹ (Office for the study of Western writings) (Yuasa, 1970). At that time, Dutch books were studied. In 1860 its syllabus was expanded to include English, French, German and Russian and courses in chemistry (Sansom, 1950).

In 1862 overseas travel was permitted for the first time in over two hundred years. In that year, the first students were sent abroad

¹ Also written Bansho-Shirabe-dokoro, the institute was built in 1855 (Sansom, 1950) and the official opening was held in 1857.

to study.¹ Under the shogunate, about one hundred students were sent abroad by the government or provincial clans (han) to Holland, England, France, Germany, Russia and the United States (Watanabe, 1970). About half the students were government-sponsored and half han-sponsored. Between 1862 and the Meiji Restoration of 1868 nearly all the government-sponsored students went to France and the han-sponsored students went mainly to England (Ogata, in Sumiya & Taira, 1979).²

In the first decade after the founding of the Bansho-Shirabe-sho (and the final decade of shogunate rule), the Tokugawa government appears to have been more or less swept along with the initial rush to gain knowledge of the West which had so threatened Japanese autonomy. The trend continued for about two decades into the Meiji period. Government policy in education accorded with the so-called Charter Oath that, "Knowledge shall be sought throughout the world, so that the foundations of the Empire may be firmly established" (Watanabe, 1970; Storry, 1976). This clearly reveals the spirit in which the importation of Western science was undertaken. Japan needed modern science and technology to become as advanced as Western nations. A leading spokesman of the time, Fukuzawa Yukichi³ (in Watanabe, 1970) wrote:

"... the steamship, and steam locomotive, electric telegraphy, printing, and the postal systems ... constitute the elements of modern civilization" (pp.116-7).

1 Nishi Amane was among the first to go abroad and contributed much to change Chu Hsi philosophy from his reading of Western philosophy (see pp.253, 279-80).

2 From the abstract of Ogata Hiroyasu (1961), 'Kaigai ryūgakusei oyobi shisatsusha' (Japanese students and observers sent abroad), in Noma Kyōiku Kenkyūjo Kiyō (The Journal of the Noma Institute for Educational Research), No. 19, May; a special edition on 'Seiyō kyōiku inyū no hōto' (The methods and procedures of transfer of Western education to Japan), Tokyo: Kōdansha, 15-71.

3 Fukuzawa, Y. (1879) 'Minjo Isshin' (Renovation of people's conditions), in Nihon Kagaku-Gijutsu-shi Taikei (History of Science and Technology in Japan), ed. by History of Science Society, vol.1, 489-91.

Watanabe Masao (1970) stated that, "... great enthusiasm for scientific know-how and for Westernization prevailed in Japan for some time in the early Meiji period" (p.117).

By 1873 three hundred eighty-two Japanese students were studying abroad (Ogata, in Sumiya & Taira, 1979). Between 1875 and 1912 four hundred forty-four students were sent abroad by the Ministry of Education, founded in 1870 (Watanabe Masao, 1970). Their fields of study, ranked in order by numbers of students, were 'natural sciences' (i.e., engineering, medicine, pure science), 'social studies' (i.e., law, education, commerce, economics, political science) and 'humanities' (i.e., languages and history). Germany was by then the most favoured country, followed by England, America and France in that order (Ogata, in Sumiya & Taira, 1979, pp.231-2). In addition, many others went privately or were sent by han (provincial clans)¹. Yuasa (1970) pointed out:

"Between 1868 and 1889 the whole edifice of the intellectual system, which had been brought from China and cultivated under Buddhism and Confucianism, was overturned and replaced by a completely new system introduced from Europe" (p.152).

For a short period after the Meiji Restoration, education in Japan was restructured so the nativist learning (kokugaku) was the centrepiece, flanked and supported by Chinese classics and Western studies. However, this scheme only created conflicts among the three schools, with the Japanese and Chinese schools vying for supremacy while combining informally against the Western school (Inatomi, in Sumiya & Taira, 1979)².

1 For example, the clans of Chōshū and Satsuma continued to send students after the collapse of the shogunate (Watanabe Minoru, 1965).

2 Inatomi, Eijirō (1944) Meiji shoki kyōiku shisō no kenkyū (Early Meiji Thought on Education), Tokyo: Sogensha.

By 1870 however, a new curriculum worked to the advantage of the Western school and downgraded the importance of the other two. In 1872 the adoption of a system of education modelled after the French and American systems marked a political and ideological victory for the Western-oriented intellectuals (Inatomi, in Sumiya & Taira, 1979). Many Westerners had been employed to help with the process of modernization. Western books were translated and published.

The trend to Westernization, however, did not go unchallenged and there were still many adherents to Confucian scholarship about. A nationalistic reaction began in the 1880's and culminated in the Imperial Rescript on Education of 1890. The Educational Ordinance of 1880 was a first step. It made the structure of education conform to Japanese tradition and culture. This reflected a reaction against Japan's earlier uncritical obsession with everything Western (Kaigo et al., in Sumiya & Taira, 1979).¹ By the 1890's the turning against European studies was quite evident (Sansom, 1950). More profound in its effects was the fact that most avid seekers of Western knowledge among the Japanese were, in their basic outlook, still Confucianist. The experiments with an American type of curriculum for elementary education within a French type of institutional structure were replaced with moral training based on traditional Confucianist values as an essential part of school education (Sumiya & Taira, 1979). The Imperial Rescript on Education (1890) propounded a return to Confucian values. Shintō had been declared the new State's religion in 1868 (Eliot, 1935) turning the emperor into a chief Shintō priest (Sumiya & Taira, 1979). That Confucianism was

¹ Kaigo Tokiomi et al. (1954) 'Kyōiku seidoshi gaisetsu' (An outline history of education), in Gakusei hachijūnenshi (Eighty years of education), ed. and publ. by the Ministry of Education, Tokyo, 1-234.

dropped as the State religion appears to have been due more to its intimate association with the defunct feudalistic regime, than with a change in basic outlook. Shintō is, moreover, not incompatible with Confucian philosophy. As Herbert (1967) pointed out, features of Shintō were accentuated, rather than attenuated by later Buddhist and Confucian influences. The official backing of Shintō, Japan's own religion, reflected an enhanced national consciousness at the time of Western input.

Thus, borrowing from the West was to be limited to technical advances in humanistic as well as physical sciences; the 'scientific spirit' of the West had to be kept away. In all aspects of life, the 'spirit' had to remain as Japanese as ever (Sumiya & Taira, 1979, p.228). The earlier slogan of "Civilization and Enlightenment" (bunmei kaika) increasingly gave way to another: "Japanese spirit and Western technology" (wakan yōsai (Japanese spirit, Western talents) or tōyō dōtoku, seiyō geijutsu (Oriental ethics, Western art, including technology)).¹ The educational system was finally stabilized as an instrument for cultivating Japanese spirit and acquiring Western technological expertise (Sumiya & Taira, 1979).

This outcome is also understandable when the social origins of the Japanese scientists are considered. Yuasa (1970) identified three types of scientists in Japan. One he named Type 'F' (feudalism) which comprised those who studied Oriental science such as wasan-ka (Japanese mathematics), honzo-ka (herbalists) and kampō-i (physicians of the Chinese school). The second was Type 'T' (transition) which included scholars of Dutch studies (Rangaku-sha) who contributed to the

¹ Tōyō dōtoku, seiyō geijutsu (Japanese ethics, spirit, Western technology) was first coined by Sakuma Shōzan (1811-1864) (Craig, 1965).

scientific revolution within the framework of feudalism, but who were not appointed to institutional positions under the Meiji government. The third was Type 'M' (modern), the new Western-trained Japanese scientists, who contributed to the scientific revolution and who were appointed to important institutional positions from around the beginning of the Meiji period.

Thus, Type 'F' and Type 'T' scientists, imbued as they would have been with Neo-Confucian ideas, were not the teachers nor members of the new regime's educational ministry. However, those Western-trained students who took over from Western teachers after 1889 (Yuasa, 1970) were predominantly of the former samurai class and had a Confucian socio-ethical system of values (Nakayama, 1965). The majority of students in the Bansho-Shirabe-sho, which was the first school for higher education in Western science (opened in 1857), were the sons of samurai, who had been the direct retainers of the Shogunate (Yuasa, 1970). These were the Type 'M' (modern scientists). Of the groups who had backed the importation of Western science in the early years (including the samurai, teachers, technical officials and military officers of the former Information Centre of the Shogunate; physicians and scholars, and clans who had fought and lost in the Restoration War), it was the former samurai who made up the bulk of Japanese scientists (Nakayama, 1965; Yuasa, 1965). This ex-military class had recognized the need to train people against the military threat posed by the West. This was their motive for importing Western science and technology and had at its basis a desire to protect the Japanese way of life.

In general, the prevailing attitude to Western science in the Meiji period was that its results had put the West in a more powerful position than Japan and had therefore better be mastered. The inevitable upheaval

resulting from the introduction of Western technology created concern that Japanese values were being affected. The policy of 'tōyō dōtoku, seiyō geijutsu' (Japanese spirit, Western technology) reflected this concern. Although the Neo-Confucian metaphysic was 'abandoned' when the Tokugawa shogunate fell, the basic moral code it espoused remained generally active. This retention of a traditional system of mores and the distinction drawn between them (or Japanese 'spirit') and Western technology was one aspect of the retention of traditional Japanese thought in modern Japan. A Confucian ethic has been retained to the present day (Reischauer, 1978; Kitahara-Frisch, pers. comm.).¹

9.4 Development of Scientific Institutions in Japan

The policy to work toward even a superficial Westernization in Japan continued to fluctuate into this century. Each period of emulation of Western techniques in science and technology was followed by a reaction against Western ideas and a surge of nationalism. Though linked for the most part with the state of the world economy, the switching between nationalist and internationalist policies in scientific research greatly affected the character of research in Japan.

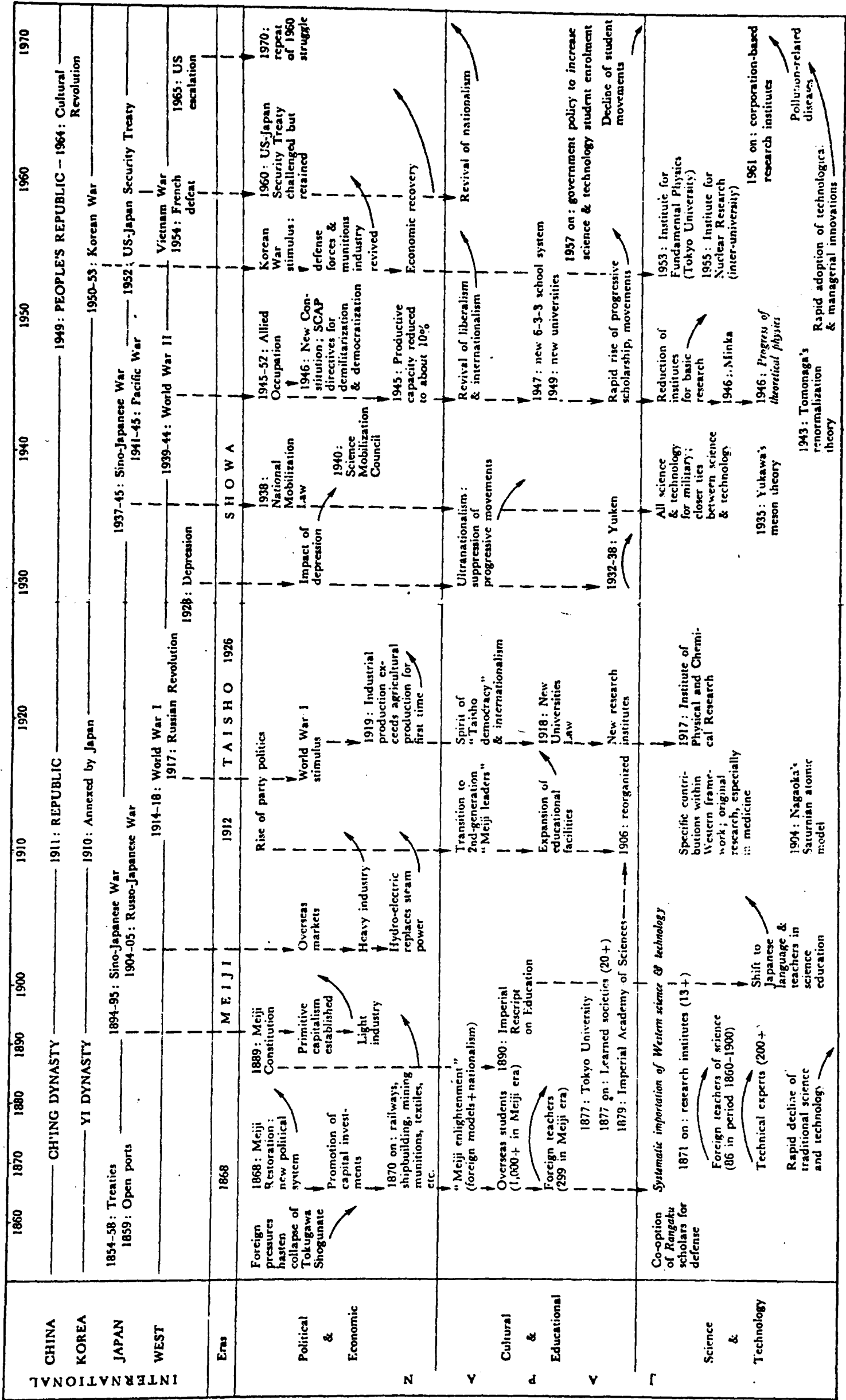
D. Swain's (1974) chart (following page) provides a sketch of major trends in the political, economic, social and scientific spheres in Japan from 1860-1970. Nationalism, in the sense of "patriotic feelings, principles, efforts"² is prevalent during the Meiji enlightenment (1868-1912) even during the importation of Western science; again from 1928-1944 and from 1960-1970. Swain noted an internationalistic attitude from around 1917 with the formation of the Institute of Physical and Chemical

1 Letter: J. Kitahara-Frisch to P. Asquith, January 27, 1980.

2 Concise Oxford Dictionary, ed. Sykes, 1976, p.725.

In: Nakayama, Swain & Yagi (eds) (1974), Science and Society in Modern Japan, M.I.T. Press, Cambridge, Mass. (after pg.xx)

INTRODUCTORY CHART ON HISTORICAL BACKGROUND



Research modelled on similar Western institutes; with the New Universities Law (1918) which authorized the establishment of private universities, and with the 'Taisho Democracy' (1926), a political event which gave the political parties in the Diet more say in cabinet decisions.

In the 1930's a period of fanatical ultranationalism began in which the presence of 'thought control police' readily summarizes the intellectual climate. After 1945 there was again an internationalistic attitude with the American occupation of Japan and implementation of the American 6-3-3 school system (in which all Japanese received at least six years of education) and the building of new universities.

The establishment of academical and scientific institutions and their development through the Meiji, Taisho and Showa periods is a useful indication of the nature of the Japanese adoption of Western science. When the Emperor Meiji became head of government in 1868 he continued the trend to Westernization begun in the 1850's. The official school of Chinese learning (Shōheikō) was closed in that year (Watanabe, 1970) and education in science, medicine and technology was drawn from the West. In 1877, through a merger of the Bansho-Shirabesho (renamed Kaisei Gakko in 1872) (Yuasa, 1970) with a medical school, Tokyo University (Tokyo Daigaku) was founded (Nakayama, 1965). It became the pivotal institution for the introduction of Western science. Renamed Tokyo Imperial University (Tokyo Teikoku Daigaku) in 1886 (Itakura & Yagi, 1974), it preceded Kyoto University, established in 1897 and Tohoku University, established in 1911, by two decades. However, the Imperial Universities were not good research places, but essentially agencies for training bureaucrats. There was no provision in the university budget for research (Itakura & Yagi, 1974).

Of the Western nations involved in education in Japan, viz., United States, England, Germany and France, American influence was greatest in early Meiji Japan. This was for two reasons: (i) the Americans had had the greatest involvement in the re-opening of Japan and several American missionaries, as well as teachers and technical directors went to Japan, and (ii) the Dutch-American missionary, Guido H.F. Verbeck (1830-1898), who had been living in Japan since 1859 and the American educator, David Murray (1830-1905), who was asked in 1873 to serve as educational advisor to the Minister of Education, had a profound influence on the Japanese educational system and the selection of foreign teachers to serve in Japan (Watanabe, 1970). Coincidentally, early American influence was greatest in the field of biology (Watanabe, 1970).

The Tokyo Academy of Science was established in 1879 (Itakura & Yagi, 1974) by the Ministry of Education on the suggestion of Minister Saigo Tsugumichi. He was supported by, among others, Nishi Amane, Katō Hiroyuki and Fukuzawa Yukichi (Hirosige, 1965), who had studied in the West. The original twenty-one members were more interested in spreading knowledge and propagating Western culture than in research. Only two of them had had training in the natural sciences (Hirosige, 1965). The Tokyo Academy became the Imperial Academy of Science in 1908¹ (Itakura & Yagi, 1974). Here too, as in the universities, there were too few funds for research and the Academy effectively only provided a pension for members over sixty years old (Itakura & Yagi, 1974). With further development of modern science in Japan, the number of scientists in the Academy increased (Hirosige, 1965; Itakura & Yagi, 1974). By 1949 the Science Council of Japan replaced the Academy, the latter becoming an honorary body. The Zoological Society was founded in 1888

¹ Hirosige (1965) dates the beginning of what he calls the Imperial Academy of Japan to 1906 (p.324).

(Yuasa, 1965). The late 1880's marked the beginning of original research by Japanese scientists (Yuasa, 1965). Of particular note is the work of Toyama Kametaro, a scientist who worked in the Faculty of Agriculture in Tokyo University. By 1900 Mendel's laws had been rediscovered by Western botanists. Toyama performed experiments with silkworms independently of any parallel European study and rediscovered the same laws as Mendel had. Toyama's experiments demonstrated for the first time that Mendel's laws were also applicable to animals (Yuasa, 1965; Yajima, 1965). The discovery was of great practical value to sericulture (silkworm breeding) which was an important industry in Japan (Yajima, 1965).

During the Taisho period, just as Japan was gaining some confidence to sustain her own economic enterprise, World War One intervened. For the West, the war demonstrated the importance of scientific research for industrial needs. Most countries had problems supplying the necessities of life and sustaining industrial production. Itakura and Yagi (1974) pointed out that, "World War One called forth ... a profound awareness of the relationship between science, war and technology, and all the involved countries began to show serious interest in government support and control of scientific and technical research" (p.173). For the Japanese the war opened markets - in Europe, China and India. Japanese capitalists fared well, but there was no interest in developing technology or science on their part. However, after the war, foreign markets were closed to Japan who could not compete with the superior technology of Western countries. Her capitalists then realized the importance of scientific and industrial research and supported their expansion. For military reasons too, the government supported their development.

The first channels for subsidizing research were created in 1918 with the Keimei Foundation which commemorated the three hundredth anniversary of Tokugawa Ieyasu's death in 1616, and in the same year grants from the Ministry of Education were begun (Itakura & Yagi, 1974).

Comments generated by the planning for an Institute of Physical and Chemical Research reveal the state of Japanese research in science and industry. They bring out the fact that Japan had been simply imitating Western models and that there was in fact little official backing for research. For instance, the Imperial Academy of Science, previously the Tokyo Academy of Science, increased the number of members related to the natural sciences in 1906. As mentioned (p.300), its funds were limited to paying pensions. It also awarded Imperial Academy prizes, but this was only made possible through money given by the Imperial Family and two or three other private donations (Itakura & Yagi, 1974). Nakamura Seiji described the Academy as a body with "no time, no money and no facilities" (quoted in Itakura & Yagi, 1974, p.168). About the time of World War One, Japanese science was depicted by Sakurai Jōji (in Itakura & Yagi, 1974) as follows and the situation had not changed appreciably well into the Taisho period:

"The dream of imitating everything had prevailed in Japan from the beginning of the Meiji period until World War One, and scarcely anyone outside the academic community, either in government or private life, realized the importance of scientific research. Thus, the lack of support for research was a major anxiety not only to the universities but to the learned world in general. And despite the growing enthusiasm of academic circles for research, the general trend is to dash cold water on it... Conditions in this country afford little ground for hope that scientific research can be smoothly developed; all we can do is to wait for more favourable times" (p.168).

In 1913 Takamine Jokichi, who had set up his own chemical laboratory in America after settling there in 1890, in a second meeting in Japan about establishing a national science institute, said that:

"... while Japanese industry thus far had developed almost entirely by copying European models, it would have to go beyond this imitative phase and create new industries based on new inventions, if the nation wanted to amass great wealth..." (in Itakura & Yagi, 1974, p.171).

However, efforts to make the country's science, industry and technology autonomous were not successful. The basis for the development of capitalism had been exploitation of underpaid workers who had had to abandon agriculture. To keep up with foreign technical developments, they turned to purchasing foreign patents, importing machinery and employing foreign technicians. Itakura and Yagi (1974) pointed out that Japanese technology was still unable to shed its colonial-style dependence on the West. The attitude of most capitalists, not to develop technology, but to rely where necessary on foreign expertise, meant that the Institute could not support itself on the income from the sale of patents. It had therefore to engage in manufacturing. The Institute set up small factories and incorporated itself in order to support its research activities. Its economic base always remained weak and it was only supported at all because of the wartime economy. In 1938 80.7% of its factories' production was military-related (Itakura & Yagi, 1974, p.196).

In the Showa period, a decade after the setback of post World War One loss of markets came world-wide economic collapse. Ultrationalism was the response of the Japanese government (Nakayama et al., 1974) with far-reaching consequences for study of Western thought in Japan. The example of the Society for the Study of Materialism (Yuibutsuron Kenkyūkai, abbreviated Yuiken) shows something of the distortion in intellectual activity caused by the social and political strains of the late 1920's to the early 1940's. Nakayama et al. (1974) pointed out:

"Against the truncated perspectives of Japanese nationalism, Marxism had a universalistic appeal - much more so than other systems like existentialism, pragmatism, etcetera, which appeared to be still too characteristically Western for application to Japan's problems" (p.xvii).

In response to restrictions imposed by the authorities, Marxism gained in appeal among intellectuals. Yuiken was formed in 1932 and members were sought among the natural scientists (Oka, 1974). The society was not attached to any academic institution, so that although the thought control police kept close watch, the members were not unduly concerned as the society had no academic status. Yuiken was active in the analysis of philosophical implications of Marxist doctrine (Nakayama, 1974c). To what lengths the application of Marxist theory was taken is illustrated by Ogura Kinnosuke's (1929) series of articles on the relationship between mathematics and social classes. Beginning with 'Arithmetic in a class society', written in 1929, he marshalled historical evidence to demonstrate that even in mathematics, supposedly the most abstract branch of knowledge, class structures are reflected (Nakayama, 1974c). By 1938 Yuiken was disbanded by the government authorities partly because of their antiwar publications.

The Association of Democratic Scientists (Minshu-shugi kagakusha kyōkai, abbreviated Minka) played a crucial role in the scientists' movement just after World War Two (Nakayama, 1974b). It was inaugurated in 1946 and many of its organizers had been active in Yuiken before the war. Minka took up the goal of creating a 'science for the Japanese people'. Scientists were urged to move among the people, enlighten them and learn with them (Nakayama, 1974b, p.287). Some natural scientists noted that in Japan basic science was out of touch with technology, that Japanese scientists have the habit of depending on other countries for their research topics, and that copying vitiates science in Japan (Nakayama, 1974b). Minka however, declined from 1955 as prosperity in Japan increased during the Korean War. As the research activity of professional scientists returned to normal, the call of Minka and of the Japan Communist Party for democracy lost its poignancy. By 1957 Minka hardly existed (Nakayama, 1974b).

One society of Minka that has survived and remained active, however, is the Society for Corporate Research in Earth Science (Chigaku dantai kenkyūkai, abbreviated Chidanken) founded in 1947 (Nakayama, 1974b). It is of interest here in that it is not only a scientific society, but also a crusading body for propagating its ideology and methodology of science. Ijiri Shōji, a geologist, has been its main spokesman and his philosophy has certain similarities to that of Imanishi Kinji. He emphasized the importance of field work in science. Traditional elements are evident in Ijiri's thinking too. Nakayama (1974b) noted:

"Ijiri's philosophy of science starts with a method based on personal experience. By 'experiment' he means commitment to practice, eventually related to an ethic of social action. First, 'One strikes his hammer into the earth, that is, performs some constructive action' and then 'feels and experiences nature instinctively with his whole body and senses in the extreme'. This is the fundamental scientific exercise" (pp.272-3).

