

## IN THE FOOTSTEPS OF HERACLITUS

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Methodology is epistemology: the way of studying a phenomenon depends on the view of that phenomenon. In attempting to avoid anthropomorphism - endowing or attributing human form and especially feelings and abilities to animals - we have developed a particular mode of finding out which we term science. In this mode we feel it is appropriate to be 'objective' that is to remove our own feelings, thoughts and biases from influencing how we study. In this paper I {1} trace the search for objective techniques in the study of non-human primates and {2} present a rapprochement to established anthropological methods which provide a return to holism in the study of social behaviour.

### INTRODUCTION

My first monkey studies were anatomical. They were conducted on caged cercopithecines at Louis Leakey's Tigon Primate Resesearch Centre in Kenya. My interest then was in studying structure and function that relate to hominization - the process of becoming human. The focus of this research was on use of the hand. Caged animals seemed eminently suited for such anatomical studies. The whole story of how they use their hand could be coupled with dissections of monkeys contributed to the centre by local farmers who shot them as pests. But the odd bits of behaviour they performed raised so many questions about social behaviour, that I knew subsequent studies had to deal with social groups. Furthermore, I knew that in contrast to the monkeys of my doctoral research who were so very restricted by their cagedness, a cage environment simply wasn't amenable to the study of social behaviour. I wanted a

research site where I could actually come to understand something of the way the primates lived.

I had always known that there were monkeys living near humans. Termed popularly "urban monkeys" they are perhaps more appropriately called synanthropic - that is, living with humans. Two classic locations had been British colonies: Gibraltar, at the tip of Spain and Kowloon/New Territories, the mainland part of Hong Kong. A freshly annointed PhD, I chose to study the Barbary "Apes" of Gibraltar, expecting those macaques to conform to earlier descriptions of them as well as to generalizations about social groups. Above all, I expected to be able to view them from a perspective compatible with that deriving from studies of caged macaques. This perspective would enable me to be objective and the monkeys to remain remote animals, functions of their biology subscribing to rules already understood. The Gibraltar monkeys lived in small groups where all members could be studied. I was not prepared for the overwhelming reality of the uniqueness of each one. I have written of this experience in a less formal collection and present an excerpt here:

What was significant was that I now understood the relationship of primate studies to anthropology and why it had its legitimacy within that field rather than zoology; I further understood the pressure to conform to other animal sciences which was, in the early 1970's a prevailing trend, and I began to examine the issue of how we should gain some understanding of the complex behaviour daily demonstrated before me. That is, what methods should be developed consistent with the nature of the organisms that profoundly recognizes their being, but which also takes into account the nature of the observer. What techniques shall we use? How will we establish the appropriate tools - both methods and skills - to enable us to de-code what is basically unintelligible. The choice of appropriate method is actually a complex issue. It depends on the definition of our subjects - the objects of our research of course: stones require different techniques than do plants. But more than this, our choice of method depends on our recognition of our selves as the chooser. The methods chosen reflect very closely how we view our role as decoder and the values, cultural system and particular history in which we are embedded (Stent, 1985).

This essay presents these thoughts beginning with the history of primate studies, I describe the context in which primate studies began, and where I think it has its legitimacy.

I then look at the methodology that has overtaken primate studies and propose an acceptance of pluralistic methods consistent with the nature of the subjects under study.

### **PRIMATOLOGY WITHIN ANTHROPOLOGY**

Primatology has its rightful place in Anthropology rather than Zoology. Primate studies exist within the discipline of Anthropology because of our interest in hominization, the process of becoming human. Anthropology has a unique interest in humankind because it wants to understand its unique adaptation: the feedback from biology to culture and culture to biology. This idea is basic to Anthropology, arguably, it is this discipline's distinguishing feature. The recognition of a set of rules, values, ways of doing things that mark off one local group from another, was an enormous contribution the young Anthropology presented to the world in the late 19th century. The notion of "culture" arrived at a time when the origin and definition of humankind was hotly debated. Linnaeus had already noted (1750s) that while primates are mammals, humans are primates. Their special place in nature placed the Order, Primates, within the discipline devoted uniquely to the study of humankind - Anthropology. This was a time when departments of Anthropology had only recently been founded, and ethnological studies of humans throughout the world were becoming field excursions rather than reviews of travelers' or missionaries' tales.

The emphasis on being in the field with the subject of enquiry has become a major chord resonating throughout Anthropology. This being on site within the group, has led to a lively discourse on how we know what we know; how we gather data for subsequent analysis, and how we go about the analysis. These steps in planning are the glasses that illuminate or cloud our vision in the field. As participant informants, social/cultural anthropologists came to witness activities from the perspective of the group they had come to study. The flow of daily life became intelligible because the anthropologist was like a member of the group: spoke the language, contributed labour, watched and took part in activities and even rituals. Trained to be able to evaluate what was seen and experienced, the anthropologist could extract from the richness of this personal exposure, could analyze and so contribute to theory.

### **DEVELOPMENT OF PRIMATE STUDIES**

Our current attitude towards non-human primates has developed over centuries. The obvious physical relationships in particular the five fingered flexible hand, the rounded face, the ability to stand on two legs, were sufficiently reminiscent

to have the monkey serve as physical surrogate in anatomy from the ancient Greeks for nearly a thousand years.

This resemblance led the ancients to wrestle with the question of the nature of humanity. Where did we come from? Were we beast or not?