It is still maintained in some quarters that Japanese science and technology lack originality and creativity¹ (Boffey, 1970b). Some would say that even in basic university research there have not been "very many original ideas or creative types of work" (*ibid.*, p.266). Different reasons that have been advanced for the apparent lack of creativity in Japanese science are that it is due to: (i) the Japanese as a race lack the innate ability for 'creative' science (Boffey, 1970a, 1970b), (ii) the stress on rote memory in Japanese education, (iii) the 'group approach' to problems which stifles individual initiative, and (iv) the 'confining' island geography imposing a psychological barrier to 'grandiose visions' (Boffey, 1970b). Boffey (1970b) himself felt that the most likely explanation is that Japan has frantically been trying to catch up with the West for a century, and the main concern has been to

1 By 1970, Japan had won 'only' two Nobel Prizes, both in theoretical physics (Boffey, 1970b).

'absorb' existing knowledge rather than to create new knowledge. They have tended only to take and improve on major breakthroughs of innovations of other countries.

It would be inaccurate to suppose there is any lack of creative ability in the Japanese people and hence Japanese science. On the contrary, individualistic methodologies in science such as those of Ijiri and (it will be seen) of Imanishi sometimes arise and develop substantial followings. The evidence points rather to the circumstance that the Japanese encounter with Western science is one which, due to the naivety of its initial adoption, which neglected (or perhaps rejected) the very alien Western philosophical basis, has left room for methodological innovation and manoeuvring by the Japanese. Response to some areas of science (for instance, evolutionary theory) was due to straightforward misunderstanding of the Western context. However, it appears that in other areas there has been a conscious effort to blend the Western and Japanese approach to the natural world. This is brought out in the next chapter.

Yajima (1965) observed that, "L'histoire des sciences et des techniques au Japon n'est que l'histoire d'une adaptation" (p.179). This is well illustrated by the introduction of the theory of evolution through the efforts of Edward S. Morse and counter-efforts of most Christian missionaries in Japan. From a Western point of view, the Japanese reaction is of particular relevance to study of non-human primate behaviour. Their reaction (and Japanese scientists had far less difficulty than many of their Western Christian colleagues in accepting the doctrine of evolution), illustrates more generally the psychological and practical factors that affected the Japanese adaptation of evolutionary theory to their own context and its current status in primatology.

9.5 Introduction of Evolutionary Theory to Japan

Edward Sylvester Morse, born in Portland, Maine, in 1838, was brought up as a Calvinist with a fundamentalist belief in Genesis. He was trained as a mechanical draughtsman and as a wood engraver which made for an exact style of drawing (Morse, 1972). His interest in collecting and classifying shells and minerals won the notice of Louis Agassiz who was about to start the new Museum of Comparative Zoology at Harvard University. Morse became a student-assistant to Agassiz at the Lawrence Scientific School at Harvard, and specialized for three years in conchology (Watanabe, 1970).

Agassiz did not accept Darwinian evolution. In a paper delivered on the fifteenth of February, 1860, before the Boston Society of Natural History, Agassiz said of Darwin's theory: "(it is)... an ingenious but fanciful theory ... Animal representatives were as numerous and diversified in early geological periods as now" (Wayman, 1942, p.101). He instanced the brachiopods. That remark, Morse later recalled, influenced his entire subsequent career (Wayman, 1942). Asa Gray, who taught in the same department as Agassiz, was a pro-Darwinist. As a result, many students who were also pro-Darwinist turned against Agassiz. Morse did not: instead, he painstakingly worked for years on the brachiopods to test for himself the validity of the theory of evolution. Thirteen years later, in 1873, he publically announced himself a Darwinist (Wayman, 1942).

Morse's systematic study of brachiopods along the Atlantic coast from Maine southward attracted the attention of Darwin and other European naturalists. It was the rich varieties of the Pacific Ocean brachiopods that first attracted Morse to Japan in 1877. He did his research at Enoshima (Morse, 1936).¹ A Japanese professor at Tokyo

First published 1877.

University who had heard Morse lecture in America arranged for him to give talks in Tokyo (Nakamura Takeshi, 1965). Out of this arose the invitation to fill the newly established chair of zoology at Tokyo University. He remained for three years on this first of three visits to Japan. Best known in science¹ for introducing the theory of evolution to Japan, Morse became an expert on Japanese pottery and made a significant archaeological discovery of shell mounds at Omori soon after he arrived in Japan (Nakamura Takeshi, 1965).

Morse gave the first lecture ever given in Japan on evolution on the sixth of October, 1877, before a number of professors, their wives, and five to six hundred students (Morse, 1936). He had an ideal audience in his students for evolutionary theory. In his diary Morse (1936) remarked:

"Most of them (male students at Tokyo University) are rationalists and a few may be Buddhists, so with these conditions I anticipate a delightful experience in presenting Darwinism pure and simple. Especially noticeable is their alert recognition of my drawings of various animals on the blackboard" (Part I, p.284).

On another day he recorded:

"I illustrated my lecture with objects and drawings on the blackboard and endeavored to explain to the students the simple factors of natural selection. In every experience of this kind I have noticed how quickly the Japanese grasp the points, and I soon realized the reason. The Japanese are more familiar with the animals and plants of their country than are we with ours; indeed, the familiarity of the country boy with flowers, fungi and insects and the like is akin to that of those who collect and study these objects in our country. The country boy has common names for hundreds of species of insects where our country boy has ten. I have often been amazed at his knowledge of structural detail" (Part II, p.205).

The learning of evolutionary theory, however, was by no means confined to the classroom or to the budding hakubutsu-gakusha (naturalist).

¹ In Japan.

It is the course of Darwinism as set against a wider intellectual and social background in Japan that is of most interest. Miyake Yujiro, a scientist, wrote:

"By far the greatest impression produced upon the thinking public of Japan was the advent of Professor E.S. Morse, who spared no pains to introduce the theories advanced by Darwin and Huxley. The Darwinian theory of man's descent from a monkey was in itself enough to surprise the Japanese students, and ... also had a great influence on the public" (cited in Wayman, 1942, p.249).

Two aspects of Darwinism were of particular interest to the Japanese. One was the idea of 'the survival of the fittest'. The other was the idea of the importance of the past for understanding the present and the continuity of past, present and future.

The idea of survival of the fittest was very attractive to the Japanese and was used politically as yūsho reppai ('superior wins, inferior loses') (Sansom, 1950). It was used, in conjunction with social Darwinism, to justify the national policy of the time: i.e., the amassing of wealth and armament when Japan herself had to struggle for existence in her new international circumstances (Watanabe, 1966).

In the idea of the relevance of the past to the present, the Japanese found a second area of compatibility with their beliefs. It offered a solution to the difficulties they at first had to try to make Christian doctrine consonant with ancestor worship. Schwantes (1953) pointed out: "... if the future, present and past were continuous, one developing inevitably out of the other, then respect for ancestors and national heroes was compatible with modernization and progress" (p.125). This question had arisen because the Japanese had initially thought that they must accept Christian doctrine along with Western technology. They had regarded Western civilization as unitary and monolithic; something to be entirely accepted or entirely rejected, its

religion along with its technology (Schwantes, 1953). For instance, Nakamura Keiu, who founded the Dōjinsha¹ in 1873, had lived in England for two years (1866-1868) before the Meiji Restoration. He was impressed by the apparent influence of Christianity on English life and felt that if important elements of Western culture were to be borrowed, then the religious system of which they were an outgrowth should be understood.² Thus he advocated not only toleration, but encouragement of Christianity in Japan (Sansom, 1950).

This was a reversal of the previous attitude to Christianity. Since the early seventeenth century, it had been prohibited in Japan as its missionaries were thought to be the vanguard of foreign colonialism. The Dutch colony at Nagasaki had been tolerated partly because it did not seem very Christian; for instance, the Dutch worked on Sundays. However, with the opening of ports to Western trade near the end of Tokugawa rule, the official policy toward Christianity was altered. The change of attitude came about because, as Schwantes (1953) pointed out: "... the legal system, literature, the whole culture of the West was so permeated with religious elements, that many thinking Japanese thought it impossible to become modern without becoming Christian" (p.123). Christian schools in fact did most for the spread of foreign learning in Japan after the coming of the Americans. Many private schools were funded by Christian bodies. This was useful as the Japanese government was unable to meet the demand for schools (Sansom, 1950). The Christian

1 The Dōjinsha was a large private school in Koishikawa in Tokyo. Though it had been very successful, it closed when Nakamura died. Nakamura (1832-1891) was a founder of the Meirokusha (Meiji Six Society) made up of men who had been among the first Japanese to visit the West after travel abroad was permitted (Kai-Nihon-Jinmei-Jiten) (Japanese Who's Who), 1937, p.191C. See also p.253.

2 This does not contradict the observation of several historians of science that the Japanese did not learn Western scientific philosophy of approach behind the technological and scientific innovations.

schools flourished in the 1870's - the years of greatest influence of American and English thought. This, however, did not last and even during the seventies an anti-Christian movement became evident (Sansom, 1950). This was the beginning of the rise in nationalism which led to the 1890 Imperial Rescript on Education, advocating Confucian ethics and a return to native tradition. Sansom (1950) recorded it was thought that "... the pragmatic, utilitarian education of the West was destroying the 'ancient morality' of Japan" (p.491). Conservatives called this morality the 'national essence' (Sansom, 1950).

It is evident that neither aspect of evolutionary theory of interest to the Japanese (i.e., survival of the fittest and the importance of the past) had anything to do with science. The theory of evolution was applied to social and cultural conditions and did not arouse interest as a theoretical framework in which to understand animal behaviour. A quantitative analysis of the articles of three major Japanese periodicals contemporary with the introduction of evolutionary theory (from 1877) reveal the preoccupation with the social, not scientific, implications of Darwinism. Watanabe and Ose (1968) tabulated the articles about theory of evolution of the following journals: Tōyō Gakugei Zasshi (Journal of Oriental Studies) (abbreviated Tōyō), founded in 1881, which published articles on the nature and benefit of science; Gakugei Shirin (Journal of Arts) (abbreviated Shirin), published from 1877 to 1885 and edited by the Colleges of Law, Science and Literature of Tokyo University, and Rikugō Zasshi (Journal of the Universe) (abbreviated Rikugō), a Christian monthly established in 1880 and published by the Japanese Unitarian Society (Nippon Unitarian Kodokai). They found that:

"The theory of evolution constituted an uncommonly high proportion as compared with other subjects treated in the three major periodicals of the time. This theory, however, was discussed mainly on the grounds of social science rather than natural science, in the two periodicals, Shirin and Toyō. In the third periodical, Rikugō, which was a leading Christian publication, Darwinian topics were more frequent in every field and were particularly so in the domain of natural science, reflecting the fact that the minority group of Christians in Japan had to set forth their polemics against the attacks based on Darwinism" (p.141).

There are two areas of inquiry that encapsulate the Japanese response to evolutionary theory and, predictably, Morse had a role in both. One is in the conflict between Western missionaries and scientists and between missionaries and Japanese, and the other is the effect of Morse's rather personalized version of evolution.

It has been maintained that Morse himself was responsible not only for the introduction of evolutionary theory, but, to a considerable extent, for the conflict between the church and scientists in Japan (Tsukuba, 1961; Watanabe, 1970). He saw evolution as conflicting with Christianity and presented it as something quite antagonistic (Watanabe, 1970). This took effect retrogressively on the social system at that time by attacking Christianity which was playing an important part in the modernization of Japan (in building schools, etcetera) (Tsukuba, 1961).¹ With the advent of evolutionary theory in Japan, many of the missionaries and Christian teachers began a strong campaign against it. The Huxley-Wilberforce clash had its parallel in Japan between Morse and Dr. Henry P. Faulds, a Scottish Presbyterian minister. Faulds took it upon himself to attend Morse's public lectures wherever they occurred to defend the Christian position. There were wider implications arising

¹ Cited in Nakamura Teiri (1965), pp.65-6.

from the Christian/evolutionist split¹ in that the controversy over evolution had revealed dissent within the Christian sects. The American Unitarian mission caused much anger within Christian ranks. For the Japanese, free scientific inquiry had appeared to be opposed by a literal faith. However, the Unitarians claimed to be Christian and yet also stood for scientific truth and freedom of inquiry. In 1886 Yano Fumio published articles saying that the Unitarian faith, because of its freedom from superstition, was the one form of Christianity suitable to Japanese needs (Schwantes, 1953). Traditional Christians were angry at the Unitarians so easily snatching away their prepared ground. People gradually drifted away from the Christian religion altogether in Japan. The Consitution of 1889 and the Imperial Rescript on Education of 1890 marked the swing toward conservatism. In 1890 Yokoi Tokio of the 'Kumamoto Band'² called for the development of a distinctively Japanese Christianity based on Buddhism and Confucianism with the original rites and ceremonies.

1 An exception among the missionaries was John T. Gulick. He was an American son of a missionary born in Hawaii in 1832 who worked in Japan as a missionary in his turn. He had an interest in natural history and made a systematic collection of land snails (*Achatinellidae*) on the Hawaiian islands. In studying the inter-relationships of the species of land snails, he not only substantiated the Darwinian theory but showed there were other factors, besides environmental forces, which worked as causes for evolution. Those factors were isolation, or the prevention of mingling and other factors that were of internal origin. Nevertheless, Gulick saw science and religion in harmony with each other. He said that whereas natural selection is a cause of evolution, it does not solve the mystery of the origin of organic forms. Furthermore, there were limitations to natural selection as a causative force in evolution and weight needed to be given to other causative forces residing within the nature of the evolving organism. (Watanabe, 1966, p.145).

2 The Kumamoto-Yogakko (school) was begun by the Japanese to cultivate knowledge of the West. In 1871 an American, Capt. C.C. Jones, was invited to head the school. Left to do everything, he set about proselytizing the Japanese to Christianity with some success. Kumamoto however, was a conservative area, and there being some ill-feeling toward the Christians, the thirty-five converts were sent to Doshisha University. At Doshisha, they became known as the Kumamoto Band. Yokoi Tokio (1857-1928) was a member. He had been baptized in 1876 and became a preacher. In 1894 he wrote a book, Problems of Christianity in Japan in which he claimed to propound a new theology. He later returned to orthodox Christianity. (Kawade-shobō Nihon-Rekishi-Jiten (Dict. Jap. Hist.) 1957, vol.6, 303-4; 1959, vol.19, 21)

The ideological battles between Christian and evolutionary theories were present in Japan through the convictions of the Westerners who brought the doctrines to Japan. This was not the case with the conflict between certain Japanese and Christian beliefs. Part of what was happening to erode the acceptance of Christianity was the development of the conflict between Christian and Japanese ideas regarding the 'worship' (as the missionaries thought) of ancestors. Shintō had been declared the State religion in the Meiji period and the Japanese had anyway always kept up their Shintō beliefs. Shintō, as Herbert (1967) explained, holds that gods (kami), men and the whole of nature were born of the same parents and are therefore kin. Man is indissolubly bound up with kami by both biological and spiritual ties. They share the same divine blood which flows through animals, plants, minerals and all other things in nature. Herbert (1967) wrote:

"When it is understood that man and the Divine are the same, there can be no worship (in the sense which we give to the word in Christianity), though there can be modes of showing respect and concentrating the mind in its spiritual being and its Divine ancestry.

"This fundamental belief is so strong that foreign religions, in spite of the amazing Japanese tolerance, are apt to meet with considerable opposition if, when they try to get a footing in Japan, they go against the resultant religious attitude, both respectful and friendly, towards all ancestors, both human and Divine" (p. 22).

The theory of evolution, on the other hand, was compatible with the juxtaposition of traditional Japanese beliefs and modernization. However, the controversy between Western religion and evolutionary theory had revealed a serious division in Occidental thought. This proved to be an important revelation to the Japanese who had understood Western religion to be integral to Western thought, hence also to her science. As it became clear that there was not uniformity of thought in Christianity, it meant, ultimately, that Japan could separate Christianity

from science. Thus Japan could select only those Western elements of culture that she desired. She chose what fitted in best with her own cultural predilections (Schwantes, 1953).

In choosing what fitted in with Japanese thought, the Japanese missed how deeply modern science was rooted in Western culture. Although eager to introduce the latest findings, she did not pay much attention to how these cohered with their original cultural environment. With the controversy over Darwinism, science became regarded generally as conflicting with Christianity. Some Western teachers taught science regardless of their religious convictions, while others disregarded the theory of evolution. For the most part, Japanese intellectuals preferred the former type and less religiously motivated Western teachers became more prevalent. Watanabe (1970) pointed out:

"In this peculiar period of intellectual history, science was consequently introduced into Japan all the more independently of the humanities and the religious aspect of the Western culture. Moreover, science was taught only in the scientific departments at government institutions. On the other hand, Christian institutions in Japan ... concentrated upon the teaching of humanistic phases of Western learning and did not include science as a major field. Consequently, the gap between scientific discipline and humanistic scholarship was there from the beginning, inherent to the Japanese academic world, and is now part of the more serious gap of the 'two cultures' of today" (p.136).

A second area in which Morse's introduction of evolutionary theory affected Japanese response was their application of his personalized version of it. Morse's own interpretation of Darwin's theory was much simpler than the original. His was a teleological view of nature. Watanabe (1970) recorded: "He sometimes did not bring transitional stages under careful consideration but related results too hastily to the supposed causes of evolution" (p.129). Tsukuba (1961) asserted that the teleological view of nature, which had been denounced by Darwin, was a reason for the

theory of evolution being accepted with ease in Japan. Morse was incautious in comparing plant and animal cases with those of mankind. Sato¹ (in Nakamura Teiri, 1965) asserted that the biologists in Japan accepted evolutionary theory within a mechanistic framework and were not able to discriminate between mankind and animals when they discussed the community or population of them. He concluded that the deviation from Darwin's theory in Japan was due to the social conditions of the time. The social applications of evolutionary theory at the time of its introduction to Japan have been noted.

Morse recommended Thomas Henry Huxley to succeed him as professor of zoology at Tokyo University, but because of failing health, Huxley declined. Watanabe (1970) felt, "Had he come, the whole story of evolution might have been different. Since Morse thus remained the major figure who introduced evolution to Japan, its effects (in science) were limited" (p.129). Instead, C.O. Whitman took over from Morse. He had only four students (Lillie, 1911), however, all of them later became professors of zoology at Tokyo University.²

The distortion and lack of general scientific interest in evolutionary theory in Japan at the end of the nineteenth century left the Japanese scientific community open to further distortions at a later date. The Minka (see p.304) was important in the scientists' movement to make science relevant to the people and to remove government controls on

1 Sato, S. (1963) 'Meiji no Shinkaron' (Theory of evolution in the Meiji era). In Bunmei, No.3, 25-38

2 I have been unable to find any reference to his teaching of evolutionary theory in Japan. Two of his students, Iwakawa Tomotaro and Ishikawa Chiyomatsu (who translated Morse's writing on evolution, see p.276) wrote somewhat biographic memoirs of Whitman (Lillie, 1911).

research just after the second world war. Their Marxist leanings made members of the group sympathetic to the Soviet Union and, in genetics, to the Lysenko theory (Nakamura Teiri, 1974). Their campaign to introduce and propagate Lysenko's theory was supported by progressive biologists as a 'methodological critique' of orthodox biology from the standpoint of dialectical materialism. Nakamura (1974) pointed out that:

"The delayed shock in Japan (over the Lysenko dispute) contrasts sharply with the instantaneous arousal of passions among biologists in Western countries, particularly Britain and the United States, which led eventually to censure of Soviet science by scientists' associations in the West" (p.259).

"It would seem, therefore," Nakamura (1974) said, "that the real reason lay in the differences between social conditions at that time in Britain and the United States on the one hand, and in Japan on the other" (p.259). Those conditions were the stifling control on Japanese research in those days and subsequent fear of criticizing the fetters placed on research in the Soviet Union which could be interpreted as criticism of the controls in Japan. With the lifting of those controls, studies in genetics could keep up with modern developments.

Evolutionary theory has a role in the general background of Japanese primatology, but it is not used in explanations for current behaviour of the monkeys. In other words, there is the assumption that animals have evolved to their present state, but the idea of the adaptiveness of behaviour is not used with any frequency as an explanation for present behaviour. Instead, sociological explanations are sought. The derivation of this approach is seen in the next chapter.

CHAPTER TEN

THE PHILOSOPHICAL BASIS FOR ANTHROPOMORPHISM IN JAPANESE PRIMATE STUDIES

10.1 Introduction

What constitutes the Japanese spirit in primatology has been alluded to in chapter six in the comments of Imanishi (1960a), Umesao (1960), Frisch (1963), and Sugiyama (1965b), but described in no great depth. By contrast, Kawai Masao (1969) devoted a chapter in his book, Nihonzaru no Seitai (Life of Japanese Monkeys) to describe and explain both the Japanese approach to primate behaviour and the Japanese attitude to animals, or spirit of study. His ideas are discussed in this chapter for the first time in an English translation of them. Several people have described the distinctive features of the Japanese method, i.e., provisionization, individual identification and long-term observation (e.g., Frisch, 1959, 1963; Imanishi, 1960a; Simonds, 1962; Sugiyama, 1965b). These features of the Japanese approach are a basis for the fourth - the kyokan or 'feel-one' method (Kawai, 1969). The kyokan method has not reached the English literature and yet, Kawai said, it is an important feature and the most striking aspect of Japanese primate studies. It is also, he maintained, the most difficult for (visiting) Westerners to understand. What these features represent to the Japanese primatologists will be discussed in the course of the chapter.

Another feature of many Japanese reports is an emphasis on the personality and 'culture' of, particularly, the Japanese macaque (Macaca

fuscata). The origin of the interest in monkey culture will be examined. Information for this is derived from a review of Imanishi Kinji's 'natural philosophy' and a paper by Imanishi (1957c) (translated here for the first time from the Japanese) in which he traced the thinking behind the introduction of the idea of 'the society of a species' (species) to the growth of interest in culture among monkeys.

Finally, Kawai (1969) noted that the Japanese approach developed on the basis of "feelings of unity with nature" (p.293). What this implies and how it may affect their approach to and final description of behaviour is examined.

10.2 The Japanese Primatologist's Viewpoint

In his book, Nihonzaru no Seitai, Kawai (1969) gave the title 'Ignored Treasure' to the first section of the chapter which describes 'The Study of Japanese Monkeys' (pp.285-295).¹ The treasure to which Kawai referred is knowledge of animals' personalities, social relationships, or way of life in the widest sense. He proceeded to show how the study of the natural life of animals has been ignored. Kawai wrote that, surprisingly, zoologists have not traditionally dealt with the question, 'What is the world of animals?' (p.285). Reproductive physiology, cytogenetics and other biological specialities, along with physics and chemistry, have contributed to unravelling the physical basis of life, but in these sciences only a particular aspect of the physical make-up is considered and not the whole animal.

Kawai noted that at the other extreme, ecology, or the study of animals' habits and their relationship to the environment, which might be thought to satisfy a nonspecialist's curiosity about animal life, again uses an essentially experimental approach with most studies being made on the more easily managed insects, and results are directed

¹ Paraphrased from the Japanese.

more toward the specialist than to the interested layman.

In universities, the naturalistic study of animals is not, according to Kawai, considered rigorous enough to be academical. Although many excellent studies of insects, fish and birds have been made by amateur and professional scientists, there are comparatively few serious studies about the life of mammals. There is the same lack of interest in the behaviour of animals in zoos where, though a lot of thought and effort goes into the exhibition of animals, few zoologists are involved. Most scientists there, noted Kawai, are veterinarians who restrict their attention to the health requirements of the animals. The same trend is apparent in animal psychology in which mainly problems of perception are investigated. There is almost no research into the 'personality' of animals. Most of that sort of description is found in fables.

Kawai mentioned that in some popular Western books on animal life the emotional side of the animals is included only in descriptions of their interaction with man, such as enmity or friendship between hunters and animals. Stories that personify animals, while giving some suggestion of the life of animals, are to Kawai of little value scientifically as they are products of the imagination.

The same can be said of our knowledge of domestic animals which live in such close proximity to man. We believe that we understand domestic animals very well; however, many excellent books written about pets, as may be expected, describe only the relationship between man and animals and not the animals' natural life. However, Kawai stated, "They have their own social relationships and people can be deceived into thinking that their behaviour vis-à-vis man is all there is to know about their life. It is astonishing that given the level of sophistication science has reached, we still do not know about the life of animals that have lived near us for so long" (pp.286-7).

Kawai noted that in elementary school, observations of nature plays an important role in education, but by middle and high school, it is no longer studied and does not even appear in text books. It is felt that natural observation of animals is not real scholarship. Thus, Kawai considered that the study of animals as expressed in various scientific or literary writings is not representative of the Japanese layman's concept of what constitutes the study of animal behaviour. He introduced the notion then of the scientific study of animal sociology which forms the subsequent section of the chapter headed 'Animal Sociology' (p.287).

Kawai noted that the West has a much longer tradition of natural history and that the first scientific study of animal sociology was done by a Westerner, Schjelderup-Ebbe in his study of 'pecking order' in chickens.¹ Pioneering field studies of primates were also done by Westerners and he mentioned Carpenter's (1934, 1935) and Bingham's (1932) studies of howler and spider monkeys and gorillas respectively. However, behavioural studies of wild animals stopped around 1940 (due mostly to World War Two). In the postwar period, Kawai said, animal sociology made its first reappearance in Japan.

It is mainly through primatology that the study of animal sociology in Japan has progressed and become acceptable to other academics. Kawai stated that ten years after the establishment of the Kyoto University Anthropology Research Group in 1952 the sociology of animal behaviour is found even in high school biology texts and nomenclature such as

¹ Schjelderup-Ebbe, Th. (1922) 'Beiträge zur Sozialpsychologie des Haushuhns'. Z. Psychol., 88, 225-52 (Contributions to the social psychology of (domestic) chickens).

'boss monkey' is now widely used. He wrote:

"Yet when the research was begun, the use of such terms as 'probationary leader' (bosuminarai) or 'daughter group' (musume-gumi)¹ was derided in conferences. However, we answered the sceptics by continuing our experiments and collection of data in spite of the criticisms" (p.288).

It is evident from Kawai's statement that for many Japanese scientists this way of talking about animals was at first unacceptable. This may have been a reflection of a predominantly 'hard' or westernized approach to science by this time. It also supports the view that this is an example of an individualistic approach being developed in a branch of science. As Umesao (1960) pointed out, those Japanese who studied primates, unlike most research in natural sciences, did not follow the tracks laid by American and European scientists and brought a traditional approach to the study. The pioneers of such individualistic groups tended to apply some aspects of a Western approach and some from their own tradition to create a unique approach of their own.

10.3 Features of the Japanese Methodology

The third section in Kawai's chapter is headed 'Methods and Unique Features of Research' (p.288). In it, he set out to answer "why the Japanese study of the natural life of monkeys ... has progressed remarkably beyond the achievements of the rest of the world" (p.288), and to outline its unique features. Although provisionization, individual identification and long-term observation have been described elsewhere, it is useful to assess these features from Kawai's viewpoint. Throughout his description of the Japanese features of primate research

¹ Musume also means 'young girls' (H. Kawakatsu, pers. comm.).

and the rationale behind them, he stressed the compatibility of the technique and spirit of modern science with the traditional Japanese outlook on nature. The great interest of Kawai's work is that these are brought together finally in the hitherto undescribed (in Western literature) fourth feature of Japanese primatology; that is, the kyokan or 'feel-one' method.

Frisch (1963) has pointed out that the feelings of closeness to nature may be reflected in certain aspects of the Japanese approach. For instance, he suggested that a feeling of sympathy with the animals may make the Japanese scientists consider that food provisioning is one element in the mutual relationship which has been established between the scientist and the monkeys (p.240). He also suggested that the success of the Japanese method of individual identification may be due to feelings of personal attachment to the monkeys (p.239). However, Kawai attributed a much more active role to the feelings of mutual relations with and personal attachment to the monkeys. For him, these relations are at the core of the Japanese studies and in part define the kyokan method. Thus, the empathy with the monkeys is not simply reflected in their approach, but arises from it. Kawai stated:

"The basis of the kyokan method is to distinguish among different monkeys (i.e., individual identification). The method develops from that point. Unless one feels the same interest in and attraction to monkeys' personalities as to humans', the kyokan method cannot be established" (p.293).

Kawai's discussion of the features of Japanese primatology establishes the background to the kyokan method. He first discussed provisionization,¹ saying that it should first be understood that close and detailed observation

1 For the meaning of 'provisionization' and 'provisioning', see footnote 2 on p.211.

of the monkeys was made possible by food provisioning which lured the wild monkeys from their mountain habitat. Provisioning not only made close observation possible, but also revolutionized research into animal life by paving the way for countless innovations in study methods. He continued, "As a scientist, I wish to emphasize that we introduced the experimental method into observation of natural behaviour" (p.228). In other words, by providing extra food, situations could be created to test for certain behaviours. Kawai maintained that provisioning added the technique and spirit of modern experimental science to simple observation. For instance, it was possible to analyze monkey society by appropriate manipulation of conditions such as using the 'orange test' to determine the linear hierarchy (p.288). In this now famous test, the rank of a monkey vis-à-vis another could be tested whereby an orange¹ or other desirable food was thrown between two monkeys. The dominant monkey would take the food while the subordinate sat by, not attempting to touch it. This was a simple but effective means of determining the relative ranks of two individuals.² Other experiments that could be carried out were those on the acquisition and propagation of a new (particularly eating) habit by members of a troop.³ This work was used in theories about subcultural traditions propagation.⁴

-
- 1 Itani (1954) first named this test. In subsequent tests, other food was used such as sweet potatoes and wheat. (Cited in Imanishi & Altmann, eds., 1965).
 - 2 A much more complex and sophisticated appreciation of the workings of group hierarchy through the interrelation of basic and dependent rank was developed by the Japanese and described in Kawai (1965a, 1965b) I & II and first published in Japanese in Primates (1958), vols. 1-2, 111-130 and 131-148.
 - 3 For instance, J. Itani (1965) On the acquisition and propagation of a new food habit in the troop of Japanese monkeys at Takasakiyama. In Imanishi & Altmann, eds., 52-65. (Originally published in Primates (1958) 1-2, 84-98.
 - 4 Kawamura S. (1959) The process of sub-culture propagation among Japanese macaques. Primates 2 (1), 43-60.

In his early publication bringing Japanese primatology to the notice of the West, Frisch (1959) remarked that there were problems in not knowing the effects of provisioning on natural behaviour. The attitude of some Western researchers can be appreciated through the comments of Hall and DeVore (1965) in their introduction to a study of olive baboons (Papio anubis) in Nairobi Park, Kenya. They wrote:

"Most of the behavior data we shall discuss were obtained by one or two observers, who worked at close range to the baboon group. A condition of neutrality between the observer and the animals was first achieved so that they were neither positively attracted toward the observer by the expectation of food, nor frightened of him, unless he introduced some marked change in their environment" (pp.53-4).

Kawai (1969) himself noted that,

"Many scientists in both Europe and America had misgivings about the effects of provisioning. It was unacceptable to those who felt that field research should be done without interfering with the natural behaviour of the animals" (p.288).

However, he defended provisioning by arguing that while it might be possible to observe some species of insects without manipulating natural conditions, little data can be obtained about wild animals without some aid to observation. In the mountains, the monkeys always run away from man. Furthermore, even if a person were to get close enough to observe a group of wild animals he would affect their natural behaviour as he would be an unusual presence among them. Unless a man can behave as though he were another monkey, he is bound to influence the monkeys' behaviour. In other words, the mere presence of an observer affects behaviour and is thus fundamentally no different from affecting behaviour through provisioning. Food provisioning is simply another device for observing behaviour in the field.

In his brief description of the rationale behind food provisioning, Kawai disclosed a consciousness of observer-effect on the monkeys. This reveals a supposition that man is mentally and physically apart from the monkeys.¹ It stands interestingly juxtaposed to his later development of the kyokan method whereby through an intense empathy with the monkeys there is a mutual communication between man and monkey: man fuses himself with the monkeys and feelings are mutually exchanged between man and monkey (pp.292-3).

The second feature of the Japanese approach is individual identification of the monkeys. Kawai said that this is accomplished by remembering the monkeys' faces and giving each a name. The process entails more than this however, and involves understanding the personality of each monkey. Kawai wrote:

"The realization that there are differences among individual animals is not new. But in other studies the individuals were mainly distinguished by physical characteristics. We rejected these neutral criteria and emphasized the need to establish the individuality and personality of Japanese monkeys. To understand the personality of each monkey, we need to consider not only its individual activities, but also its social and cultural background. Of course, it is only possible to describe the activities and social relations of particular monkeys once individuals are recognized. To understand a group, therefore, we must recognize that it is made up of individuals, but it should be clearly understood that the group is considered to be an organized society and the events in it are understood as social phenomena. This approach is a complete departure from population ecology and marks the beginnings of the study of biological sociology" (pp.289-90).

1 Imanishi (1965b) had some reservations about provisionization. He said that although it was indispensable for making individual identification, it restricted what data could be collected. Japanese primatologists did not feel it caused the disintegration of a troop, but that troop-oriented behaviour could be most clearly observed in the natural nomadic life in the forest (p.45). In view of the difficulties of observing monkeys in the forest, this would be accomplished by first provisionization and identification of the monkeys followed by driving them back into the forest.

Becoming familiar with monkeys' personalities as the basis for individual identification points to one source of specific anthropomorphism in the Japanese reports. Much of the descriptive terminology about the monkeys includes reference to their personality, such as being 'timid', 'brave', 'strict', 'adventurous', 'dignified', etcetera. The personality of monkeys is not merely descriptive however; it is part of a theory about the mechanics of troop leadership (i.e., gaining and securing the position of most dominant animal of a troop). Itani (1961) has suggested that for a leader to retain his position at all, a special psychological balance may be necessary and a loss of this balance, or 'confidence' may make it difficult for him to maintain his status. Also important to retaining dominance is the confidence of the females who make up the centre of the troop (Itani, 1961; Imanishi, 1965b, 41-3).

Kawai stated that the activities of individual monkeys are considered to be social phenomena and that individuals make up a group that is seen as an organized society. This appears to be a condensed version of Imanishi's (1957c) explanation of the Japanese primatologists' viewpoint. More particularly, Kawai's statement that this approach is a departure from population ecology and the beginning of biological sociology is expanded in Imanishi's original article. In 'Reicho-rui Kenkyu Group no Tachiba' (The standpoint of the Primates Research Group), Imanishi described how he became dissatisfied with the existing theory of ecology and formulated the idea of a society of species. He wrote:

"By that I meant a group of individuals of the same species, which fell between two concepts: i.e., the macroecology of the entire community of living things where the community is the unit, and the microecology with the individual as the unit.¹ A new unit found by the analysis of living things in nature is the society of members of the same species" (p.3).²

1 In the West, the distinction is made between synecology, or the ecology of communities (as opposed to individual species) and autecology or the ecology of individual species. There is not a microecology in Imanishi's sense of the ecology of an individual animal.

2 That is, in Western terms, autecology.

In the move from population ecology to biological sociology in Kawai's terms, 'society' is the key term. Rather than study the community of species or the individual animal vis-à-vis the environment, Imanishi advocated study of the social relations between members of a group ('specia') and the relations between different groups. Thus it was called sociology. Its development into 'socioanthropology' is described in section 10.5.

The third feature of Japanese research is long-term observation. By this Kawai meant several years continuous observation. In explaining what information the Japanese derive from this, he compared their study of the gorilla (Gorilla gorilla) to that of George Schaller (1963). Kawai (1969) wrote:

"Dr. George Schaller from the University of Wisconsin did a remarkable study of the wild mountain gorilla. He visited our Centre and when we announced that we were going to study the gorilla again he insistently assured us that the study of mountain gorillas was virtually complete. He, in common with most foreign scientists, did not really understand why Japanese primatologists have ten or more people studying Japanese monkeys over a period of more than ten years. To some it seems a ridiculous waste of time and labour.

"Social phenomena are variable and evolving. They change over time. This is not a new view of society. It is characteristic of social phenomena. Dr. Schaller's study of the gorilla gives details of such things as sleeping nests, food habits, individual activities, home range and so on. As far as those aspects are concerned his work is nearly perfect. However, we do not think that such phenomena are permanent or can be generalized about. It is at this point that our views diverge. We believe that even seemingly highly stable characteristics such as sleeping areas, food habits and so on tend to evolve or change over time and that it is the change itself and the process of the change that holds the key to understanding the life of animals. This applies also to social relationships" (p.290).

The Western zoologist is ultimately seeking to explain the biological function or adaptive advantage of behaviour that ensures the survival of the individual. It is important therefore to seek recurrent behaviour, to determine what is the 'norm' of the group.

A disturbance to normal conditions is useful for determining the biological function of that behaviour.

An example of this is found in Schaller's (1973) study of lions (Panthera leo) in the Serengeti, East Africa. He found evidence for what appeared to be the important social role (other than as procreator) of male lions living in a pride. The males of a pride rest for about twenty-one hours of the day and do less than 5% of the hunting. When lionesses make a kill, the males may eat everything and the females get nothing. If lions contributed nothing more than their part in procreation it would seem less costly in terms of the females' efficiency if the males lived separately and only joined the females for mating. (Males are quite capable of hunting for themselves as the nomadic male groups and solitary males prove). Schaller had seen little evidence of what else lions did for the pride except defend the integrity of the territory by roaring and chasing off strange males. However, even the territory was exclusive of strange males only so far as pride males were concerned; lionesses would accept them. Similarly, pride males would accept strange lionesses while pride females would not.

Then an unusual event occurred which put one pride Schaller was studying into a state of change and instability. Two prides lived quite near to each other. One morning, the males of one pride killed one of the two males of the other. Schaller described the results:

"His death had dramatic effects on both prides. Looking back at the incident and its consequences has helped me reach a deeper appreciation of the complexity of lion society. For, with the death of that male, the males from three other prides penetrated into his former territory even though his companion was still there ... Finally, two males of the Kamareshe pride, whose range adjoined that of the Seronera pride to the west, drove him out. I never saw him again. The lionesses suffered too. An unknown assailant pursued three cubs and one at a time bit them to death ... Another morning the Kamareshe males found three cubs hidden beneath a fallen tree and killed them. One male ate the viscera of a cub and the other carried one off with him like a trophy. I waited by the third cub for the return of its mother. At dusk she came. I was not certain what to expect, certainly not a wild expression of grief, but perhaps some sentiment. Instead she ate the cub ..." (p.79).

In this example of the results of the death of a pride male we have one social function the males serve made clear: they keep other males out who would otherwise kill the existing cubs (as has been seen in other instances of pride take-over). This too serves a biological function of ensuring that their offspring survive. An explanation of the reason for new males killing existing cubs (under eight months) is that females come into estrus shortly after losing their cubs instead of after the usual eighteen month interval between the birth of cubs that survive and the next estrus. The new males are thus able to mate and form a new pride almost immediately.

To return to non-human primates, in comparing intraspecific behaviour of different groups, the Western scientist seeks what is the natural or true tendency of the group. Where behaviour differs between groups, reasons for the difference are usually sought in environmental factors. In the final analysis, it is the probable norm of behaviour that is sought in primate ethology and speculation about its likely adaptive advantage is helped by observing change: i.e., the disruption and reassembling of the status quo.

The Japanese primatologists' interest in change, however, is not in its relevance to a genetically adaptive context (e.g. Andrews (?1977)), but to help them understand how the society of monkeys has attained its present form. Imanishi (1960a) mentioned that intraspecific comparison of behaviour could elucidate what is genetically and what culturally based behaviour, but the main interest is in the culture of non-human primates. Questions such as how the leader attains his position or how a new habit is transmitted through the group are major guideposts to understanding primate behaviour. How the present leaders attained their position can never be known, but observing the development of young monkeys over many years may reveal the likely history of the group and the mechanism for social change. Imanishi wrote: "Long-term observation may be the only possible method for intensive survey of societies of subhuman primates, for which neither interviews nor documents can be used by researchers" (1960a, p.394). Elsewhere, he wrote:

"We do not and cannot yet know how Jupiter and Titan became leaders at Takasakiyama, for example, because we have no way of knowing their past histories. All the data on existing infant monkeys and babies, however have been recorded by us since their birth. The continued observation of their development will some day surely reveal the whole aspect of the society of monkeys" (1965b, pp.44-5).

The development of Imanishi's approach can be traced first through a description of his natural philosophy and then its specific application in primate studies.

10.4 The Natural Philosophy of Imanishi Kinji

Imanishi Kinji was born in 1902 and was influenced by the education of the time which stressed learning foreign languages, and he studied Western philosophy. He enjoyed mountaineering and showed an early interest in collecting insects. He graduated from Kyoto University in

biology in 1928 and received a Doctor of Science from there in 1940. He published papers on animal behaviour, ecology and aquatic life in the mountain torrents of Japan.¹ His interest in mountaineering and study of behaviour of free-living animals remained part of his professional life. He led expeditions to Micronesia (1940), Inner Mongolia (1941), the Great Khingan (1942), Nepal (1952) and to Kashmir (1955) as manager of Kyoto University's expedition to the Great Karakorum Mountains. In 1958 he went to Africa (Imanishi, 1960a).

After being called up to fight in the second world war and thinking that he might not survive, he wrote his main ideas in a book, Seibutsu no Sekai (World of Living Things), published in 1941.² It was written spontaneously and quickly and contained the philosophy which had supported his biological work thus far and out of which his future work came. Ueyama Syunpei (1941), a professor of philosophy at Kyoto University, who wrote the epilogue to World of Living Things, judges Imanishi to be one of the few original thinkers in Japan since the Meiji Restoration. He said that although Imanishi's book is about biology, it is really a philosophical work and that no previous book had attempted to discuss the basis of biology in Japan.

Imanishi was the first of his generation in Japan to advocate the study of animals in their natural environment.³ With the possible exception of the honzōgaku naturalists of the Tokugawa era, people did not study nature as such; they noticed it, lived in harmony with it, but did not objectify it for study. Imanishi's long-term research was the ecology and sociology of plants, animals and man. He was totally against

1 Japanese Biographical Encyclopedia & Who's Who: 1964-65, 3rd ed.

2 KBS Bibliography of Standard Reference Books for Japanese Studies, vol.V-A, History of Thought. Part II.

3 Ueyama (1941).

the laboratory study of animals, which he saw as being the Western method. He understood Western studies of animals to be 'static', whereas he was interested in the dynamics of animal societies. Imanishi wrote an autobiographical essay called 'My Way' (Waga-Michi), the contents of which are very similar to what appears in his article 'The Standpoint of the Primates Research Group', published in Shizen (Imanishi, 1957c). In it, he related that the sight of a grasshopper on a leaf suddenly made him realize that the real life of animals is their life in their natural surroundings, not as a specimen in a laboratory or collector's box. He resolved then and there to abandon his collecting for his taxonomic work and to study the life or 'living' (biosociology) of animals. How far his thinking progressed in a sociological line for animals is evidenced by his appointment in 1960 as professor of social anthropology in the Research Unit of Humanistic Science at his old university.

Another of Imanishi's ideas, unique for his time, was the belief that everything living came from the 'one'.¹ All have a basic similarity, yet each individual is unique. Everything (plants, animals, inanimate things) fit in harmoniously with one another. Because monkeys are more similar to man than to other animals we can feel more at one with them. Although Imanishi had been very interested in evolutionary theory,² he was not interested in looking at past evidence for development of present form. He felt that everything exists now as it should be, that things are good in their present state. He felt that one could look at monkeys as they are today and gain some insight into how they used to be. This is developed in his Shizen paper (Imanishi, 1957c).

1 World of Living Creatures (1941).

2 Prehuman Societies (1951) offered a theory of evolution from sub-human society to human society. Gorilla (1960c) revised and extended this theory.

His scientific papers are collected in Logic of the Society of Living Things (1949).

Imanishi represents a philosophical tradition somewhere between the traditionalists and modernists in Japan. Traditionalists reject Western culture, but Imanishi learned Western languages, read Western philosophy and adapted what he found compatible with Japanese philosophy. Modernists have no Japanese roots, but took systems over from the West. Imanishi based his work and some ideas on Western science, yet retained a Japanese outlook. Nishida Kitarō was another representative of this mixed tradition.

10.5 Imanishi and the 'Society' of Monkeys

The development of their interest in the culture of Japanese macaques is explained by Imanishi (1957c). The term 'society' appears frequently in the Japanese reports, as the "society of subhuman primates" or the "society of monkeys" (for example, Imanishi 1965b, quoted on p.331). According to the first section of his article, called 'From Ecology to Sociology'¹, Imanishi felt some doubt about using the term 'society' in the 1950's. He suggested instead the word 'specia' to refer to the society of members of the same species.² The concept of a society of a species was developed to fill the lacuna, as Imanishi saw it, between the study of whole communities of species and that of the individual animal. He wrote: "The word 'society', however, was used by some to refer to only human society. Therefore I used the technical term 'specia' to refer to

1 Passages quoted from this article are translations from the Japanese.

2 The term 'specia' and another, 'oikia', were not taken up in the English literature (e.g., 'Comments' in Imanishi, 1960a). V. Reynolds (1976) wrote: "... as Japanese primatologists well know, some efforts were made to introduce specialist terminology into primate studies, e.g., the term 'oikia', drawing on non-English terms as these would hopefully avoid the ambiguity of lay English terms. But the effort has not, so far at least, had much success, and has seemingly been abandoned by the Japanese" (p.137). 'Specia' was not adopted into the literature either. Reynolds (1976) also mentioned that it was never made clear whether such terms as 'oikia' had an existing meaning in Japanese. As Imanishi's paper makes clear, 'specia' and 'oikia' were in fact technical neologisms.

the society of a species, and 'specion' to refer to an individual of the same 'specia'" (p.3). The study of the 'specia' or society of members of a species was a study of social relations among the members ('specions') of a group and between different 'specias' in an area. Imanishi (1957c) named this a theory of sociology:

"The reason I suggested a theory of sociology was that, contrary to the prevailing idea that the boundary between living things was determined by the inorganic elements of the environment, my copious observations in the field gave me the impression that the boundary was not determined by any physiological limit determined in an experiment, but by the social tension between neighbouring 'specias'. The encounter of two different 'specias' produces a boundary between their societies notwithstanding the possibility for a 'specion' to extend its own boundary (social limit). It is a 'line' of social tension which reflects the confrontation between two different 'specias'.

"The above assumption developed into a theory of sumiwake (i.e., each 'specia' lives separately): a 'specia' lives separately from others to avoid unnecessary disorder and confrontation. We could as well call it a theory of co-existence rather than of confrontation. The study of 'specia' involves, firstly, the relation between 'specions' within the 'specia' and secondly, the relation between 'specias' which constitute one synusia" (p.4).

In a 'specia', according to Imanishi, members can be either solitary or group-living. Even a solitary animal is a member of his 'specia':

"From our point of view, each individual animal, whether solitary or in a temporary or permanent group, cannot avoid being included in a 'specia', and is leading a life as a 'specion' within the 'specia'" (p.5).

Under the second section of his article, 'Definition of mure', Imanishi distinguished between two types of group life. One is the family which included members (e.g. infants) unable to live alone; the other is a mure, "... or group consisting of animals able to lead

1. Sumiwake ('inhabitant-segregation') has not entered the English literature, but contains the kernel of Imanishi's disagreement with Darwinian theory: that is, to look at the group rather than the individual, and stress on co-existence rather than individual competition.

a solitary life" (p.5).¹ Imanishi explained:

"A mure (a group of animals each of which is able to lead a solitary life) and a family (a group in which some animals are not able to live alone) cannot live together.² Thus, for instance, some birds leave the mure and enter a family life during the breeding season and when their offspring are mature enough to fend for themselves, all of them return to the mure life. The formation of the mure is not possible if the individual animals are not equally able to live alone. Monkeys or kangaroos which lead a permanent mure life can do so because adults can carry babies on their back, in their arms, or in a pouch" (p.5).

A mure itself can be one of two kinds. It can have members of equal abilities, as in grasshoppers and fish, or it can have members of unequal abilities (i.e., a hierarchy) as in horses, deer and monkeys. The difference lies in the presence of different age groups which persist over generations in the mure of, for instance, monkeys, whereas the mure of grasshoppers and fish, "... reproduces itself annually, but ceases to exist in each generation" (p.6). Imanishi wrote:

"In the case of the mure of grasshoppers and fish, each individual is required to have the ability to cope with everything in the course of its life. This is also true of an animal which does not form the mure with others. On the other hand, an animal which was born in the mure such as that of the monkey can learn essential things from the senior and carry out his social role corresponding to his status in the mure, even if he does not know how to survive when he is born. The ability to lead a solitary life is only required if he has to leave the mure" (p.6).

1 In contrast to 'specia' and 'oikia', mure is a Japanese word which means, in general, a 'group'. It is used of humans to mean a 'throng', 'crowd', 'multitude', etcetera, and of animals to mean a 'school', 'shoal' (of fish), 'herd', 'flock', etcetera. It can mean a 'cluster' or 'clump' of inanimate objects. (Shincho Kokugo-Jiten, 1965) (Jap. Dict.).

2 Imanishi revised this after studying monkeys and said that the mure of monkeys seemed to be an enlarged form of family, though not necessarily a development from a family (p.6).

In the section called 'Socio-Anthropological Method' in Imanishi's (1957c) paper, to distinguish between the mure of grasshoppers and fish and the mure of monkeys, Imanishi used the term 'oikia'. The mure of monkeys represents an 'oikia':

"'Oikia' is an independent entity which cannot be submerged into 'specia' or 'specion'. A solitary monkey which leaves the mure may be called a 'specion' (or member of the society of a species), but a monkey within the mure is a 'specion' or 'oikion' (or a member of the type of mure that has a hierarchy)" (p.7).

'Oikia' is a refinement of the concept of mure and although it was introduced into the English primate literature by Imanishi (1960a), it was not taken up by Western primatologists on the grounds that it obscured the real differences that existed in different groupings of non-human primates (see p.219).

Imanishi first adopted the method of individual identification in his study of semi-wild horses at Toi-cape. It was necessary to distinguish among the horses to reveal relations between horses within the mure and between mures. This observational method was carried over into the study of monkeys, though the monkeys had to be provisioned to keep them in view for identification.

The data the Japanese primatologists first wanted to collect about the 'oikia' of monkeys was on how the present stable social relationships among its members had been formed. Imanishi (1957c) wrote:

"We could never know what had happened in the past and so there was no alternative but to record all the details of events that took place within the mure. If we could identify all the monkeys, making such records would not be an impossible task and we could understand the process of attaining the status of boss once the present ones died and we could identify parents of newborn monkeys and so on. We had to patiently collect these records over a long period. We launched into writing a history of the monkeys which never leave records.

"In a sense this was a great undertaking. Apparently it was more than one scholar could do alone. However, this laid an indispensable groundwork which had to be done and continued" (p.7).

Here, then, is an explanation of Kawai's statement about why Japanese primatologists have ten or more people studying monkeys for more than ten years (1969, p.290).

The basis for the study of the culture of the monkey group arose through their discovery that the 'oikia' was a more closed entity (i.e., would not accept strangers, nor did members leave) than expected. Imanishi (1957c) wrote: "Since this 'oikia' was so consolidated, we thought that each 'oikia' must have its own characteristics" (p.7). This was shown to be so after studies of eleven different 'oikias' of monkeys. Some of the differences Imanishi cited between 'oikias' were in the number of boss monkeys, the existence of probationary boss-status monkeys and in the occurrence of baby-sitting by boss monkeys. Imanishi continued:

"Our aim is to understand how each mure leads its own life from all possible angles. At first we claimed that our approach was sociology, but now it is developing into socioanthropology. I must explain this below.

"If a monkey within a mure behaved only as a 'specion', every monkey within the other different mures should show the same type of behaviour. In actual fact, however, the behaviour of monkeys differs according to the mure to which they belong. This indicates that each monkey behaves as an 'oikion' of its mure. Therefore, the behaviour of the monkey cannot be purely instinctive, but what has been learned in the mure in which he was born. Henceforth, I will speak of two types of behaviour - instinctive and noninstinctive. I regarded the latter as cultural behaviour, following the terminology of human beings.

"Thus the difference between mures in terms of the behaviour of monkeys is the difference in culture among the mures. What we pursued were the cultural differences" (p.8).

Thus Imanishi had come full circle in his use of terms that refer to human behaviour. He initially invented the term 'specia' to avoid the term 'society' which, "... was used by some to refer only to human society" (p.3). Yet, after observing monkeys for several years, Imanishi moved from a study of animal sociology to what he considers socioanthropology:

i.e., "At first we claimed that our approach was sociology, but now it is developing into socioanthropology" (1957c, p.8). With that shift has come the use of human behaviour terminology even to the extent of talking about the culture of the monkeys. In the passage quoted above, he said he regards noninstinctive behaviour as cultural behaviour after the terminology of human beings. The underlying shift associated with the literal use of human behaviour terms is reinforced in his paper in the concluding section, 'Ten Years of Unswerving Loyalty'. In it, Imanishi (1957c) wrote:

"In that monkeys are called animals there has been a tendency to deal with them in the same way as with amoebas or grasshoppers, but there is nothing more unreasonable than this. It has been disregarded that monkeys resemble human beings more than they resemble other animals. The problems of culture and personality have come into focus because the research is about monkeys. For this point to be made clear we named our group the Primates Research Group. The Order Primates includes only human beings and monkeys and apes. Thus, the participation of not only zoologists but also anthropologists is required for the study of monkeys which are (like man) primates, so that the evolution from ape to man may be elucidated" (pp.8-9).

Thus, the point at which Western and Japanese views diverge regarding long-term observation (Kawai, 1969) can be clarified. Western primatologists sought what could be called the behavioural characteristics of a species (e.g., food habits, home range, form and content of social relationships among group members, etcetera) and determined the effects of the environment¹ on these characteristics both to show why they differed between groups and in order ultimately to speculate on their adaptive advantage to the species. Imanishi's followers on the other hand, did not consider even such characteristics as sleeping areas, food habits and so on to be stable or static. Their interest was based on the social (i.e., individual relationships)

¹ There has been considerable refinement on the factors that affect social relationships of course.

and cultural (i.e., how the present form of society has developed, based on social interaction and not adaptation for biological needs) aspects of individual groups of the same species (i.e., characteristics were expected to differ between groups).¹ An almost indefinite study or at least the life history of one generation of monkeys is necessary to answer the questions posed by this.

10.6 The Kyokan Method

Kawai (1969) described the fourth feature of the Japanese approach as the most striking feature of the Japanese method. In Japanese it is called the kyokan method which is rendered in English as 'feel-one', 'feel-together' or 'sympathetic' method. As some of the sense of the Japanese is lost in translation, rather than lose yet more in paraphrasing it, a sizable portion of the text of Kawai's explanation of the kyokan method is transcribed below. The context of the quotation is that Kawai has described his confusion in trying to distinguish for the first time among different monkeys in a group, despite his previous experience in distinguishing among rabbits. Kawai found that except for remembering some monkeys with a distinctive physical trait, such as a missing finger or a mole, he was "... utterly confused trying to distinguish among a shifting population of two hundred monkeys" (p.291). He said that Itani who was studying the group (at Takasakiyama) "... patiently pointed out the characteristics of the faces of the monkeys" (p.291):

"He described his impressions of their features and mentioned qualities such as a 'sneaky' face, a 'stupid' face and so on; however, I did not understand his meaning. I scrutinized the monkeys but whenever I finally began to recognize certain

¹ The idea of variability among groups of the same species came about later in the West after more than one study began to be done on particular species (e.g., Rowell, 1967).

monkeys, they would leave and different ones would appear" (p.291).

Kawai continued:

"I observed the monkeys for three days, and then suddenly it became easier to recognize individuals' faces. In short, I became attuned to the 'aura' ('atmosphere', in Japanese, fun'iki) of the monkeys. The world of rabbits which live on dry meadow grass is a simple one: the forested world of monkeys is variegated. The solution suddenly struck me.

"We do not recognize a person by a particular physical trait such as a mole on the face. We recognize him intuitively by our awareness of his whole personality. We recognize monkeys after a time in the same way. Becoming familiar with a group of monkeys, and learning about their various personalities, we come to be able to recognize different ones at a glance. The most important thing is to sense the 'aura' that is emitted by the monkeys through our presence among them.

"This is not illogical. By penetrating the group and sharing its living space, we come to sense the monkeys' 'aura'. Our eventual cognitive knowledge of individual monkeys may depend upon this emotional or intuitive awareness which is perhaps based on a natural empathy with the monkeys which comes through sharing the experience of simply being alive. It may sound far-fetched, but perhaps our intuition about animals is sensed by the old cortex rather than the new" (p.292).

This is made clearer by closer study of the concept fun'iki.

Fun'iki in Japanese means mood, aura or atmosphere. The general usage of fun'iki by the Japanese is exemplified in the phrase, sono ba no fun'iki, meaning, the atmosphere (mood, aura) of the frame. 'Frame' is the English translation for the Japanese ba. According to a sociologist, Nakane (1973), ba is an essential technical term in the analysis of Japanese society. By ba, Nakane means:

"... a locality, an institution or a particular relationship which binds a set of individuals into one group: in all cases it indicates a criterion which sets a boundary and gives a common basis to a set of individuals who are located or involved in it" (p.1).

The ba is a concept which is also used in physics to represent 'field' in English. Fun'iki is always accompanied by the ba, or fun'iki is what ba brings about. As such, they constitute one set. The ba is a frame of visible things, whereas the fun'iki is a spiritual frame, a frame of mind or invisible atmosphere which each ba gives rise to, creates, or brings about.¹ An example which highlights the distinction is the following: a third person coming into a room where two people are talking could change the fun'iki surrounding the people. The ba is the situation of two people talking (and a third joining in). The fun'iki is the mood or atmosphere that is built up by that particular association and interchange between the two people. This atmosphere may change completely on the arrival of someone else. It can be said that there is a fun'iki about inanimate things too, such as the fun'iki of a temple or a rock garden. Thus, the ba gives a more objective description, while the fun'iki gives a subjective description of the same surroundings.

In the passages quoted above, Kawai has not made a clear distinction between the fun'iki of the group of monkeys and the process of getting to know individual monkeys. When he said he became attuned to the monkeys' aura, he came to know the 'monkey essence' or the fun'iki of that particular group. His intuitive awareness of the monkey group allowed him to come to know individual personalities. He said it suddenly became easier to recognize individuals' faces once he became attuned to the atmosphere of the monkeys. In order to sense the aura of the group the primatologist must penetrate the group and share its living space. The ability to sense

1 H. Kawakatsu, personal communication, Oxford.

the monkey group's atmosphere, Kawai said, is perhaps based on a natural empathy with the monkeys which comes through sharing the experience of simply being alive. Knowledge of individuals comes latterly. This is also supported where he wrote: "Our eventual cognitive (i.e. new cortex) knowledge of individual monkeys may depend on this emotional ... awareness ..." (p.292). Kawai speculated that their intuition about animals may be sensed by the old cortex rather than the new; in other words, it is a more primitive, instinctive response to the monkeys.

Thus, in utilizing the kyokan method, three steps are involved. The first is becoming attuned to the fun'iki of the monkeys and the second is identifying individual monkeys. Once the monkey society has been penetrated and the aura (fun'iki) felt, one can begin to distinguish among different monkeys. Furthermore, to accomplish individual identification, it is helpful to think of the monkeys as though they were people. These are the necessary preliminaries to the third step, which is that of going beyond sensing the monkey group's aura to becoming fused with the monkeys' lives. Kawai wrote:

"The basis of the feel-one method is to distinguish among different monkeys. The method develops from that point. Unless one feels the same interest in and attraction to monkeys' personalities as to humans, the feel-one method cannot be established" (p.293).

"If people overheard primatologists talking about their subject there are few who would realize they were talking about monkeys and not people. How merrily they can 'gossip' about the monkeys. There is in fact very little problem with speaking about the monkeys as though they were people" (p.292).

The actual kyokan technique refers to the third stage of going beyond sensing the group's aura to becoming fused with the monkeys' lives where, through an intuitive channel, feelings are mutually exchanged. Kawai explained:

"We frequently say we understand how the monkeys felt about something ... Though we do not use words like 'feelings' in publications, we often do understand the monkeys' feelings very well. At one level we fuse ourselves with the monkeys' lives and through an intuitive channel where feelings are mutually exchanged between monkey and man, we can actually sense their lives. This we believe is the most striking feature of the Japanese method. It is what we call the kyokan or feel-one method" (pp.292-3).

Thus, the kyokan method takes the Japanese one step beyond sensing the group's aura to becoming fused with the monkeys' lives, where, through an intuitive channel, feelings are mutually exchanged. Kawai gave an example to make this clear. He wrote:

"Recently, a surprising experience made all this very clear to me. The social behaviour of adult male monkeys is essentially understood. By contrast, study of female monkeys was begun later and many aspects of their behaviour are still not understood. We had always found it more difficult to distinguish among females as we could not see any particular differences among them. However, a female researcher who joined our study could recognize individual females easily and understood their behaviour, personality and emotional life much better than that of male monkeys. I was very taken aback by this revelation. There were many puzzles about female behaviour and I revealed that I could analyze males' activities much more easily than those of females. Sometimes I was aggravated by such things as females taking advantage of their dependent rank¹ and activities like masturbation. The reason why the study of female monkeys has lagged behind is that the researchers have all been men. I had never before thought that female monkeys and women could immediately understand each other; but there has been some barrier between female monkeys and male observers. This revelation made me feel I had touched upon the essence of the feel-one method; at the same time I realized the importance of the phenomenon" (p.293).

1 For instance, in his description of an incident where females used their rank dependence on No.2 male to chase No.3 male off the feeding box, Kawai (1965b) said: "Of course No.3 had to get off, but he never forgot to chase and scatter these swaggering females that took advantage of the influence of the presence of No.2 male" (p.94). This adds another dimension to anthropomorphic terminology whereby even the primatologist's feelings about or reaction to the behaviour of the monkey is included in the description. This has occurred in Kawai's phrases, "swaggering females" and "took advantage of".

Here then, is a further insight into what is happening when feelings are mutually exchanged between monkey and man and the scientists 'sense' the monkeys' lives. What is understood or felt by the scientists is an empathy with the animals which is manifest, for example, by the fact that success of individual identification of the monkeys varied according to the gender of the scientist and observed monkeys. This may or may not simply be a function of the researcher's interests, i.e., a female observer may be more interested in the roles of female monkeys in a group, especially if this has not received much attention in the past. However, Kawai seems to imply something more than this is going on when he says he found it difficult to analyze females' activities, implying he had tried to observe them. Coupled with the empathy with the monkeys and indeed necessary to it, is a positive entering into the monkey group and a making of contact. Kawai further remarked:

"No doubt there are people who fundamentally disagree with this approach. It is easy to fall into personifying the monkeys and it is to be expected that we would be accused of nonobjectivity. Foreign scientists in particular oppose this method. In order to avoid disturbing the natural scene as far as possible they construct blinds, shutting themselves off from their subjects. Dr. Schaller's approach to studying gorillas was to interfere with them as little as possible. Western observers make great efforts not to disturb or influence the animals' activities" (p.293).¹

The Japanese feature of entering into the group is then linked with both the kyokan method and with the establishing of objectivity. Kawai continued:

1 Schaller (1963) does remark on precisely this aspect. He wrote: "If conditions were such that I was able to watch the gorillas clearly while remaining undetected by them, I chose this method, for their activity was then not affected by my proximity" (p.22), and "My technique of habituating the gorillas was simple, but essential, for I could only obtain unbiased data on their behavior if they remained relatively unaffected by my presence" (p.23).

"It is our view, however, that by positively entering the group, by making contact at some level, objectivity can be established. It is on this basis that the experimental method can be introduced into natural behaviour study and which makes a scientific analysis possible ... It is probably permissible to describe the method of the Primates Research Group as 'the new subjectivity'. This method is in clear opposition to the method hitherto employed by Europeans and Americans and is constructed on a uniquely Japanese mode of intellectual expression" (p.293).

The objectivity that results from making contact with the monkeys refers to the experimental manipulation of conditions made possible by this contact. While it is interesting that the Japanese primatologists stress that their method is thus scientific in the modern sense, it is the communicative aspect of making contact with the monkeys that is relevant to formulating a basis to their anthropomorphic description. In the relationship that is built up between the observers and the monkeys and in the reasons that that relationship is considered possible lies an important insight into the Japanese approach. In the passages quoted above, Kawai is not merely saying that the difference between Western and Japanese studies is that the Japanese enter the group whereas the Westerner attempts to remain unnoticed. Rather, he stresses the communicative contact with the monkeys and elaborates on it in his concluding section. This section called 'Feelings of Unity with Nature' explains the philosophical basis for the feeling of unity between man and nature which is a prerequisite for the kyokan method. Kawai (1969) wrote:

"In Japan, with its only very recent tradition of natural history, it is of great interest to consider the origins of the methodology used by the Primates Research Group. It is a unique method which grew on the basis of a Japanese view of nature and a Japanese manner of expression.

"As Dr. Umesao has already pointed out, the Japanese view has developed from something different from the Christian view of nature held by western Europeans. In western Europe, God, man and animals are treated as contrasts

and there is a clear break or discontinuity between them and assumptions of superiority and inferiority. Man cannot become God. If there is a heaven, the one that controls heaven is God. However, in Japan a man can become a god, for when he dies he can become a Buddha and join the company of gods. The messenger of Inari (god of harvests) is a fox. In the order between man, gods and the fox the connection is extremely ambiguous, or rather the connections are not established vertically but are linked horizontally.

"When Japanese children see an animal, they may throw stones at it and bully it. Westerners would point out that they lack a protective spirit for animals and are behaving immorally. But the behaviour has nothing to do with that kind of thing. Basically there is no great difference between that and the feelings of a naughty boy who bullies a weakling or an outsider. Between older and younger there is an order and however much a parent strikes a child it is allowable and feelings between parent and child are enacted normally. What we have here (in children bullying animals) is something like the feeling of unity and belonging in a family; it is a corporate feeling which includes animals. Because in the West animals are conceived to be in opposition to or as qualitatively different from people, feelings of pity may be borne towards them; the Western construct of an order for harmony is something that is conceived in opposition and implies superiority and inferiority. But the Japanese, in contrast, feel a continuity and unity with animals and, by extension, have feelings of possession of animals (in the same sense as parents possessing children): thus any of that kind of treatment of animals is permissible. In the child who strikes the dog there is no hatred or anger; what is at work is the feeling of viewing life as homogeneous.

"It is probably the case that the methods of the Primates Research Group came into being on the basis of feelings of unity and continuity with nature that the Japanese possess. The fact that they continue without wearying to observe Japanese monkeys cannot be explained simply by the impersonal relationship of observer and object or such things as stamina and hard work. Is it not necessary that a view of nature which stresses continuity is based upon a kind of continuum of blood?

"However much you explain this sympathetic (kyokan) method to foreign scientists, there is much they cannot understand. Even the rank test which should be very straightforward is difficult for Westerners. However, when one leads a foreigner into the monkey troop and actually puts the test into practice, they understand it immediately. Even among foreign scientists, people have appeared who have at last adopted the Japanese method, but very interestingly they are all women researchers. The sympathetic method in point

of having at its basis a delicate emotional impressibility and sensibility is diametrically opposite to the intellectual European and American method. The fact that the women researchers of Europe and America have begun to adopt the kyokan method is very interesting in the light of the preceding discussion" (pp. 293-5).

The chapter ends rather abruptly (for a Western reader) with that observation. Kawai does not name to which female Western researchers he is referring in the last few sentences, though Jane Goodall is a likely candidate. However, Kawai and Imanishi have raised several points on which to formulate a basis for the attribution of specific mental characteristics to monkeys (i.e., specific anthropomorphism) in Japanese primate studies.

10.7 Basis for Anthropomorphism in Japanese Studies

Imanishi's and Kawai's essays bring out two important factors relevant to the basis for anthropomorphism in Japanese primate studies. One is the kinds of questions posed by the monkeys' behaviour for the Japanese - 'personality' and 'culture' being starting points for a theory of monkey society. The second is the effect on description of the traditional assumptions of the unity of life and the affinity of man and animals which are put into practice through the kyokan method. Together, they create a psychological realm of discourse about the animals' behaviour.

As was mentioned (section 10.4), Imanishi's personal philosophy contains elements from both the Western and Japanese traditions. He was, for instance, the first of his generation to advocate naturalistic study of animals (Ueyama, 1941). As was pointed out in chapter eight, Japan had no tradition of objective study of nature and the observation of nature in honzōgaku was ultimately an aid to self-revelation. Thus, the idea of looking at nature rather than simply living harmoniously with it,

was inherited from the West. However, Imanishi's (1941) basic metaphysic was the Oriental idea that everything comes from the 'one'. Therefore, everything has a basic similarity. Imanishi felt that we can feel more at one with monkeys because they are more similar to man than to other animals: "... monkeys resemble human beings more than they resemble other animals. The problems of culture and personality have come into focus because the research is about monkeys" (1957c, p.8). There was not in this any emphasis on a biological (evolutionary) framework for study of behaviour. The only sense in which evolution was talked about was the elucidation of the evolution of culture or society from the subhuman to the human level through study of monkey culture (Itani, 1961; Imanishi, 1965a).

Imanishi developed his social theory about monkeys from his observation that boundaries between different groups of the same species were not determined by environmental factors, but by 'social tension'. Each 'specia' (society of members of a species) lives separately from other 'specia' to avoid unnecessary disorder and confrontation. (The 'specias' in other words, co-exist). The concept of the 'specia' was further refined into the concept of a mure which was a type of 'specia' consisting of individual animals able to live alone. Members of a mure could live either in a hierarchical relationship, as in monkeys, or all the members could be of equal ability, as in a shoal of fish. Imanishi called the hierarchical form of mure an 'oikia'.

Imanishi noted that each 'oikia' (group) of monkeys was closed (intolerant to strangers) and because this was so, each 'oikia' must have its own behavioural characteristics. The differences between 'oikias' were defined by Imanishi as differences in culture ('noninstinctive behaviour'). The thrust of the study of monkeys was to determine how each 'oikia' got its present form. Imanishi observed that as they could never know what

had happened in the past, they needed to extrapolate from present behaviour by keeping thorough records of behaviour over a long period of time. The aim was "... to understand how each mure ('oikia') leads its own life from all possible angles" (Imanishi, 1957c, p.8). He noted elsewhere (Imanishi, 1965b) that "... we think it necessary to grasp culture as a problem of the whole troop in full activity, that is, the function of culture is the behavior system of monkeys. In other words, the troop of monkeys is organized as the behavior system during the time all the monkeys, including infants, acquire culture" (p.47). To determine the process by which culture, or the traditions of the group, is acquired, was the rationale for application of anthropological and psychological theories to primate behaviour (as in Imanishi, 1965b).

Finally Imanishi (1957c) observed, "At first we claimed that our approach was sociology, but now it is developing into socioanthropology" (p.8). He also chose to use the term cultural behaviour for noninstinctive behaviour, "following the terminology of human beings" (p.8) and has changed to referring to the society of monkeys, rather than using 'oikia' to avoid the human term. In other words, there has been a deliberate change to use of terminology and theory as employed of human activities.

It is significant that both Kawai and Imanishi pointed out that anthropomorphic terminology was not at first acceptable to other Japanese zoologists. Imanisi (1957c) invented the term 'specia' so as to avoid the term 'society' "... which was used by some to refer only to human society" (p.3). Kawai (1969) reported that other zoologists did not accept the primatologists' terms: "... when the research was begun, the use of such terms as 'probationary leader' or 'daughter group' was

derided in conferences" (p.288). They also both made the point that the Primates Research Group is a unique group among zoologists.

Imanishi (1957c) said that they called themselves by that name in order to specify the restriction of their studies to the Order Primates:

"The problems of culture and personality have come into focus because the research is about monkeys. For this point to be made clear we named our group the Primates Research Group" (p.8). This implies they would not necessarily use this approach to study other species.

Similarly, Kawai (1969) stressed the uniqueness of the group in stating that "... it is probably permissible to describe the method of the Primates Research Group as 'the new subjectivity'" (p.293).

These comments imply that anthropomorphic description of animals could not be taken for granted by the primatologists, which suggests that a cultural background that might tolerate such description and would be common to all Japanese researchers is not the primary factor causing anthropomorphism. However, it is not without its effect, as Kawai's explanation of the kyokan method reveals.

Kawai (1969) said he did not at first understand Itani's method of distinguishing among a large number of monkeys: "He described his impressions of their features and mentioned qualities such as a 'sneaky' face, a 'stupid' face, and so on; however, I did not understand his meaning" (p.291). This means that Kawai was unable to do it at first. His finding it easier to recognize individual monkeys after a few days is a familiar experience to Western and Japanese observers alike. Kawai, however, described the basis for that familiarity with the monkeys in Japanese terms. He explained that the communicative contact with the monkeys that constitutes the kyokan method is based upon traditional Japanese beliefs.

Kawai contrasted the Buddhist idea of an ambiguous order between gods, man and animals, to the Western assumption of a strict hierarchy between them. He characterized the connections between them as 'horizontal' for the Japanese (a man can become a god or an animal in a future life) and as 'vertical' for Westerners. In his example of the respective reactions to children bullying an animal in Japan and in the West, Kawai noted that the Japanese would not consider the children to be behaving immorally, but as treating the animals in much the same way as they would behave toward a weakling or an outsider: "Between older and younger there is an order and however much a parent strikes a child it is allowable and feelings between parent and child are enacted normally. What we have here (in children bullying animals) is something like the feeling of unity and belonging in a family; it is a corporate feeling which includes animals" (p.294). The unity of animals and man is seen in the absence of a qualitative difference between them. Kawai noted that Westerners would consider bullying animals immoral and that the children would be thought to "lack a protective spirit for animals" (p.194). (This is the Western notion of man as vicegerent of God. Man should be kind to animals because he is superior).

There are other sources for the idea of the unity of man and animals in Japanese tradition. McMullen¹ noted that in Confucian thought there is a continuum with animals, but a hierarchy within that. There is no idea of 'special creation' as there was in the West; monkeys and other animals are on a continuum with man. Man is the higher creature because the ether (ki) is clearer in him. There is possibly a special relation with monkeys as they are closer to man; a monkey's ether is clearer than

¹ Personal communication, Oxford, 10 November, 1980.

in other animals. Despite the continuum, the Japanese are quite cruel to animals and to disabled people. In Buddhism, though compassion is preached, there is also the idea that reincarnation as an animal or disabled person means that in one's past life one was not good and this is the 'punishment'. For this reason, animals and disabilities are seen as things not to be respected. It is different from the Western idea of the superiority of man, however. There, man is thought to be endowed with qualities by God and is qualitatively different from other things. In the Japanese viewpoint, the elements, ri and ki are the same, just proportioned differently in man and other animals.

Kawai gave as a reason for their prolonged interest in studying monkeys the strong feeling of unity with nature: "The fact that they continue without wearying to observe Japanese monkeys cannot be explained simply by the impersonal relationship of observer and object or such things as stamina and hard work. Is it not necessary that a view of nature which stresses continuity is based upon a kind of continuum of blood?" (p.294). The kyokan method is an emotional or intuitive awareness of the monkeys "which is perhaps based on a natural empathy with them" (p.292). "At one level we fuse ourselves with the monkeys' lives and through an intuitive channel where feelings are mutually exchanged between monkey and man, we can actually sense their lives" (pp.292-3). He suggested that the kyokan method developed out of a traditional Japanese view of nature and manner of expression: "It is probably the case that the methods of the Primates Research Group came into being on the basis of feelings of unity and continuity with nature that the Japanese possess" (p.294). It appears, however, that Imanishi's socioanthropological approach was worked out before the traditional cultural effects became evident (except in his assumption that everything comes from the 'one').

He advocated study of monkey culture on the basis of having made copious observations of their behaviour. He at first avoided applying human terms such as 'society' to monkeys. Most zoologists apparently felt that any naturalistic study of animals was not academical (Kawai, 1969). In other words, the approach of the Primates Research Group did not arise out of a traditional Japanese viewpoint; rather, it was a unique development in a branch of science. However, because Western science was imported to an existing Japanese approach to knowledge, the Japanese have not been restricted by the idea that there is only one way to do science. McMullen¹ remarked that 'science' as such in the Western sense is easy for the Japanese to understand, but there could well be the retention of an Oriental viewpoint in the study of primates because there is not the same feeling of distance between man and animals as in the West. Thus it seems that once Imanishi and his group launched the study of monkey culture, traditional views could be applied where it was natural to do so.

Kawai noted that because of their special relationship with animals, they understand the monkeys very well: "We frequently say we understand how the monkeys felt about something" (p.292). "If people overheard primatologists talking about their subject there are few who would realize they were talking about monkeys and not people... There is in fact very little problem with speaking about the monkeys as though they were people" (p.292). The belief that monkeys have specific mental states which they can understand and so describe, and its extension into personalities within a cultural context yields a specific anthropomorphism with application of words such as 'timid', 'brave', 'dignified', etcetera to monkeys.

1 Personal communication, Oxford.

Thus, the basis for anthropomorphism in these Japanese studies is suggested to lie in the stress on study of culture and personality in the monkeys, which presupposes a psychological realm of discourse, and in an empathetic relationship with the monkeys based on the traditional views of the unity of all life and being 'at one' with what is studied.

CHAPTER ELEVEN

SUMMARY AND CONCLUSIONS

This chapter summarizes the course of the whole investigation and discusses what conclusions may be drawn.

The original question, 'How does anthropomorphism arise in description of natural behaviour of non-human primates?', was divided into two questions: namely, 'How does anthropomorphism arise in Western primate studies?' and 'How does anthropomorphism arise in Japanese primate studies?'. This bifurcation was found necessary due to fundamental differences of approach to primate field studies between Japanese and Western researchers. Those differences were initially noted in the metaphorical¹ use of anthropomorphic terms in most Western reports and an apparently literal use of them in many Japanese reports. Thus the focus of the study, anthropomorphism in primate studies, incidentally provided a means by which to clarify and identify some of the characteristics that give Japanese primate studies a vaguely apprehended 'different quality' from Western studies. Those characteristics necessitated an investigation into Japanese intellectual history to determine the basis for the Japanese researchers' use of anthropomorphism. The basis for anthropomorphism in Western studies

¹ This term is used advisedly here. When the distinction was made between Western and Japanese use of anthropomorphic terms, metaphor as a basis for anthropomorphism in Western reports was not yet determined.

was sought through study of the nature of language and in particular the use of terms in common use for man requiring re-definition for reference to animals.

Part One focused on the Western basis for anthropomorphism. A reason for the attempt to avoid anthropomorphism by most Westerners was found to be the deeply ingrained Christian belief in the separateness of man and animals. The more immediate intellectual background to Western primate studies was traced through the development of comparative psychology and ethology and then of primatology itself. A more precise formulation of the Western inquiry was developed through discussion of various arguments about anthropomorphism and the distinction between generic and specific anthropomorphism. The notion of 'ordinary language' terms was explained and it was pointed out that they make up the bulk of the descriptive vocabulary of primate behaviour studies. Problems with the use of ordinary language terms that have been considered by primatologists were reviewed and it was noted that general terminological problems have not received much attention in primatology and anthropomorphism even less so. Early and classical ethological studies (especially of birds) have been characterized as anthropomorphic, but that contention was shown to be a confusion between a subjective approach to study and the ascription of human subjective experiences to the animals. The relatively new subdiscipline, cognitive ethology, which seeks to objectively study 'mental experiences' in animals was described.

Western primatologists were shown on the whole to want to avoid specific anthropomorphism, or the ascription of particular mental states to animals. It was pointed out however, that the ascription of a general purposefulness (generic anthropomorphism) to animals occurred in any reports that used ordinary language terminology. Finally, the characteristic of language

use that gives rise to anthropomorphism in Western studies was identified as metaphor which affects the meaning of terms at the level of behaviour categories in an ongoing description of animal behaviour. It was noted that this aspect of language use is likely to occur in Japanese language descriptions too, but that cultural and methodological elements in the Japanese case appeared to be the basis of a more explicit use of anthropomorphism.

Part Two developed the argument that ever since Japan began to import Western scientific knowledge, she adapted that knowledge as far as possible to existing Japanese thought and retained elements of traditional ideas about man and nature to the present. The traditional view of nature was presented and the absence of the mind/body dichotomy in Japanese thinking was noted. Of particular interest for the analysis of Japanese primatology was the revelation that evolutionary theory was not understood in the same way by the Japanese as in the West and that it has not assumed the same importance as an explanatory framework for primate behaviour in Japan as it has in Western primatology. The methodology of the Japanese primatologists was discussed in some detail and the hitherto unpublished (in English) aspect of their approach (i.e., the kyokan method) was described. The application of the kyokan method to primate studies was seen to be an application of aspects of the traditional Japanese approach to nature. The origins of Imanishi Kinji's theoretical focus on culture and personality in non-human primates was traced and it was noted that it fulfills a similar function to that of evolutionary theory in the West as a general explanatory framework for primate behaviour. The basis for anthropomorphism in Japanese primate studies was concluded to lie in the use of a socioanthropological research framework and in the effect of traditional Japanese ideas of nature on their relationship with the monkeys.

The bases for anthropomorphism in Western and Japanese primate field studies are held to lie in, respectively, the phenomenon of metaphor and the study of culture and personality coupled with an empathetic relationship with the monkeys based on a traditional view of nature. This conclusion can now be considered in more detail with respect to evidence presented in the thesis.

It might be objected that the metaphorical use of ordinary language terms throughout a behaviour report does not give rise to anthropomorphism as long as the report is read in its biological (O-purposive /Purton, 1970/) context. As long as, for instance, 'appeasement' is discussed in terms of how the behaviour pattern aids the survival of the individual, how it compares with appeasement patterns in other species, how it evolved, and so on, we are out of the anthropomorphic realm. The notions of perception, purpose and motive are quite out of place here. It is only when the psychological realm (A-purposive /Purton, 1970/) is applied that the terms become anthropomorphic. This study has shown, firstly, that it is metaphor which makes it possible to apply the psychological context at all, and secondly, that this opportunity can prompt questions or generalizations about behaviour that are anthropomorphic. Examples are Simpson's (1973) set of questions:

"Does the frequency with which an individual chimpanzee grooms his fellows reflect 'his preferences among'¹ those individuals or is he often involved in grooming sessions because they 'chose' him and perhaps even demand grooming from him...?" (p.416),

or Hess's (1973) description of captive lowland gorillas (Gorilla gorilla): "Later on Stefi usually refrained¹ from entering the right-hand cage, limiting himself to the middle and the left-hand one" (p.511).

¹ My emphasis

The purposeful connotations are always present in ordinary language vocabulary because the everyday meaning of the terms is not lost through the primatologists' stipulated definitions. The source of the purposefulness is that ordinary language terms for social behaviour have most often been used to express human action. It is the ascription of this general purposefulness or general consciousness to the animals that characterizes generic anthropomorphism.

There appears to be only a vague notion of 'anthropomorphic licence' in primatologists' use of ordinary language terms. For instance, a term such as Hess's (1973) 'refrained' (quoted on the previous page) seems more anthropomorphic than a term such as 'greeted'. It is suggested here that these differences may be due to our familiarity with terms that commonly appear in primate behaviour reports. Terms such as 'threaten', 'submission', 'dominance', 'beg', 'chase', 'play', are so much a part of the literature that they do not jolt or surprise the reader. However, the fact that other terms, such as 'refrain', do surprise the reader is a reminder that the metaphorical process is constantly in the background and constantly implying the human reference of the terms.

The acceptance of many ordinary language terms in primate reports may not be only a matter of becoming used to their common recurrence. It may also be that primatologists have become practised in staying mentally within their stipulated definitions. Even so, terms read in an O-purposeful context may get connected with more unusual terms such as 'reconciliation' and 'consolation' (de Waal & van Roosmalen, 1979) and the links will be forged along the same lines as in human action (thus, 'appease' goes with 'threat'; 'submission' with 'dominance' and so on). In this way, the human referent serves as a heuristic aid

to formation of social theories in primatology. This incidentally shows that generic anthropomorphism need not be misleading - quite the contrary - the human action referent can provide a rich source of theories of social behaviour among primates.

Use of specific anthropomorphism, or description of particular emotions or thoughts in animals, is dependent on the breaking down of the Western objective of retaining a scientifically respectable distance from the object of study. It has been shown that this characteristic 'objectivity' was not part of Japan's intellectual tradition. There are examples of Western primatologists who employ specific anthropomorphism; for instance, Jane van Lawick-Goodall. In her 1971 book on chimpanzee behaviour van Lawick-Goodall noted that she had been surprised when Louis Leakey asked her if she would be willing to tackle a study of wild chimpanzees as she was unqualified to undertake a scientific study of animal behaviour. However, she said,

"Not only did he feel that a university training was unnecessary, but even that in some ways it might have been disadvantageous. He wanted someone with a mind uncluttered and unbiased by theory who would make the study for no other reason than a real desire for knowledge; and, in addition, someone with a sympathetic understanding of animals" (pp.19-20, my emphasis).

The much greater incidence of specific anthropomorphism in Japanese reports has been shown to arise through a socioanthropological approach and the retention of certain traditional ideas about man's relationship to the rest of nature. In the kyokan method, a mutual communication between the human observer and the monkeys is created. Specific thoughts and feelings are attributed to the monkeys and emotions and ploys of the animals are given human labels so that terms such as 'secret plot', 'timid', 'duty' and so on appear frequently in reports. This may be the reason why Japanese reports appear more anthropomorphic

than Western reports. Specific anthropomorphism is more noticeable than generic anthropomorphism.

The inquiry into the basis for anthropomorphism in Japanese reports revealed the following points. Traditional Japanese observation of nature in the Tokugawa period was not science as the West construes it, but a kind of self-revelation as a search for the Principle (ri) that is common to all things. The subsequent Meiji period heralded the beginning of a major importation of Western science to Japan. A reaction against it was expressed in the slogan tōyō dōtoku, seiyō geijutsu (Japanese ethics, Western technology) which referred to the retention of traditional Confucian ethics while learning Western technical skills. Thus, the Japanese 'spirit' in the Meiji period referred to a moral code. An important point that arose from the discussion of the introduction of Western science was that the Japanese did not absorb the philosophy behind the techniques of science and evidence for the retention of a Japanese outlook in science was seen in the formation of individualistic groups in science which utilized a mixture of elements from both traditions. Imanishi's approach to primate behaviour is an example of this mixed tradition. The Japanese 'spirit' to which Kawai referred in the approach of the Primates Research Group does not refer to a moral code, but to traditional Japanese ideas of the unity of all life and continuity between animals and man. The different bases for anthropomorphism in Western and Japanese primate reports are thus reflected in the predominant kind of anthropomorphism that appears in their reports - generic in Western reports and predominantly specific in the Japanese.

In general, it can be concluded that anthropomorphism of a generic kind is inevitable in primate studies as long as ordinary language terms are used to describe behaviour. The apparently 'more' anthropomorphic

descriptions of the Japanese Primates Research Group arise from a greater use of specific anthropomorphism in their reports.

The study has shown that despite superficial similarities in methods and goals, there are fundamental differences between Japanese and Western primatologists with respect to their intellectual heritages. So far as anthropomorphism is concerned, its being considered a terminological problem by many Western scientists stems from an intellectual heritage that has stressed the separateness of man and animals.

REFERENCES

- Adler, L.L. (1973) Contributions of C. Lloyd Morgan to comparative psychology. Ann. N.Y. Acad. Sci. 223 (1), 41-48.
- Agassiz, L. (1857) Essay on Classification. Boston: Little, Brown.
- Albrecht, H. & S.C. Dunnett (1971) Chimpanzees in Western Africa. München: R. Piper & Co.
- Altmann, J. (1974) Observational study of behavior: sampling methods. Behaviour 49, 227-267.
- Altmann, S.A. (1959) Field observations on a howling monkey society. J. Mammal. 40, 317-330.
- Altmann, S.A. (1962) A field study of the sociobiology of rhesus monkeys, Macaca mulatta. Ann. N.Y. Acad. Sci. 102, 338-435.
- Altmann, S.A. (1965) Sociobiology of rhesus monkeys. II. Stochastics of social communication. J. theor. Biol. 8, 490-522.
- Altmann, S.A. (Ed.) (1967) Social Communication Among Primates. Chicago & London: U. of Chicago Press.
- Altmann, S.A. (1968) Primates. Ch. 18 in Animal Communication. Ed. T.A. Sebeok. Indiana: Indiana U. Press.
- Andrews, D. (?1977) Infanticide among hanuman langurs. Zenith. Oxford University Science Magazine, 16-18.
- Antal, E. & J. Harthan (Eds.) (1971) Animals in Art and Thought to the End of the Middle Ages. London: Routledge & Kegan Paul.
- Aristotle (1910) Historia animalium. Transl. by D'Arcy Wentworth Thompson. Oxford: O.U.P.
- Armstrong, E.A. (1950) The nature and function of displacement activities. Symp. Soc. exp. Biol. 4, 361-384.
- Asquith, P.J. (1978) A suggestion for fixed criteria definitions of terms that describe the social organisation of non-human primates. In Recent Advances in Primatology, vol. 1. Eds. D.J. Chivers & J. Herbert. London: Academic, 201-204.
- Bachmann, C. & H. Kummer (1980) Male assessment of female choice in hamadryas baboons. Beh. Ecol. Sociobiol. 6, 315-321.
- Baelz, E. (1970) Baelz no Nikki. Part 1 (2). (Baelz's Diary). n.d.
- Barash, D. (1979) Sociobiology. The whisperings within. New York: Harper & Row.

- Barns, T.A. (1922) The wonderland of the Eastern Congo. London: G.P. Putnam's Sons.
- Barns, T.A. (1923) Across the great craterland to the Congo. London: Ernest Benn, Ltd.
- Barns, T.A. (1926) An African Eldorado: the Belgian Congo. London: Methuen & Co.
- Bateson, P.P.G & P.H. Klopfer (Eds.) (1973) Perspectives in Ethology. New York: Plenum Press.
- Beach, G.A. (1950) The snark was a boojum. Am. Psychol. 5, 113-127.
- Beer, C.G. (1963) Incubation and nest building behaviour in black-headed gulls III: the pre-laying period. Behaviour 21, 13-77.
- Beer, Th., Bethe, A. & J. von Uexküll (1899) Vorschläge zu einer objektivierenden Nomenklatur in der Physiologie des Nervensystems (A proposal for an objective nomenclature in the physiology of the nervous system). Biol. Zbl. XIX, 517-521.
- Beloff, J. (1973) Psychological Sciences. A Review of Modern Psychology. London: Crosby Lockwood Staples.
- Benn, A.W. (1908) Modern England. A record of opinion and action from the time of the French Revolution to the present day. Vol. 1. London: Watts & Co. 2 vols.
- Bester, J. (1965) Introduction. The Japanese Character. N. Hasegawa. Tokyo: Kokusai Bunka.
- Bierens de Haan, J.A. (1947) Animal psychology and the science of animal behaviour. Behaviour 1, 71-80.
- Bingham, H.C. (1927) Parental play of chimpanzees. J. Mammal. 8, 77-89.
- Bingham, H.C. (1928) Sex development in apes. Comp. Psychol. Monogr. 5, 1-165.
- Bingham, H.C. (1932) Gorillas in a native habitat. Carnegie Institution of Washington Publications. No. 426, 1-66.
- Black, M. (1962) Models and Metaphors. Studies in Language and Philosophy. Ithaca, New York: Cornell U. Press.
- Boas, G. (1933) The Happy Beast in French Thought of the Seventeenth Century. Baltimore: Johns Hopkins Press.
- Boffey, P.M. (1970a) Japan (I): On the threshold of an age of big science? Science 167, 31-35.
- Boffey, P.M. (1970b) Japan (III): Industrial research struggles to close the 'gap'. Science 167, 264-267.

- Bolwig, N. (1959) A study of the behaviour of the chacma baboon. Behaviour 14, 136-163.
- Bolwig, N. (1964) Facial expressions in primates and remarks on a parallel development in certain carnivores (a preliminary report on work in progress). Behaviour 22, 167-193.
- Bonnet, C. (1764) Contemplation de la nature. Amsterdam: M.-M. Rey.
- Boring, E.G. (1950) A History of Experimental Psychology. New York: Appleton-Century Crofts Inc. Second edition.
- Boulenger, E.G. (1936) Apes and Monkeys. London: Harrap.
- Bourlière, F. (1960) Comments. In K. Imanishi. Social organization of subhuman primates in their natural habitat. Curr. Anthropol. vol. 1, (5-6), 393-407. Comment on p. 402.
- Bourlière, F. (1961) Patterns of social grouping among wild primates. In Social Life of Early Man. Ed. S.L. Washburn. Chicago: Aldine, 1-10.
- Box, H.O. & A.G. Pook (1974) A quantitative method for studying behaviour in small groups of monkeys in captivity. Primates 15 (1), 101-105.
- Boyd, R. (1979) Metaphor and theory change: What is 'metaphor' a metaphor for? In Metaphor and Thought. Ed. A. Ortony. Cambridge: C.U.P., 356-408.
- Bradley, M.H. (1922) On the Gorilla Trail. London: Appleton & Co.
- Bramblett, C.A. (1976a) Patterns of Primate Behavior. California: Mayfield.
- Bramblett, C.A. (1976b) Ethology and primates: Some new directions for the 1970's. Am. Anthropol. 78 (3), 593-607.
- Brown, R. (1980) The first sentences of child and chimpanzee. In Speaking of Apes. Ed. T.A. Sebeok & J. Umiker-Sebeok. New York & London: Plenum Press, 85-101.
- Buffon, G.K.K. Comte de (1749-1803) Histoire naturelle, générale et particulière, avec la description du cabinet du roi par Buffon et Daubenton. Paris: De l'imprimerie royale. 44 vol. Trans. into Eng. by William Smellie. London: A. Strahan, 1791.
- Burbridge, B. (1928) Gorilla. London: Harrap & Co.
- Burchfield, R.W. (Ed.) (1976) A Supplement to the Oxford English Dictionary. vol. II. Oxford: Clarendon Press.
- Burrow, J.W. (Ed.) (1968) Darwin. The Origin of Species. Harmondsworth: Penguin.
- Callan, H. (1970) Ethology and Society: Towards an Anthropological View. Oxford: Clarendon.

- Campbell, L. (1964) Science in Japan. Science 143, 776-782.
- Camper, P. (1779) Account of the organs of speech of the orang outang. Philos. Trans. Lond. 69, 139-159.
- Cannon, H.G. (1957) What Lamarck really said. Proc. Linn. Soc. Lond. 168, 70-87.
- Carpenter, C.R. (1934) A field study of the behavior and social relations of howling monkeys (Alouatta palliata). Comp. Psychol. Monogr. 10 (2), 1-168.
- Carpenter, C.R. (1935) Behavior of red spider monkeys in Panama. J. Mammal. 5 (16) (3), 171-180.
- Carpenter, C.R. (1938) A survey of wild life conditions in Atjeh, North Sumatra, with special reference to the Orang-utan. Communications, Nr. 12, Amsterdam. Pp. 122-144 in Carpenter, 1964.
- Carpenter, C.R. (1940) A field study in Siam of the behavior and social relations of the gibbon (Hylobates lar). Comp. Psychol. Monogr. 16 (5), 1-212.
- Carpenter, C.R. (1942a) Sexual behavior of free ranging rhesus monkeys: specimens, procedures and behavioral characteristics of estrus. In Naturalistic Behavior of Nonhuman Primates. (1964). Pennsylvania: Penn. State U. Press, 289-317.
- Carpenter, C.R. (1942b) Sexual behavior of free ranging rhesus monkeys: periodicity of estrus, homosexual, auto-erotic and nonconformist behavior. In Naturalistic Behavior of Nonhuman Primates. (1964). Pennsylvania: Penn. State U. Press, 319-341.
- Carpenter, C.R. (1942c) Characteristics of social behavior in non-human primates. Trans. N.Y. Acad. Sci. 4 (8), 248-258.
- Carpenter, C.R. (1952) Social behavior of non-human primates. Colloques Internationaux du Centre National de la Recherche Scientifique. vol. 34, 227-246. Paris, Mars, 1950.
- Carpenter, C.R. (1960) Comments. In K. Imanishi. Social organization of subhuman primates in their natural habitat. Curr. Anthropol. vol. 1 (5-6), 393-407. Comment on pp. 402-403.
- Carpenter, C.R. (1962) Comments, problems and suggestions. Ann. N.Y. Acad. Sci. 102, 488-496.
- Carpenter, C.R. (1964) Naturalistic Behavior of Nonhuman Primates. Pennsylvania: Penn State U. Press.
- Carpenter, C.R. (1969) Introduction. In Proc. 2nd Int. Congr. Primat. Ed. C.R. Carpenter. vol. 1. London: Academic, xi-xiv.
- Caton, C.E. (Ed.) (1963) Philosophy and Ordinary Language. Urbana: U. of Illinois Press.
- Chamberlain, B.H. (1971) Japanese Things. Being Notes on Various Subjects Connected with Japan. Rutland, Vermont & Tokyo: Charles E. Tuttle Co. Reprint of fifth revised edition, 1905.

- Chambers, R. (1844) Vestiges of the Natural History of Creation. New York: Wiley & Putnam.
- Chamove, A.S. (1974) A new primate social behaviour category system. Primates 15 (1), 85-99.
- Chance, M.R.A. (1956) Social structure of a colony of Macaca mulatta. Br. J. Anim. Beh. 4, 1-13.
- Chance, M.R.A. (1960) Comments. In K. Imanishi. Social organization of subhuman primates in their natural habitat. Curr. Anthropol. (1), (5-6), 393-407. Comment on pp. 403-404.
- Chance, M.R.A. & A.P. Mead (1953) Social behaviour and primate evolution. Symp. Soc. exp. Biol. 7, 395-439.
- Chance, M.R.A. & C.J. Jolly (1970) Social Groups of Monkeys, Apes and Man. London: Jonathan Cape.
- Chauvin, R.A. (1971) Animal Societies from the Bee to the Gorilla. London: Sphere Books. Trans. G. Ordish. First published Paris: Plon, 1963.
- Colgan, P.W. (Ed.) (1978) Quantitative Ethology. New York: John Wiley & Son Ltd.
- Copernicus, N.T. (1543) De Revolutionibus Orbium Coelestium. Norimbergae, Apud Ioh. Petreium.
- Count, E.W. (1958) The biological basis of human sociality. Am. Anthropol. 60 (6), 1049-1085.
- Coxe, J.R. (1846) The Writings of Hippocrates and Galen. Epitomized from the original Latin translations. Philadelphia: Lindsay & Blakiston.
- Craig, A. (1965) Science and Confucianism in Tokugawa Japan. In Changing Japanese Attitudes Toward Modernization. Ed. Marius B. Jansen. New Jersey: Princeton U. Press, 133-160.
- Craig, W. (1909) The expressions of emotions in the pigeons: 1: The Blond Ring-Dove (Turtur risorius). J. Comp. Neurol. Psychol. 19, 29-80.
- Craig, W. (1918) Appetites and aversions as constituents of instincts. Biol. Bull. 34. Woods Hole, Mass, 91-107.
- Crook, J.H. (Ed.) (1970) Social Behaviour in Birds and Mammals: Essays on the Social Ethology of Animals and Man. New York: Academic.
- Crook, J.H. & J.S. Gartlan (1966) On the evolution of primate societies. Nature 210 (June 18), 1200-1203.
- Cuvier, F. (1811) Description of an ourang outang; with observations on its intellectual faculties. Trans. of 1810 publ. Philos. Mag., 1st series, London 38, 188-199.

- Dahl, F. (1902) Die Ziele der Vergleichenden 'Ethologie' (The aims of comparative 'ethology'). Verh. der V. Zool.-Kongr. zu Berlin, V., 296-300.
- Dai-Nihon-Jinmei-Jiten (Japanese Who's Who) (1937). vol.3. Tokyo: Naigai-Shoseki Ltd.
- Dalton, J. (1802-1808) Foundations of the Atomic Theory. Edinburgh: Alembic Club reprints, no. 1, 1893.
- Darwin, C. (1859) On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life. London: J. Murray.
- Darwin, C. (1872) The Expression of the Emotions in Man and Animals. London: J. Murray.
- Darwin, E. (1794) Zoonomia, or the Laws of Organic Life. Dublin: P. Byrne & W. Jones; London: J. Johnson. vol. 1. Vol. 2 publ., 1976.
- Descartes, R. (1637) Discourse on the method of rightly directing one's reason and of seeking truth in the sciences. Leyde: I. Maire. Trans. from French by J. Veitch. Chicago: The Open Court Publ. Co.; London: K. Paul, Trench, Trübner & Co., 1910.
- Dethier, V.G. & E. Stellar (1961) Animal Behavior. New Jersey: Englewood Cliffs.
- De Vore, I. (Ed.) (1965) The Study of Primate Behavior. New York: Holt, Rinehart & Winston.
- Diderot, D. (1751-1765) Encyclopédie, ou dictionnaire raisonné des sciences. Paris: Briasson.
- Douglas - Hamilton, I. & O. (1975) Among the Elephants. London: Collins & Harvill.
- Durant, J. (in press) Innate character in animals and man: A perspective on the origins of ethology. In Biology, Medicine and Society, 1840-1940. Ed. C. Webster. Cambridge: C.U.P., 1981.
- Edwards, P. (Ed.) (1967) The Encyclopedia of Philosophy. vol. 1. New York: MacMillan & The Free Press; London: Collier & MacMillan Ltd.
- Eibl-Eibesfeldt, I. (1952) Nahrungserwerb und Beuteschema der Erdkröte (Bufo bufo L). Behaviour 4, 1-35.
- Eibl-Eibesfeldt, I. (1970) Ethology: The Biology of Behaviour. New York: Holt, Rinehart & Winston.
- Eibl-Eibesfeldt, I. (1971) Love and Hate. On the Natural History of Basic Behaviour Patterns. London: Methuen; New York: Holt, Rinehart & Winston. Trans. G. Strachan, 1972.
- Eisenberg, J.F., Muckenhirn, N.A. & R. Rudran (1972) The relation between ecology and social structure in primates. Science 176 (May), 863-874.

- Eliot, Sir Charles (1935) Japanese Buddhism. London: Edward Arnold & Co.
- Emlen, J.T. (1960) Comments. In K. Imanishi. Social organization of subhuman primates in their natural habitat. Curr. Anthropol. 1 (5-6), 393-407. Comment on pp. 404-405.
- Encyclopedia of Philosophy (1967) Ed. P. Edwards. Vol. 1. New York: MacMillan & The Free Press; London: Collier & MacMillan Ltd.
- Evans, R.I. (1975) Konrad Lorenz. The Man and His Ideas. New York & London: Harcourt Brace Jovanovich.
- Fabre, J.H. (1785) The Wonders of Instinct. Chapters in the Psychology of Insects. London: T.F. Unwin Ltd. Transl. by Alexander Teixeira de Mattos & Bernard Miall, 1918.
- Fairbank, J. McKay, D.C., Paauw, D.S., Pelzel, J.C., Reischauer, E.O., Schwartz, B.I., & Lien-Sheng Yang (1955) The influence of modern Western science and technology on Japan and China. Explorations in entrepreneurial history. VII (4), 189-204.
- Ferguson, A. (1767) An Essay on the History of Civil Society. Edinburgh: A. Kincaid & J. Bell; London: A. Millar & T. Caddell.
- Fernberger, S.W. (1928) False suggestion and the Piderit model. Am. J. Psychol. 40, 562-568.
- Flourens, P. (1864) Psychologie Comparée. Paris: Carnier frères.
- Foley, J.P. Jr. (1935) Judgment of facial expression of emotion in the chimpanzee. J. soc. Psychol. 6 (1), 31-67
- Fouts, R. (1973) Acquisition and testing of gestural signs in four young chimpanzees. Science 180, 978-980.
- Fox, R. (1967) Kinship and Marriage. Harmondsworth: Penguin.
- Fox, R. (Ed.) (1975) Biosocial Anthropology. London: Malaby Press Ltd.
- Frisch, J.E. (1959) Research on primate behavior in Japan. Am. Anthropol. 61 (4), 584-596.
- Frisch, J. (1963) Japan's contribution to modern anthropology. In Studies in Japanese Culture. Ed. J. Roggendorf. Tokyo: Sophia U., 225-244.
- Fukuzawa, Y. (1879) Minjo Isshin (Renovation of People's Conditions). In Nihon Kagaku-Gijutsu-Shi Taikei (History of Science and Technology in Japan). Ed. History of Science Society. Vol. 1, 489-491.
- Gallup, G.R. Jr. (1977) Self-recognition in primates; a comparative approach to the bidirectional properties of consciousness. Am. Psychol. 32 (5), 329-338.
- Garasse, Père (1624) La Doctrine Curieuse des Beaux Esprits de ce Temps ou Pretendus Tels ... Paris: Sebastien Chappelet.

- Gardner, B.T. & R.A. Gardner (1971) Two-way communication with an infant chimpanzee. In Behavior of Nonhuman Primates IV. Eds. A.M. Schrier & F. Stollnitz. New York: Academic, 117-184.
- Garner, R.L. (1896) Gorillas and Chimpanzees. London: Osgood.
- Geoffroy-Saint-Hilaire, E. (1798) Observations on the account of the supposed orang outang of the East Indies ... (J. Phys. Chim.). Philos. Mag. London, 1, 337-342.
- Geoffroy-Saint-Hilaire, I. (1854-1862) Histoire naturelle générale des règnes organiques. Paris: V. Masson. 3 vols.
- Geoffroy -Saint-Hilaire, I. (1858-1861) Description des mammifères, nouveaux ou imparfaitement connus de la collection du Muséum d'Histoire Naturelle ... Quatrième mémoire: Famille des singes. Deuxième supplément. Arch. Mus. Hist. nat. Paris 10, 1-102.
- Gesner, C. (1551) Historiae animalium vol. 1 De Quadrupedibus viviparus. Tigur (1602 edition, Francofurti).
- Giard, A.M. (1904) Controverses Transformistes. Paris: C. Naud.
- Gillispie, C.C. (1951) Genesis and Geology. Cambridge, Mass: Harvard U. Press.
- Gillispie, C.C. (1956) The formation of Lamarck's evolutionary theory. Arch. Int. d'Hist. Sci. 9, 323-338.
- Gillispie, C.C. (1959) Lamarck and Darwin in the history of science. In Forerunners of Darwin, 1745-1859. Eds. B. Glass, O. Temkin, W.L. Straus, Jr. Baltimore: Johns Hopkins Press, 265-291.
- Goodman, G.K. (1967) The Dutch Impact on Japan (1640-1853). Leiden: E.J. Brill.
- Gossett, T. (1963) Race: The History of an Idea in America. Dallas: Southern Methodist U. Press.
- Grant, E.C. (1969) Human facial expression. Man 4 (4), 525-536.
- Gray, P.H. (1962) Douglas Alexander Spalding: The first Experimental behaviourist. J. gen. Psychol. 67, 299-307.
- Gray, P.H. (1963a) The descriptive study of imprinting in birds from 1873-1953. J. gen Psychol. 68, 333-337.
- Gray, P.H. (1963b) The Morgan-Romanes Controversy. Proc. Montana Acad. Sci. 23, 225-230.
- Gray, P.H. (1967) Spalding and his influence on developmental behaviour. J. Hist. Behav. Sci. 3, 168-179.
- Gray, P.H. (1968) The early animal behaviourists: Prolegomenon to ethology. Isis 59, 372-383.
- Green, R. (1712) The Principles of Natural Philosophy. Cambridge: C.U.P.
- Griffin, D.R. (1976) The Question of Animal Awareness. Evolutionary Continuity of Mental Experience. New York: Rockefeller U. Press.

- Griffin, D.R. (1978) Prospects for a cognitive ethology. Behav. Brain Sci. 4, 527-538.
- Guyénot, E. (1941) Les sciences de la vie aux XVIIe et XVIIIe siècles. L'idée d'évolution. Paris: A. Michel.
- Haeckel, E. (1866) Generelle Morphologie der Organismen. Berlin: G. Reimer. 2 vols.
- Haeckel, E. (1905) The Evolution of Man. London: Watts. Trans. J. McCabe (From fifth edition).
- Hall, K.R.L. (1963) Some problems in the analysis and comparison of monkey and ape behavior. In Classification and Human Evolution. Ed. S.L. Washburn. New York: Wenner-Gren, 273-300.
- Hall, K.R.L. (1965) Experiment and quantification in the study of baboon behavior in its natural environment. In The Baboon in Medical Research. Ed. H. Vagtborg. Austin: U. of Texas Press, 29-42.
- Hall, K.R.L. & I. DeVore (1965) Baboon social behavior. In Primate Behavior. Field Studies of Monkeys and Apes. Ed. I. DeVore. New York: Holt, Rinehart & Winston, 53-110.
- Haller, M.H. (1963) Eugenics: Hereditarian Attitudes in American Thought. New Brunswick, N.J.: Rutgers U. Press.
- Hamilton, G.V.A. (1911) A study of trial and error reactions in mammals. J. Anim. Behav. 1, 33-66.
- Hamilton, G.V.A. (1914) A study of sexual tendencies in monkeys and baboons. J. Anim. Behav. 4, 295-318.
- Hamilton, G.V.A. (1916) A study of perseverance reactions in primates and rodents. Behav. Monogr. 3, 1-65.
- Hamlyn, D.W. (1953) Behaviour. Philosophy 28, 132-145.
- Hamlyn, D.W. (1964) Causality and human behaviour. Arist. Soc. Supp. vol. 38, 125-142.
- Hanno (1912) The Periplus of Hanno; a voyage of discovery down the West African coast, by a Carthaginian admiral of the fifth century B.C. Philadelphia: Commercial Museum. Trans. W.H. Schoff.
- Harre, R. & P.F. Secord (1972) The Explanation of Social Behaviour. Oxford: Basil Blackwell.
- Harrisson, B. (1962) Orang-Utan. London: Collins.
- Hartley, D. (1749) Observations on Man. London: J. Johnson. 2 vols., 1791. (Vol. 1, section VII. Of the intellectual faculties of brutes).
- Hasegawa, N. (1935) Educational and Cultural Background of the Japanese People. Tokyo: Kokusai Bunka Shinko Kai (Society for international cultural relations). Trans. S. Sakabe.

- Hasegawa, N. (1965) The Japanese Character. Tokyo. Trans. J. Bester. Published London: Ward Lock & Co., 1966. First edition, 1938.
- Hastings, H. (1936) Man and Beast in French Thought of the Eighteenth Century. Baltimore: The Johns Hopkins Press.
- Hayes, C. (1952) The Ape in Our House. New York: Harper & Bros.
- Hayes, K.J. & C.H. Hayes (1951) The intellectual development of a home-raised chimpanzee. Proc. Am. phil. Soc. 95, 105-109.
- Hayes, K.J. & C.H. Nissen (1971) Higher mental functions of a home-raised chimpanzee. In Behavior of Nonhuman Primates IV. Eds. A.M. Schrier & F. Stollnitz. New York: Academic, 60-115.
- Hediger, H. (1968) The Psychology and Behaviour of Animals in Zoos and Circuses. London: Constable & Co., Ltd. First edition, 1955.
- Heinroth, K. (1971) Oskar Heinroth. Vater der Verhaltensforschung, 1871-1945. Stuttgart: Wissenschaftliche Verlagsgesellschaft.
- Heinroth, O. (1911) Beiträge zur Biologie, namentlich Ethologie und Psychologie der Anatiden. Verhandlungen des V Internationalen Ornithologen-Kongresses (1910) Berlin, 589-702.
- Heinroth, O. & K. Heinroth (1924-1933) Die Vögel Mitteleuropas, in allen Lebens - und Entwicklungsstufen photographisch aufgenommen und in ihrem Seelenleben bei der Aufzucht vom Ei ab beobachtet. 4 vols. Berlin: H. Bermühler.
- Herbert, J. (1967) Shintō. At the Fountain-Head of Japan. London: Allen & Unwin, Ltd.
- Hess, J.P. (1973) Some observations on the sexual behaviour of captive lowland gorillas (Gorilla g. gorilla, Savage and Wyman). In Comparative Ecology and Behaviour of Primates. Eds. R.P. Michael & J.H. Crook. London & New York: Academic, 507-581.
- Hess, L. (1954) Christine, the Baby Chimp. London: G. Bell & Sons Ltd.
- Heymer, A. (1977) Ethological Dictionary. Berlin & Hamburg: Verlag Paul Parey.
- Hinde, R.A. (1956) Ethological models and the concept of drive. Br. J. Phil. Sci 6, 321-331
- Hinde, R.A. (1960) Energy models of motivation. Symp. Soc. exp. Biol. 14, 199-213.
- Hinde, R.A. (1970) Animal Behaviour. A Synthesis of Ethology and Comparative Psychology. New York & London: McGraw-Hill. Second edition. First edition, 1966.
- Hinde, R.A. (1973) On the design of check-sheets. Primates 14 (4), 393-406.
- Hinde, R.A. (1974) Biological Bases of Human Social Behaviour. London: McGraw-Hill.

- Hinde, R.A. (1978) Inter-individual relationships and group structure: introduction to a symposium. In Recent Advances in Primatology. vol. 1. Eds. D.J. Chivers & J. Herbert. London: Academic, 1-3.
- Hinde, R.A. & T.E. Rowell (1962) Communication by postures and facial expressions in the rhesus monkey (Macaca mulatta). Proc. Zool. Soc. Lond. 138, 1-21.
- Hirosige, Tetu (1965) The role of government in the development of science. Cahiers d'histoire mondiale IX. 2, 320-339.
- Holst, E. von (1954) Relations between the central nervous system and the peripheral organs. Br. J. Anim. Beh. 2, 89-94.
- Home, D. (1775) Sketches of the History of Man. Dublin: J. Williams. Vol. 1.
- Hooff, J.A.R.A.M., van (1967) The facial displays of the Catarrhine monkeys and apes. In Primate Ethology. Ed. D. Morris. London: Weidenfeld & Nicolson, 7-68.
- Hopf, S. (1972) Study of spontaneous behavior in squirrel monkey groups: observation techniques, recording devices, numerical evaluation and reliability tests. Folia Primat. 17, 363-388.
- Hopf, S., Hartmann-Wiesner, E., Kuhlmoegen, B. & S. Mayer (1974) The behavioral repertoire of the squirrel monkey (Saimiri). Folia Primat. 21, 225-249.
- Hornaday, W.T. (1922) The Minds and Manners of Wild Animals. New York: C. Scribner's Sons.
- Howard, H.E. (1920) Territory in Bird Life. London: J. Murray.
- Howard, H.E. (1929) An Introduction to the Study of Bird Behaviour. Cambridge: C.U.P.
- Howard, H.E. (1935) The Nature of a Bird's World. Cambridge: C.U.P.
- Howard, H.E. (1940) A Waterhen's Worlds. Cambridge: C.U.P.
- Hoyt, A.M. (1941) Toto and I: A Gorilla in the Family. Philadelphia: J.B. Lippincott Cp.
- Huber, E. (1931) Evolution of Facial Musculature and Facial Expression. Baltimore: Johns Hopkins.
- Hume, C.W. (1959) In praise of anthropomorphism. Anim. Beh. 7, 248-249.
- Hume, D. (1739-1740) Treatise of Human Nature. London: Selby-Bigg. 3 vols.
- Humphrey, N.K. (1977) Review of D. Griffin's The Question of Animal Awareness, 1976. Anim. Beh. 25 (2), 521-522.
- Hutt, S.J. & C. Hutt (1970) Direct Observation and Measurement of Behavior. Springfield, Ill.: Charles C. Thomas.

- Huxley, J.S. (1907) Habits of Birds. Edward Grey Institute of Field Ornithology, Oxford. Huxley Ms. Miscellaneous Item A.
- Huxley, J.S. (1914) The courtship-habits of the Great Crested Grebe (Podiceps cristatus), with an addition to the theory of sexual selection. Proc. Zool Soc. 35, 491-562.
- Huxley, J.S. (1916) Bird-watching and biological science. Auk 33, 142-161; 256-269.
- Huxley, J.S. (1923) Ils n'ont que de l'âme: An essay on bird-mind. In Essays of a Biologist. London: Chatto & Windus, 105-129.
- Huxley, J.S. (1930) Bird-Watching and Bird Behaviour. London: Chatto & Windus.
- Huxley, J.S. (1962) Higher and lower organization in evolution. J. Roy. Coll. Surgeons Edin. 7, 163-179.
- Huxley, J.S. (1968) The Courtship Habits of the Great Crested Grebe. London: Cape.
- Huxley, T.H. (1863) Evidence as to Man's Place in Nature. London & Edinburgh: Williams & Norgate.
- Huxley, T.H. (1894) Evolution and Ethics. Canada: MacMillan, 1911.
- van Iersel, J.J.A. & A.C. Bol (1958) Preening in two tern species. A study in displacement behaviour. Behaviour 13, 1-88.
- Ikeda, D. (1974) Buddhism: The Living Philosophy. Tokyo: The East Publications Inc. Second edition, 1976.
- Imanishi, K. (1941) Seibutsu no Sekai (World of Living Things). Tokyo: Kobunsha.
- Imanishi, K. (1949) Seibutsu shakai-no-ronri (Logic of the Society of Living Things). Tokyo: Mainichi-Shinbun-sha.
- Imanishi, K. (1950) Social Life of Semi-Wild Horses. Seibutsu no Shudan to Kankyō (Group and Environment of Living Creatures). Minka-Kagaku-bunkensho 23. Tokyo: Iwanami, 1-9.
- Imanishi, K. (1951) Prehuman Societies (Ningen Izen-no-shakai). Tokyo: Iwanami-Shoten.
- Imanishi, K. (1952) Evolution of the human characteristics. Man. Ed. K. Imanishi. Tokyo: Mainichi-Shinbun-sha, 36-94.
- Imanishi, K. (1955) Semi-wild horses in Toi-misaki. In Nihon Dobutsu-ki (Japanese Zoology) 1, 1-140. Tokyo: Kobunsha.
- Imanishi, K. (1956) Evolution of sex and society. Shiso (Thought) 10, 35-46.
- Imanishi, K. (1957a) Social behavior in Japanese monkeys, Macaca fuscata. Psychologia, Kyoto 1, 47-54.

- Imanishi, K. (1957b) Conservation of Japanese monkeys. Proc. & Pap. 6th Tech. Meet.: 71-72 International Union for the Conservation of Nature and Natural Resources.
- Imanishi, K. (1957c) Reicho-rui Kenkyu Group no Tachiba (The standpoint of the Primates Research Group). Shizen (Nature). 12 (2), 1-9.
- Imanishi, K. (1960a) Social organization of subhuman primates in their natural habitat. Curr. Anthropol. 1 (5-6), 393-407.
- Imanishi, K. (1960b) Bird, monkey and man - Is it possible to find a general theory to support identification? Jinbun Gakuho (Journal of Humanistic studies) 10, 1-24. Kyoto U.
- Imanishi, K. (1960c) Gorilla. Tokyo: Bungei-Shunju-Sha.
- Imanishi, K. (1963) Social behavior in Japanese monkeys, Macaca fuscata. In Primate Social Behavior. Ed. C.H. Southwick. New Jersey: D. van Nostrand Co., Inc., 68-81.
- Imanishi, K. (1965a) The origin of the human family: A primatological approach. In Japanese Monkeys. Eds. K. Imanishi & S.A. Altmann. Publ. by the editor, 113-140.
- Imanishi, K. (1965b) Identification: A process of socialization in the subhuman society of Macaca fuscata. In Japanese Monkeys. Eds. K. Imanishi & S.A. Altmann. Publ. by the editor, 30-51.
- Imanishi, K. & S.A. Altmann (Eds.) (1965) Japanese Monkeys. A Collection of Translations. Publ. by the editor.
- Itakura, K. & E. Yagi (1974) The Japanese research system and the establishment of the Institute of Physical and Chemical Research. In Science and Society in Modern Japan. Eds. S. Nakayama et al. Cambr., Mass.: M.I.T. Press, 158-198.
- Itani, J. (1954) Japanese Monkeys in Takasakiyama. In Nihon Dobutsuki (Japanese Zoology) II. Ed. K. Imanishi. Tokyo: Kobunsha. Also in K. Imanishi & S. Altmann, 1965, pp. 68, 85.
- Itani, J. (1957) Personality of Japanese monkeys. Iden 11 (1), 29-33. (Heredity).
- Itani, J. (1960) Life and society of anthropoid. In Life of Mankind. Ed. S. Izumi. Tokyo: Nakayama-shoten, 27-71.
- Itani, J. (1961) The society of Japanese monkeys. Japan Quarterly 8 (4), 421-430.
- Itani, J. (1965) On the acquisition and propagation of a new food habit in the troop of Japanese monkeys at Takasaki-yama. In Japanese Monkeys. Eds. K. Imanishi & S.A. Altmann. Publ. by the editor, 52-65.
- Itani, J. (1967) Editorial. Primates 8 (1), 89-90; (2), 187-188.
- Ito, Y. (1965) Terrestrial life and arboreal life. Monkeys and Apes. Eds. S. Kawamura & J. Itani, 49-69.
- Iwamoto, M. (1966) Intraspecific variations in the Japanese monkeys observed from dermatoglyphic and somatometrical aspects. Primates 7 (3), 400.

- James, W. (1890) Principles of Psychology. New York: Dover.
- Japanese Biographical Encyclopedia and Who's Who. (1964) Third edition.
- Jaynes, J. (1969) The historical origins of ethology and comparative psychology. Anim. Beh. 17, 601-606.
- Jennings, H.S. (1906) Behavior of the Lower Organisms. New York: The Columbia U. Press; London: MacMillan & Co.
- Jolly, C.J. (1970) The seed-eaters: A new model of hominid differentiation based on a baboon analogy. Man n.s. (5), 5-26.
- Joncich, G. (1968) The Sane Positivist. A Biography of E.L. Thorndike. Middletown, Conn.: Wesleyan U. Press.
- Kaibara E. (1911) Yamato honzō (Medicinal Herbs of Japan). In Ekken zenshū. vol. 6. Tokyo. First published 1710.
- Kai-Nihon-Jinmei-Jiten (Japanese Who's Who) (1937).
- Kalikow, T.J. (1975) History of Konrad Lorenz's ethological theory 1927-1939. Stud. Hist. Phil. Sci. 6, 333-341.
- Kalikow, T.J. (1976) Konrad Lorenz's ethological theory, 1939-1943: 'Explanations of human thinking, feeling and behaviour. Phil. Soc. Sci. 6, 15-34.
- Kasahara, K. (Ed.) (1966) Yosetsu Nihonshi-Nenpyo (Chronological table of Japanese history). Tokyo: Yamakawa.
- Kasahara, K. (1974) Chizu; Zuroku; Nenpyo Nihonshi (Geography, graphical and chronological table of Japanese history). Tokyo: Yamakawa.
- Katz, D. (1937) Animals and Men: Studies in Comparative Psychology. London: Longmans, Green.
- Kawade Shobō (1957) (1959) Nihon-Rekishi-Dai-Jiten (Dictionary of Japanese History). vols. 6, 19. Tokyo: Kawade Shobō.
- Kawade Shobō (1964) Nihon-Rekishi-Dai-Jiten (Dictionary of Japanese History). Supplement 16. Tokyo: Kawade Shobō.
- Kawai, M. (1965a) On the system of social ranks in a natural troop of Japanese monkeys: (I) Basic rank and dependent rank. In Japanese Monkeys. Eds. K. Imanishi & S.A. Altmann. Publ. by the editor, 66-86.
- Kawai, M. (1965b) On the system of social ranks in a natural troop of Japanese monkeys: (II) Ranking order as observed among the monkeys on and near the text box. In Japanese Monkeys. Eds. K. Imanishi & S.A. Altmann, Publ. by the editor, 87-104.
- Kawai, M. (1969) Nihonzaru no seitai (Life of Japanese Monkeys). Tokyo: Kawade-shohoshinsha.
- Kawamura, S. (1954) On a new type of learning habit which developed in a group of wild Japanese monkeys. Seibutsu-shinka 2 (1), 1-4. (Evolution of Living Things).

- Kawamura, S. (1959) The process of sub-culture propagation among Japanese macaques. Primates 2 (1), 43-60.
- Kawanaka, K. & T. Nishida (1975) Symp. 5th Congr. Int. Primat. Soc. Tokyo: Japan Science Press, 173-186.
- KBS Bibliography of Standard Reference Books for Japanese Studies. vol. V-A, Part 2. History of Thought.
- Keene, D. (Ed.) (1955) Anthology of Japanese Literature. New York: Grove Press.
- Kellogg, W.N. & L.A. Kellogg (1933) The Ape and the Child. New York: McGraw-Hill.
- Kennedy, J.S. (1954) Is modern ethology objective? Br. J. Anim. Beh. 2 (1), 12-19.
- Kidd, B. (1894) Social Evolution. London: MacMillan & Co.
- Klopfer P.H. & J.P. Hailman (1967) An Introduction to Animal Behavior: Ethology's First Century. New Jersey: Prentice-Hall Inc.
- Klüver, H. (1933) Behavior Mechanisms in Monkeys. Chicago: U. of Chicago Press.
- Köhler, W. (1925) The Mentality of Apes. London: Kegan Paul, Trench, Trubner & Co., Ltd.
- Kohts, N. (1921) Report of the Zoopsychological Laboratory of the Darwinian Museum (In Russian) Moscow.
- Kohts, N. (1928) Recherches sur l'intelligence du chimpanzé par la methode de 'choix d'après modèle'. J. Psych. nom. path. Paris, 25, 255-275.
- Kohts, N. (1935) Infant ape and human child. Sci. Mem. Mus. Darwinianum Moscow.
- Kondo, S., Kawai, M., Ehara, A. & S. Kawamura (Eds.) (1975) Symp. 5th Congr. Int. Primat. Soc. Nagoya, 1974. Tokyo: Japan Science Press.
- König, L. (1951) Beiträge zu einem Aktionssystem des Bienenfressers (Merops apiaster L). Z. Tierpsychol. 8, 169-210.
- Kortlandt, A. (1940) Eine Übersicht der angeborenen Verhaltensweisen des Mitteleuropäischen Kormorans (Phalacrocorax carbo sinensis (Shaw & Nodder)), ihre Funktion, ontogenetische Entwicklung und phylogenetische Herkunft. Arch. néerl. Zool. 4, 401-442.
- Kummer, H. (1957) Soziales Verhalten einer Mantelpaviangruppe. Bern: Huber.
- Kummer, H. (1971) Primate Societies. Chicago: Aldine.
- Laidler, K. (1980) The Talking Ape. London: Collins.
- Lamarck, J.B. (1809) Philosophie zoologique, ou exposition des considerations relatives à l'histoire naturelle des animaux. Paris: J.B. Baillière, Libraire.

- Lamarck, J.B. (1815) Histoire naturelle des animaux sans vertèbres. Paris: Verdière, Libraire.
- Lamarck, J.B. (1907) Discours d'ouverture (an VII, an X, an XI et 1806) Bull. Sci. de la France et de la Belgique. Ed. Giard. T. 40, Paris.
- Lamarck, J.B. (1914) Zoological Philosophy: An Exposition with regard to the Natural History of Animals. Trans. by Hugh Elliot. London: MacMillan.
- La Mettrie, Julien Offray de (1748) Man a Machine, wherein the several systems of philosophers, in respect to the soul of man are examined... London: G. Smith, 1750. Trans. from the French.
- Landrieu, M. (1909) Lamarck, le fondateur du transformisme; sa vie, son oeuvre. Paris: Soc. Zool.
- Lang, E.M. (1962) Goma the Baby Gorilla. London: Victor Gollancz.
- Lashley, K.S. (1938) The experimental analysis of instinctive behaviour. Psychol Rev. 45, 445-471.
- Lavoisier, A.L. (1789) Traité élémentaire de chymie ... Paris: Cuchet. 2 vols.
- Leibniz, G.W. von (1693) Discourse on Metaphysics. Chicago: The Open Court Publ. Co, 1902. Trans. G.R. Montgomery.
- Lenneberg, E.H. (1980) A world between us. In Speaking of Apes. Eds. T.A. Sebeok & J. Umiker-Sebeok. New York & London: Plenum Press, 71-83.
- Le Roy, C.-G. (1764) The Intelligence and Affectability of Animals from a Philosophic Point of View, with a Few Letters on Man. London: Chapman & Hall, 1870.
- Lillie, F.R. (1911) Charles Otis Whitman. Biographical Sketch. J. Morph. 22. Whitman Memorial Volume, xv-lxxvii.
- Linnaeus, C. (1735) Systema Naturae. Lugduni Batavorum, apud T. Haak.
- Lissman, H. (1932) Die Umwelt des Kampffisches (Betta splendens Regan). Z. vergl. Physiol. 18, 65-111.
- Lorenz, A. (1936) My Life and Work. The Search for a Lost Glove. New York & London: Charles Scribner's Sons.
- Lorenz, K. (1931) Beiträge zur Ethologie sozialer Corviden. J. Orn. Lpz 79, 67-127.
- Lorenz, K. (1935) Der Kumpan in der Umwelt des Vogels. J. Orn. Lpz 83, 137-214; 289-413.
- Lorenz, K. (1937) The establishment of the instinct concept. In Studies in Animal and Human Behaviour (1970) vol. 1, 259-315.
- Lorenz, K. (1938) A contribution to the comparative sociology of colonial nesting birds. Proc. 8th Int. Orn. Congr. Oxford: O.U.P.

- Lorenz, K. (1939) Vergleichende Verhaltensforschung. Zool Anz. Supp. 12, 69-102.
- Lorenz, K. (1941) Vergleichende Bewegungsstudien an Anatinen. J. Orn. Lpz. 89, 194-294.
- Lorenz, K. (1950) The comparative method in studying innate behaviour patterns. Symp. Soc. exp. Biol. 4, 221-268.
- Lorenz, K. (1952) King Solomon's Ring. New Light on Animal Ways. London: Methuen.
- Lorenz, K. (1956) The objectivist theory of instinct. In L'instinct dans le comportement des animaux et de l'homme. Ed. EP. Grassé. Paris: Masson, 51-76.
- Lorenz, K. (1966) On Agression. London: Methuen; New York: Harcourt, Brace & World.
- Lorenz, K. (1970) Studies in Animal and Human Behaviour. vol. 1. Cambridge, Mass.: Harvard U. Press.
- Lorenz, K. (1971) Studies in Animal and Human Behaviour. vol. 2. Cambridge, Mass.: Harvard U. Press.
- Lorenz, K. (1975) The fashionable fallacy of dispensing with description. In Konrad Lorenz. The Man and His Ideas. Ed. R.I. Evans. New York & London: Harcourt Brace Jovanovich, 152-180.
- Lorenz, K. & N. Tinbergen (1938) Taxis und Instinkthandlung in der Eirollbewegung der Graugans. Z. Tierpsychol. 2, 1-29.
- Lovejoy, A.O. (1936) The Great Chain of Being. Cambridge, Mass.: Harvard U. Press.
- Lovejoy, A.O. (1959) Buffon and the problem of species. In Forerunners of Darwin, 1745-1859. Eds. B. Glass, O. Temkin & W.L. Strauss, Jr. Baltimore, Johns Hopkins Press, 84-113.
- Lowenstein, O. (1964) Descartes, Mechanistic Biology and Animal Behaviour Anim. Beh. Supp. I (On learning and associated phenomena in universities) Presidential Address, 109-111.
- Lyell, C. (1835) Principles of Geology. London: J. Murray. Fourth edition. 2 vols.
- Macalister, A. (1871) On some points in the myology of the chimpanzee and others of the primates. Ann Mag. nat. Hist. 7, 341-351.
- McCann, C. (1928) Notes on the common Indian langur (Pithecus entellus). J. Bombay nat. Hist. Soc. 33 (1-2), 192-194.
- McClintock, M. (1981) Explaining Animal Social Behaviour: A Historical and Conceptual Analysis. PhD. Thesis, S.U.N.Y., Binghamton.
- McCloskey, M.A. (1964) Metaphors. Mind LXXIII, 215-233.
- McDougall, W. (1923) An Outline of Psychology. London: Methuen.

- MacKinnon, J. (1974) In Search of the Red Ape. London: Collins.
- Makkink, G.F. (1936) An attempt at an ethogram of the European avocet (Recurvirostra avosetta) with ethological and psychological remarks. Ardea 25, 1-60.
- Malthus, T.R. (1798) An Essay on the principle of population as it affects the future improvement of society. London: J. Johnson.
- Manning, A. (1967) An Introduction to Animal Behaviour. London: Edward Arnold.
- Marais, E. (1939) My Friends the Baboons. London: Blond & Briggs Ltd., 1975.
- Marais, E. (1969) The Soul of the Ape. London: Anthony Blond Ltd.
- Markino, Y. (1913) My Recollections and Reflections. London: Chatto & Windus.
- Marler, P. (1980) Primate vocalization: affective or symbolic. In Speaking of Apes. Eds. T.A. Sebeok & J. Umiker-Sebeok. New York & London: Plenum Press, 221-229.
- Marler, P.R. & W.J. Hamilton (1966) Mechanisms of Animal Behavior. New York: J. Wiley & Sons.
- Marsh, P. (1978) Aggro. The Illusion of Violence. London: J.M. Dent & Sons Ltd.
- Martin J. & R. Harré (in press) Metaphor in Science. In Metaphor. Ed. D.Miall. Cambridge: C.U.P., 1981.
- Martin, R.D. (1979) Book review of Primate Ecology: Problem-Oriented Field Studies. Ed. R.W. Sussman. New York: J. Wiley. In Primate Eye. Nov., 33-34.
- Maruyama, M. (1974) Studies in the Intellectual History of Tokugawa Japan. Princeton & Tokyo: Princeton U. Press, U. of Tokyo Press. Trans. M. Hane. First publ., 1952, Tokyo U. Press.
- Mason, W.A. (1978) Ontogeny of social systems. In Recent Advances in Primatology. vol. 1. Eds. D.J. Chivers & J. Herbert. London: Academic, 5-14.
- Matschie, P. (1903) Über einen Gorilla aus Deutsch-Ostafrika. Sitzber. Ges. naturf. Fr. Berl., 253-259.
- Maupertuis, Moreau de (Pierre Louis) (1750) Essai de philosophie morale. London: J. Brakstone.
- Maurus M. & H. Pruscha (1973) Classification of social signals in squirrel monkeys by means of cluster analysis. Behaviour 47 (1-2), 106-128.
- Maurus, M., Pruscha, H., Wiesner, E., & B. Geissler (1979) Categorization of behavioural repertoire with respect to communicative meaning of social signals. Z. Tierpsychol. 51, 48-57.
- Maynard Smith, J. (1975) The Theory of Evolution. Harmondsworth: Penguin. Third edition.

- Mayr, E. (1976) Evolution and the Diversity of Life. Selected Essays. Cambridge, Mass. & London: Belknap.
- Melden, A.I. (1961) Free Action. London: Routledge & Kegan Paul.
- Menzel, E.W. Jr. (1975) Natural language of young chimpanzees. New Scientist, Jan. 16, 127-130.
- Menzel, E.W. Jr. (1978) Implications of chimpanzee language-training experiments for primate field research - and vice versa. In Recent Advances in Primatology. vol.1. Eds. D.J. Chivers & J. Herbert. London, New York & San Francisco: Academic, 883-895.
- Michael, R.P. & J.H. Crook (Eds.) (1973) Comparative Ecology and Behaviour of Primates. London: Academic.
- Midgley, M. (1978) Beast and Man: The Roots of Human Nature. Hassocks, Sussex: The Harvester Press.
- Mill, J.S. (1843) Psychology and ethology. Ch. III from A System of Logic. Reprinted in Wayne Dennis, Readings in the History of Psychology (1948). New York: Appleton-Century-Crofts.
- Mischel, T. (Ed.) (1969) Human Action: Conceptual and Empirical Issues. New York: Academic.
- Miyadi, D. (1959) On some new habits and their propagation in Japanese monkey groups. Proc. 15th Int. Congr. Zool Lond., 860-875.
- Miyadi, D. (1961) Fission of Japanese macaque groups. Trop. Ecol. 2 (1-2), 77-83.
- Miyadi, D. (1964) Social life of Japanese monkeys. Science. 143, 783-786.
- Monboddo, J. Burnett, Lord (1773-1792) Of the Origin and Progress of Language. Edinburgh: A. Kincaid & W. Creech. 6 vols. Second revised edition, 1774.
- Monboddo, J. Burnett, Lord (1779-1799) Antient metaphysics, or the science of universals... Edinburgh: J. Balfour & Co. Vol. 3, 1784.
- Montaigne, Michel Eyquem de (1580) Essais. Bourdeaux. 2 vols. Third vol. added, 1588.
- Morgan, C. Lloyd (1894) An Introduction to Comparative Psychology. London: W. Scott Ltd.
- Morgan, C. Lloyd (1896) Habit and Instinct. London: Edward Arnold.
- Morgan, C. Lloyd (1900) Animal Behaviour. London: Edward Arnold.
- Morgan, C. Lloyd (1912) Instinct and Experience. London: Methuen; New York: MacMillan & Co.
- Morris, D. (1958) The Story of Congo. London: Batsford.
- Morris, D. (Ed.) (1967) Primate Ethology. London: Weidenfeld & Nicolson.

- Morsbach, H. (1977) An intensive 'triangular' study (Japan -U.S.A.-Europe) of sociopsychological variables. In Issues in cross-cultural research, Ed. L.L. Adler: Ann. N.Y. Acad Sci. 285, 221-226.
- Morse, E.S. (1936) Japan Day by Day. Tokyo: Kobunsha. 2 vols. First publ., 1877.
- Morse, E.S. (1972) Japanese Homes and Their Surroundings. Rutland, Vermont & Tokyo: Charles E. Tuttle Co.
- Morton W. Scott (1973) Japan: Its History and Culture. Newton Abbot, Devon: David & Charles (Publishers) Ltd.
- Nakamura, H. (1964) Ways of Thinking of Eastern Peoples: India-China-Tibet-Japan. Hawaii: East-West Centre Press.
- Nakamura, Takeshi (1965) The contribution of foreigners. Cahiers d'histoire mondiale. IX 2, 294-319.
- Nakamura, Teiri (1965) Studies of the history of biology recently published in Japan. Jap. Stud. Hist. Sci. 4, 60-75.
- Nakamura, Teiri (1974) Marxism and biology in Japan. In Science and Society in Modern Japan. Eds. S. Nakayama et al. Cambridge, Mass.: M.I.T. Press, 253-269.
- Nakane, Chie (1973) Japanese Society. Harmondsworth: Penguin. Revised edition.
- Nakayama, Shigeru (1965) The role played by universities in scientific and technological development in Japan. Cahiers d'histoire mondiale IX 2, 340-362.
- Nakayama, Shigeru (1974a) A history of universities: An overview. In Science and Society in Modern Japan. Eds. S. Nakayama, et al. Cambr., Mass.: M.I.T. Press, 72-80.
- Nakayama, Shigeru (1974b) Grass-roots geology: Ijiri Shōji and the Chidanken. In Science and Society in Modern Japan. Eds. S. Nakayama et al. Cambridge, Mass.: M.I.T. Press, 270-289.
- Nakayama, Shigeru (1974c) Beginnings of the Marxist approach to the history of science. In Science and Society in Modern Japan. Eds. S. Nakayama et al. Cambridge, Mass.: M.I.T. Press, 8-15.
- Nakayama, S. & N. Sivin (Eds.) (1973) Chinese Science. Explorations of an Ancient Tradition. Cambridge, Mass.: M.I.T. Press.
- Nakayama, S. Swain, D. & E. Yagi (Eds.) (1974) Science and Society in Modern Japan. Cambridge, Mass.: M.I.T. Press.
- Napier, J.R. & P.H. Napier (1967) A Handbook of Living Primates. London: Academic.
- Needham, R. (1975) Polythetic classification: Convergence and consequences. Man n.s. 10, 349-369.

- Newton, Sir Isaac (1687) Philosophiae naturalis principia mathematica. London: Jussu Societatis Regiae ad typis Josephi Streater. Prostat apud plures Bibliopolas. First published, 1686.
- Nishida, Kitarō (1958a) Intelligibility and the Philosophy of Nothingness. Tokyo: Maruzen Co., Ltd. Trans. R. Shinzinger in collaboration with I. Kōyama & T. Kojima.
- Nishida, K. (1958b) Problem of Japanese Culture. In Sources of the Japanese Tradition. Eds. R. Tsumoda et al. New York: Columbia U. Press, 857-872.
- Nishida, K. (1960) A Study of Good. Tokyo: Printing Bureau, Japanese Gov't. Trans. V.H. Viglielmo. First publ., 1911.
- Nissen, H.W. (1931) A field study of the chimpanzee. Observations of chimpanzee behavior and environment in western French Guinea. Comp. Psychol. Monogr. 8 (1), 1-122.
- Ogura, K. (1929) Kaikyū shakai no sanjutsu (Arithmetic in a class society). Shisō 1, Aug.
- Oka, K. (1974) Society for the study of materialism: Yuiken. In Science and Society in Modern Japan. Eds. S. Nakayama et al. Cambridge, Mass.: M.I.T. Press, 151-157.
- Owen, R. (1830) On the anatomy of the orang-utan (Symia satyrus L). Proc. Zool. Soc. Lond., 28-29.
- Owen, R. (1859) On the gorilla (Troglodytes gorilla, Sav.). Proc. Zool. Soc. Lond., 1-23.
- Oya, S. (1974) Reflections on the history of science in Japan. In Science and Society in Modern Japan. Eds. S. Nakayama et al. Cambridge, Mass.: M.I.T. Press, 57-71.
- Paine, T. (1791) Rights of Man: being an answer to Mr. Burke's attack on the French Revolution. London: J. Johnson.
- Paley, W. (1802) Natural Theology, or evidences of the existence and attributes of the Deity collected from the appearances of nature. London: R. Faulder.
- Passmore, J. (1974) Man's Responsibility for Nature. London: Gerald Duckworth & Co. Ltd.
- Patterson, F.G. (1978a) Conversations with a gorilla. National Geographic 154 (4), 438-465.
- Patterson, F.G. (1978b) The gestures of a gorilla: Sign language acquisition in another pongid species. Brain and Language 5, 72-97.
- Patterson, F.G. (1979) Linguistic capabilities of a lowland gorilla. In Language Intervention from Ape to Child. Eds. R.L. Schiefelbusch & J.H. Hollis. Baltimore: University Park, 325-356.

- Peckham, G.W. & E.G. Peckham (1889) Observations on sexual selection in spiders of the family Attidae. Occ. Pap Nat. Hist. Soc. of Wisconsin, 1 (Milwaukee), 1-60.
- Peckham, G.W. & E.G. Peckham (1905) Wasps, Social and Solitary. Boston & New York: Houghton, Mifflin & Co.
- Pelseneer, P. (1935) Essai d'Ethologie Zoologique d'après l'étude des Mollusques. Bruxelles: Palais des Académies.
- Peters, R.S. (1958) The Concept of Motivation. London: Routledge & Kegan Paul.
- Peterson, W.J. (1980) 'Chinese scientific philosophy' and some Chinese attitudes towards knowledge about the realm of heaven-and-earth. Past and Present 87 (May), 20-30.
- Pigafetta, F. (1591) A Report of the Kingdom of Congo, and of the surrounding countries; drawn out of the writings and discourses of the Portugese, Duarte Lopez. London: J. Murray, 1881. Trans. M. Hutchinson.
- Pope, A. (1787) An Essay on Man. London: J. Wenman.
- Popper, K.R. (1945) The Open Society and Its Enemies. London: Routledge & Kegan Paul.
- Popper, K.R. (1972) Objective Knowledge. Oxford: O.U.P.
- Portielje, A.F. (1928) Zur Ethologie bzw. Psychologie der Silbermöwe (Larus argentatus argentatus Pont.) Ardea 27, 112-149.
- Premack, D. (1971a) Language in a chimpanzee? Science 172, 808-822.
- Premack, D. (1971b) On the assessment of language competence in the chimpanzee. In Behavior of Nonhuman Primates, IV. Eds. A.M. Schrier & F. Stollnitz, New York: Academic, 186-228.
- Priestly, J. (1777) Disquisitions Relating to Matter and Spirit. London: J. Johnson.
- Pruscha, H. & M. Maurus (1973) A statistical method for the classification of behavior units occurring in primate communication. Behav. Biol. 2 (4), 511-516.
- Pruscha, H. & M. Maurus (1975) Classifying agonistic behavior patterns according to their function in the communication process. In Contemporary Primatology. Eds. S. Kondo, M. Kawai, A. Ehara. Basel: S. Karger, 245-253.
- Pruscha, H. & M. Maurus (1976) The communicative function of some agonistic behaviour patterns in squirrel monkeys: the relevance of social context. Behav. Ecol. Sociobiol. 1, 185-214.
- Purton, A.C. (1970) Philosophical Aspects of Explanation in Ethology. M. Phil. Thesis, London.
- Purton, A.C. (1978) Ethological categories of behaviour and some consequences of their conflation. Anim. Beh. 26, 653-670.

- Putnam, H. (1966) The analytic and the synthetic. In Minnesota Studies in the Philosophy of Science. vol.3, Eds. H. Feigl & G. Maxwell. Minneapolis: U. of Minnesota Press, 358-397.
- Quine, W.V. (1964) Word and Object. Cambridge, Mass.: M.I.T. Press.
- Ray, J. (1691) The Wisdom of God Manifested in the Works of the Creation. London: S. Smith.
- Ray, J. (1693) Synopsis methodica animalium quadrupedum et serpentini generis. London: S. Smith & B. Walford.
- Reischauer, E.O. (1963) Modernization in the nineteenth century: China and Japan. Japan Quarterly, X (3), 298-307.
- Reischauer, E.O. (1978) The Japanese. London: Belknap Press.
- Reynolds, V. (1961) Social life of a colony of rhesus monkeys (Macaca mulatta). Ph.D. Thesis, London University.
- Reynolds, V. (1966) Open groups in hominid evolution Man 1 (4), 441-452.
- Reynolds, V. (1967) The Apes. The Gorilla, Chimpanzee, Orangutan and Gibbon - Their History and Their World. London: Cassell.
- Reynolds, V. (1968) Kinship and the family in monkeys, apes and man. Man 3 (2), 209-223.
- Reynolds, V. (1976) The origins of a behavioural vocabulary: the case of the rhesus monkey. J. Theor. Soc. Beh., 105-142.
- Reynolds, V. (1980a) The Biology of Human Action. Oxford & San Francisco: W.H. Freeman & Co. Second edition.
- Reynolds, V. (1980b) The proper study of chumankind. TLS Aug.1, p.865.
- Richards, I.A. (1936) The Philosophy of Rhetoric. Oxford. O.U.P.
- Richards, R.J. (1974) The innate and the learned: The evolution of Konrad Lorenz's theory of instinct. Phil. Soc. Sci. 4, 111-133.
- Riddle, O. (Ed.) (1919) C.O. Whitman: Posthumous Works. Washington: Carnegie Instit. Publ. Vol. 3: The Behaviour of Pigeons.
- Robinet, J.B.R. (1768) De la nature. Amsterdam: E. van Harreveld Vol. 5 added in 1768.
- Robinson, R. (1972) Definition. Oxford: Clarendon Press. First Publ. 1954.
- Romanes, G.J. (1882) Animal Intelligence. London: Kegan Paul, Trench & Co.; New York: D. Appleton & Co.
- Romanes, G.J. (1883) Mental Evolution in Animals. London: Kegan Paul, Trench, & Co.

- Rousseau, J. -J. (1775) Discours sur l'origine et les fondements de l'inégalité parmi les hommes. Cambridge: C.U.P., 1941.
- Rowell, T. (1966) Forest living baboons in Uganda. J. Zool. Lond. 149, 344-364.
- Rowell, T.E. (1967) Variability in the social organization of primates In Primate Ethology. Ed. D. Morris. London: Weidenfeld & Nicolson, 219-235.
- Rowell, T.E. & R.A. Hinde (1962) Vocal communication by the rhesus monkey (Macaca mulatta). Proc. Zool. Soc. Lond. 138, 279-294.
- Rumbaugh, D.M., Gill, T.V. & E.C. von Glasersfeld (1973) Reading and sentence completion by a chimpanzee (Pan). Science 182, 731-733.
- Russell, B. (1961a) Theory of knowledge. In The Basic Writings of Bertrand Russell, 1903-1959. Eds. R.E. Egner & L.E. Denonn. London: Allen & Unwin, 225-234.
- Russell, B. (1961b) History of Western Philosophy. London: Allen & Unwin Ltd. Second edition.
- Russell, C. & W.M.S. Russell (1961) Human Behaviour. A New Approach. London: Andre Deutsch.
- Russell, C. & W.M.S. Russell (1968) Violence, Monkeys and Man. London, Melbourne & Toronto: MacMillan.
- Russell, W.M.S., Mead, A.P. & J.S. Hayes (1954) A basis for the quantitative study of the structure of behaviour. Behaviour 6 (3), 154-205.
- Saheki, M. (1966) Morphological study on the molar of the Japanese monkey. Primates 7 (3), 400.
- Sansom, G.B. (1950) The Western World and Japan. London: Cresset Press.
- Sansom, G.B. (1967) Japan in World History. Vancouver: U. of B.C. Publ. Centre.
- Savage, T.S. (1847) Notice of the external character and habits of a new species of Troglodytes (T. gorilla, Savage) recently discovered by Dr. Savage near the river Gaboon, Africa. Proc. Boston Soc. nat. Hist. 2, 245-247.
- Savage, T.S. & J. Wyman (1847) Notice of the external characters and habits of Troglodytes gorilla, a new species of orang from the Gaboon River ... Osteology of the same ... Boston J. nat. Hist. 5, 417-443.
- Schaller, G.B. (1963) The Mountain Gorilla: Ecology and Behavior. Chicago: U. of Chicago Press.
- Schaller, G.B. (1973) Serengeti. A Kingdom of Predators. London: Collins.

- Schaller, G.B. & G.R. Lowther (1969) The relevance of carnivore behavior to the study of early hominids. Southwestern J. Anthrop. 25 (4), 307-341.
- Schiller, C.H. (Ed.) (1957) Instinctive Behaviour. London: Methuen.
- Schiller, P.H. (1957) Innate motor pattern as a basis of learning. In Instinctive Behavior. New York: International Universities Press, Inc., 264-287. Trans. and ed. by C.H. Schiller.
- Schjelderup-Ebbe, Th. (1922) Beiträge zur Sozialpsychologie des Haushuhns. Z. Psychol. 88, 225-252.
- Schultz, A.H. (1960) Comments. In Social organization of subhuman primates in their natural habitat (K. Imanishi) Curr. Anthropol. 1 (5-6), 393-407. Comment on p.405.
- Schwantes, R.S. (1953) Christianity versus science: A conflict of ideas in Meiji Japan. Far Eastern Quarterly XII (2), 123-132.
- Schwarz, E. (1929) Das Vorkommen des Schimpansen auf dem linken Kongo-Ufer. Revue Zool. Bot. afr. Tervuren 16, 425-433.
- Sebeok, T.A. & J. Umiker-Sebeok, (Eds.) (1980) Speaking of Apes. A Critical Anthology of Two-Way Communication with Man. New York & London: Plenum.
- Sedgwick, A. (1845) Review of the Vestiges of Creation. Edinburgh Review 82, 1-45.
- Selous, E. (1901) An observational diary of the habits - mostly domestic - of the Great Crested Grebe (Podiceps cristatus). Zoologist 5, 161-183.
- Selous, E. (1906) (1907) Observations tending to throw light on the question of sexual selection in birds, including a day-to-day diary on the breeding habits of the Ruff (Machetes pugnax). Zoologist 10, 201-219; 285-294; 419-428 and 11, 60-65; 161-182; 367-380.
- Selous, E. (1927) Realities of Bird Life. Being Extracts from the Diaries of a Life-Loving Naturalist. London: Constable & Co.
- Selous, E. (1933) Evolution of Habit in Birds. London: Constable & Co.
- Seyfarth, R.M., Cheney, D.L. & P. Marler (1980) Vervet monkey alarm calls: semantic communication in a free-ranging primate. Anim. Behav. 28 (Nov), 1070-1094.
- Shimomura, T. (1960) Nishida Kitarō and some aspects of his philosophical thought. In A study of Good. K. Nishida. Printing Bureau, Japanese government, 191-217.
- Shincho Kokugo-Jiten (Shincho Japanese Dictionary) (1965). Ed. S. Hisamatsu. Tokyo: Shincho
- Siebold, P.F. von (1973) Manners and Customs of the Japanese in the Nineteenth Century. Rutland & Tokyo: Charles E. Tuttle Co. First publ. 1841.

- Simonds, P. (1962) The Japan Monkey Centre. Curr. Anthropol. 3 (3), 303-305.
- Simonds, P. (1965) The Bonnet macaque in south India. In Primate Behavior. Ed. I. DeVore. New York: Hold, Rinehart & Winston, 175-196.
- Simpson, M.J.A. (1973) The social grooming of male chimpanzees. In Comparative Ecology and Behaviour of Primates. Eds. R.P. Michael & J.H. Crook. London & New York: Academic, 411-505.
- Slater, P.J.B. (1973) Describing sequences of behavior. In Perspectives in Ethology. Eds. P.P.G. Bateson & P.H. Klopfer. New York & London: Plenum Press.
- Slater, P.J.B. (1978) Data Collection. In Quantitative Ethology. Ed. P.W. Colgan. New York: John Wiley & Son., 8-24.
- Smith, F.V. (1971) Purpose in Animal Behaviour. London: Hutchinson & Co., Ltd.
- Smith, W.J. (1968) Message-meaning analysis. In Animal Communication, Techniques of Study and Results of Research. Ed. T. Sebeok. Bloomington: Indiana Univ. Press, 44-60.
- Spalding, D. (1872) On instinct. Nature 6, 485-486.
- Spalding, D. (1873) Instinct, with original observations on young animals. MacMillan's Magazine 27, 282-293.
- Stauffer, R.C. (1957) Haeckel, Darwin, and Ecology. Q. Rev. Biol. 32, 138-144.
- Storry, R. (1976) A History of Modern Japan. Penguin. Fifth edition.
- Strum, S. (1978) Dominance hierarchy and social organization. Strong or weak inference? In Baboon Field Research: Myths and Models. Wenner-Gren meeting, New York, June 25-July 4.
- Sugiyama, Y. (1964a) Short report on the social life of hanuman langurs (Presbytis entellus). Physiol. Ecol. 12 (1-2), 175-185.
- Sugiyama, Y. (1964b) Group composition, population density and some sociological observations of hanuman langurs (Presbytis entellus). Primates 5 (3-4), 7-38.
- Sugiyama, Y. (1965a) The way to the bipedalism in the evolution of life. Iden 19 (4), 12-15.
- Sugiyama, Y. (1965b) Short history of the ecological and sociological studies on non-human primates in Japan. Primates 6 (3-4), 457-460.
- Sugiyama, Y. (1965c) On the social change of hanuman langurs (Presbytis entellus) in their natural condition. Primates 6 (3-4), 381-418.
- Sugiyama, Y. (1976) Life histories of male Japanese monkeys. In Advances in the Study of Behavior. Vol. VII. Eds. J.S. Rosenblatt, R.A. Hinde, E. Shaw & C. Beer. New York: Academic, 255-284.

- Sugiyama, Y., Yoshida, K. & M.D. Parthasarathy (1965) Home-range, mating season, male group, and inter-troop relations of hanuman langurs (Presbytis entellus). Primates 6 (1), 73-106.
- Sumiya, M. & K. Taira (Eds.) (1979) An Outline of Japanese Economic History 1603-1940. Chicago: U. of Chicago Press; Tokyo: U. of Tokyo Press.
- Survival (1977) ITV Programme, 'Japanese Monkeys', July, 18, 1977.
- Swain, D. (1974) Introductory chart on historical background. In Science and Society in Modern Japan. Eds. S. Nakayama et al. Cambridge, Mass.: M.I.T. Press, after p.xx.
- Swammerdam, J. (1737-1738) The Book of Nature or the History of Insects. London: John Hill. Trans. T. Flloyd, 1758. (Written before 1680).
- Sykes, J.B. (Ed.) (1976) The Concise Oxford Dictionary of Current English. Oxford: Clarendon. Sixth edition.
- Taylor, C. (1964) The Explanation of Behaviour. London: Routledge & Kegan Paul.
- Taylor, R. (1966) Action and Purpose. Englewood Cliffs, N.J.: Prentice-Hall.
- Taylor, T. (1792) A Vindication of the Rights of Brutes. Florida: Scholars' Facsimiles and Reprints, 1966.
- Temerlin, M.K. (1975) Lucy: Growing Up Human. A chimpanzee daughter in a psychotherapist's family. Palo Alto, California: Science and Behavior Books.
- Terrace, H. (1980) Nim. A Chimpanzee Who Learned Sign Language. London: Eyre Methuen.
- Terrace, H.S. & T.G. Bever (1980) What might be learned from studying language in the chimpanzee? The importance of symbolizing oneself. In Speaking of Apes, Eds. T.A. Sebeok & J. Umiker-Sebeok. New York & London: Plenum Press, 179-189.
- Thomas, H.M. (1979) Editorial comment: A lesson from archaeology. Biology and Human Affairs 44 (1), 1-6.
- Thorndike, E.L. (1911) Animal Intelligence. New York: MacMillan.
- Thorpe, W.H. (1963) Learning and Instinct in Animals. London: Methuen.
- Thorpe, W.H. (1979) The Origins and Rise of Ethology. London: Heinemann Educ. Books, Ltd.
- Tiger, L. & R. Fox (1971) The Imperial Animal. New York: Random House.
- Tinbergen, N. (1940) Die Übersprungbewegung. Z. Tierpsychol. 4, 1-40.
- Tinbergen, N. (1942) An objectivist study of the innate behaviour of animals. Biblthca. Biotheor. 1, 39-98.

- Tinbergen, N. (1951) The Study of Instinct. Oxford: O.U.P. Second printing with a new introduction, 1969.
- Tinbergen, N. (1969) Ethology. In Scientific Thought (1900-1960). A Selective Survey. Ed. R. Harre. Oxford: Clarendon, 238-268.
- Tinbergen, N. (1974) Curious Naturalists. Penguin. Revised. First publ. 1958.
- Tinbergen, N. & D.J. Kuenen (1939) Über die auslösenden und die richtunggebenden Reizsituationen der Sperrbewegung von jungen Drosseln (Turdus merula L und T. e. ericetorum Turton). Z. Tierpsychol. 3, 37-60.
- Topsell, R. (1607) The History of Four-Footed Beasts and Serpents. London: W. Iaggard.
- Tsukuba, J. (1961) Nihonjin no Shiso (Japanese Thoughts) Tokyo: Sanichishobo.
- Tsunoda, R. De Bary, W.T., & D. Keene (Eds) (1958) Sources of the Japanese Tradition. New York: Columbia U. Press.
- Tsunoda, R. De Bary, W.T., & D. Keene (Eds) (1958) Kaibara Ekken. In Sources of the Japanese Tradition. New York: Columbia U. Press, 374-375.
- Tulp, N. (1641) Nicolai Tulpii, Amstelredamensis, Observationum medicarum libri tres. Amsterdam: Apud, Ludovidum Elzevirium
- Tyson, E. (1699) Orang-outang, sive homo sylvestris: or, the anatomy of a pygmie compared with that of a monkey, an ape and a man. London: T. Bennet & D. Brown.
- Uexküll, J. von (1909) Umwelt und Innenwelt der Tiere. Berlin: J. Springer.
- Uexküll, J. von (1957) A stroll through the world of animals and man. A picture book of invisible worlds. In Instinctive Behavior. The Development of a Modern Concept. Trans. and ed. C.H. Schiller. New York: International Univ. Press, Inc., 5-80.
- Ueyama, Syunpei (1941) Epilogue. In K. Imanishi. Siebutsu no Sekai. Tokyo: Kobunsha, 173-191.
- Umesao, T. (1960) Nihon Tanken (Exploring Japan). Tokyo: Chuo Koronsha.
- Umiker-Sebeok, J. & T.A. Sebeok (1980) Introduction: questioning apes. In Speaking of Apes. Eds. T.A. Sebeok & J. Umiker-Sebeok. New York & London: Plenum Press, 1-59.
- Vaitl, E. (1978) Nature and implications of the complexly organised social systems in nonhuman primates. In Recent Advances in Primatology. Vol. 1 Eds. D.J. Chivers & J. Herbert. London: Academic, 17-30.
- Van Lawick-Goodall, J. (1967) My Friends the Wild Chimpanzees. National Geographic Society.
- Van Lawick - Goodall, J. (1971) In the Shadow of Man. London: Collins.

- Verwey, J. (1930) Die Paarungsbiologie des Fischreiher. (Ardea cinerea). Zool Jb. Abteilung für allgemeine Zoologie 48, 1-120.
- Viaud, G. (1960) Intelligence. Its Evolution and Forms. London: Hutchinson.
- Vosmaer, A. (1778) Description de l'espèce de singe aussi singulier que très rare, nommé orang-outang, de l'île de Borneo. In Description d'un recueil exquis d'animaux rares, consistant en quadrepèdes, oiseaux et serpents ... Amsterdam, 1767-1805.
- De Waal, F.B.M. & A. van Roosmalen (1979) Reconciliation and consolation among chimpanzees. Beh. Ecol. Sociobiol. 5, 55-66.
- Walsh, L. (1969) Read Japanese Today. Rutland & Tokyo: Charles E. Tuttle.
- Warden, C.J. (1927) Historical Development of Comparative Psychology. Psychol. Rev. 34, 57-58; 135-168.
- Washburn, S. & I. De Vore (1960) Comments. In K. Imanishi. Social organization of subhuman primates in their natural habitat. Curr. Anthropol. 1 (5-6), 393-407. Comment on p.405.
- Washburn, S.L. & I. De Vore (1961) The social life of baboons. Scient. Am. 204 (6), June, 62-71.
- Watanabe, Masao (1966) John Thomas Gulick: American Evolutionist and Missionary in Japan. Jap. Stud. Hist. Sci. 5, 140-149.
- Watanabe, Masao (1970) Science across the Pacific: American-Japanese scientific and cultural contacts in the late nineteenth century. Jap. Stud. Hist. Sci. 9, 115-136.
- Watanabe, Masao & Yōko Ose (1968) General academic trend and the evolution theory in the late nineteenth century Japan: A statistical analysis of the contemporary periodicals. Jap. Stud. Hist. Sci. 7, 129-141.
- Watanabe, Minoru (1965) Japanese students abroad and the acquisition of scientific and technical knowledge. Cahiers d'histoire mondiale IX 2, 254-293.
- Watsuji, T. (1934) Ningen-no-Gaku-Toshiteno-Rinrigaku (Ethics as a science of human beings). Tokyo: Iwanami Shoten.
- Watsuji, T. (1961) A Climate. A philosophical Study. Tokyo: Ministry of Education. Trans. G. Bownas. First published 1935. (Fūdo).
- Wayman, D.G. (1942) Edward Sylvester Morse. A Biography. Cambridge, Mass.: Harvard U. Press.
- Weber, M. (1947) The Theory of Social and Economic Organization. London: Free Press. Trans. A.M. Henders and Talcott Parsons. Second edition 1925.
- Wheeler, W.M. (1902) 'Natural History', 'oecology' or 'ethology'? Science 25, 971-976.

- Wheeler, W.M. (1905) Ethology and the mutation theory. Science 21, 535-540.
- Wheeler, W.M. (1906) An ethological study of certain maladjustments in the relations of ants to plants. Bull. Amer. Mus. Nat. Hist. 21, 403-418.
- Wheeler, W.M. (1908) Comparative ethology of the European and North American ants. J. Psychol. Neurol. 13, 404-435.
- Wheeler, W.M. (1927) Carl Akeley's early work and environment. Natural History 27, 133-141.
- Wheelwright, P. (1954) The Burning Fountain. A Study in the Language of Symbolism. Bloomington: Indiana U. Press.
- White, A.R. (1968) The Philosophy of Action. Oxford: O.U.P.
- White, G. (1789) The Natural History of Selborne. Edinburgh: Constable & Co, 1829.
- Whitman, C.O. (1898) Animal Behavior. 16th lecture from Biological Lectures of the Marine Biological Laboratory (Woods Hole, Mass.), 285-338.
- Whitman, C.O. (1899) Myths in Animal Psychology. The Monist 9, 524-537.
- Wiepkema, P.R. (1961) An ethological analysis of the reproductive behaviour of the bitterling (Rhodeus amarus Bloch). Arch. neerl. Zool. 14, 103-199.
- Wilde, J. (1615) De Formica. Augustanus Ambergae.
- Willey, B. (1934) The Seventeenth Century Background. Studies in the thought of the age in relation to poetry and religion. New York: Columbia U. Press
London: Chatto & Windus.
- Willey, B. (1940) The Eighteenth Century Background. Studies on the idea of nature in the thought of the period. London: Chatto & Windus.
- Wilson, E.O. (1975) Sociobiology. The New Synthesis. Cambridge, Mass.: Belknap.
- Wing Tsit-Chan (1963) A Source Book of Chinese Philosophy. Princeton, N.J.: Princeton U. Press.
- Wittgenstein, L. (1953) Philosophical Investigations. Oxford. Basil Blackwell.
- Wollstonecraft, M. (1790) A Vindication of the Rights of Men, in a letter to the Right Honourable Edmund Burke; occasioned by his reflections on the revolution in France. London: J. Johnson.
- Wollstonecraft, M. (1792) A Vindication of the Rights of Woman. London: J. Johnson.
- Wundt, W. (1865) Lehrbuch der Physiologie des Menschen. Erlangen: F. Enke.
- Wundt, W. (1867) Handbuch der Medicinischen Physik. Erlangen: F. Enke.

- Wurmb, F. Baron van (1798) Description of the large orang outang of Borneo. Philos. Mag. London 1, 225-231. First publ. 1781.
- Yabuuti, Kiyoshi (1965) The pre-history of modern science in Japan: the importation of Western science during the Tokugawa period. Cahiers d'histoire mondiale IX 2, 208-232.
- Yajima, S. (1965) A propos des sciences et des techniques au Japon depuis 1900. Cahiers d'histoire mondiale IX 2, 179-186.
- Yamada, M. (1957) A case of acculturation of a subhuman society of Japanese monkeys. Primates 1, 30-46.
- Yamakawa Nihonshi Shi-Jiten (Dictionary of Japanese History) (1965) Ed. T. Sakamoto. Tokyo: Yamakawa. Seventh edition.
- Yerkes, R.M. (1916) The mental life of monkeys and apes: A study of ideational behavior. Behav. Monogr. 3, 1-145.
- Yerkes, R.M. (1920) The New World of Science: Its Development During the War. Freeport, New York: Century Press.
- Yerkes, R.M. (1925) Almost Human. New York: Century Co.
- Yerkes, R.M. (1927) A program of anthropoid research. Am. J. Psychol. 39, 181-199.
- Yerkes, R.M. (1932) Yale Laboratories of Comparative Psychobiology. Comp. Psychol. Monogr. 8, 1-33.
- Yerkes, R.M. & B.W. Learned (1925) Chimpanzee Intelligence and its Vocal Expressions. Baltimore: Williams & Wilkins.
- Yerkes, R.M. & A. Yerkes (1929) The Great Apes. A Study of Anthropoid Life. New Haven: Yale U. Press.
- Yoshida, Mitsukuni (1955) Nihon Kagakushi (History of Japanese Science) Tokyo: Asakura Shoten.
- Yoshida, M. (1963) Nihon Kagakushi (History of Japanese Science). Tokyo: Asakura Shoten, First publ. 1955. Cited in J.E. Frisch, 1963.
- Young, G. (1969) Two Worlds - Not One: Race and Civilization. London: Ad Hoc. Publ.
- Yuasa, Mitsutomo (1965) The scientific revolution and the age of technology. Cahiers d'histoire mondiale IX 2, 187-207.
- Yuasa, M. (1970) The growth of scientific communities in Japan. Jap. Stud. Hist. Sci. 9, 137-158.
- Yuasa, M. (1974) The shifting center of scientific activity in the West. In Science and Society in Modern Japan. Eds. S. Nakayama et al. Cambridge, Mass.: M.I.T. Press, 81-103.
- Zuckerman, Sir Solly, (1932) The Social Life of Monkeys and Apes. London: Kegan Paul, Trench, Trubner; New York: Harcourt, Brace.
- Zuckerman, Sir Solly (1960) Comments. In K. Imanishi. Social organization of subhuman primates in their natural habitats. Curr. Anthropol. 1(5-6), 393-407. Comment on pp. 405-406.