To the ancient Egyptians, the baboon was a sacred deity, Toth. With a body like a man's, and a head of an ibis or dog-headed baboon, it was he who was the god of wisdom and of writing -arguably the highest forms of human endeavour, hence primate-ness confers a special nature. What of the beast, the wild animal?

The Sumerian tale of Enkidu and Gilgamesh illustrates the concern for a definition of human nature. Intuiting that the rise of cities had something to do with humanity as the ancients experienced themselves, they told the tale of the wild man, Enkidu, who loses his innocence and is "tamed" after he is brought to the city, Uruk. The story clearly illustrates that the dilemma of who we think we are, how we define ourselves is at the centre of how we regard other beings, and the means we find suitable to study them.

Aristotle voiced the intuited difference between "us" and "them" in his model that placed life forms on a ladder, from most primitive to most complex. The hierarchical formulation is a constant theme. We read it in early evolutionary theory; in structures like churches and nations; and in social organization of non-human primates. The construct has become "natural" and seen as innate where ever it occurs.

Nature proceeds little by little from things lifeless to animal life in such a way that it is impossible to determine the exact line of demarcation, nor on which side thereof an intermediate form should lie. Thus, next after lifeless things in the upward scale comes the plant, and of plants one will differ from another as to its amount of apparent vitality... Indeed, as we have just remarked, there is observed in plants a continuous scale of ascent towards the animal. So, in the sea, there are certain objects concerning which one would be at a loss to determine whether they be animal or vegetable... *Historia animalium*, VIII, 1. transl. D.W.Thompson, Oxford, 1910. (Clagett, 1955:67)

A prime variable in the distinction between forms was the possession of a soul. To Aristotle, there were several kinds of soul. The simpler forms, like the vegetative soul, motivated lower forms. Only humans had a soul capable of reason: only humanity could leave the realm of opinion to become capable of seeing the light; to rise to the realm of reason.

Aristotle, and later the greek physician Galen (c. 129-200 C.E.) actually dissected monkeys - probably *Macaca sylvanus*, the barbary ape of Gibraltar and north Africa. They acknowledged the similarity in form, such that monkey was even used as the basis for human physiology and structure. Aristotle's teachings were incorporated

into Church doctrine and therefore indisputable. Yet this morphological relationship did not suggest kinship over time, that is an evolutionary connection. Bodies might look similar; the issue of the soul, and indeed the kind of soul made the difference between beings.

For Europeans, the time after the Fall of the Roman Empire (around 476 C.E.) marked a breakdown in communications and access to knowledge. The great libraries of the Ancient World, such as the one in Alexandria, Egypt, were burned, dispersed or off-limits, accessible only to members of the Church. Stories told by travelers, like those the Greek Historian Herodotus had told, were popular, and if the traveler was given to exaggeration, or recounted a story told by someone else who got it from a third party, so much the more interesting. Stories of monstrous human races were recounted far and wide (Friedman, 1981). Some of these races had no heads, but rather, eyes in the center of the chest; or walked on their hands, or had feet above the head, or were dog-faced, or had long-tails and lived in trees or caves. It is probable that these latter were at least inspired by observations or accounts of non-human primates, embellished in Pliny (Friedman, 1981). Primates had been used earlier in Egypt and India as metaphors for deities; they were now metaphors for unknown humans from distant locations. Distinctions between human and non-human primates blurred with distance and age of account and were accepted in the guise of these monstrous groups at the fringes of the known world (Friedman, 1981)

These two metaphors: the ladder of life and the monstrous races influenced the attitudes towards non-human primates. Aristotle's *Scala Naturae* was accepted and extended within the dogma of the Church, so that human was superseded by angels and finally, the deity, the Perfect form, the Source or Type. Examples of the Type were always poor tokens of it, and as humans were not God, so too, were those who resembled humans - primates - less than they. Humans had the soul which enabled them to strive to reach Perfection, but primates lacked the wherewithal (soul) to become more Perfect.

When knowing became formalized as Science in the 16<sup>th</sup> century, and the secrets of the universe were explored, trade expanded (Rossabi, 1992) and technological inventions multiplied. The metaphor for the deity shifted to become the Great Clockmaker. Clocks are made with cogs and wheels, sprockets and rachets, and toys as well as other objects move,



dance, whistle, in phantasmagoric evidence of creative genius. In similar fashion does the Great Clockmaker make the creatures of the planet which move, dance, whistle with cogs, wheels, sprockets and rachets. The exuberance that came from creating things that could simulate life forms was expressed in the attribution of machine characteristics to actual life

forms. The grinding of their gears is evidence of the celestial movements that were conferred to them by the Creator as Machinist. Humans as creators, as thinking animals aware that they think, were however, different to other machines. Personal knowledge that "I think" discriminated between human and animal as keenly as had the different levels of soul. The special attributes of soul had indeed become special attributes of mind. Incidentally, but most importantly, the French thinkers who contributed so much to this picture, do not distinguish between 'soul' and 'mind': both take the noun "âme". A more technological age had replaced spiritual, unmeasureable soul with materialist, knowable mind. What made mind palpable was speech.

Since the time of Linnaeus (active 1750's), non-human primates were grouped with humans. From time to time, scholars suggested that apes were actually *Homo alalus* (humans minus language), but the general view was that despite resemblance in form, there was a great barrier dividing us from them. But the image of the ape was growing. Novelists played with the idea of apes more courteous, charming and distinguished than contemporary 'civilized' Englishmen (e.g. Peacock, 1896). Attribution of human characteristics to an ape: knowledge, reason, and emotions (but, of course, not speech), was truly fictitious since there was a general lack of knowledge about the social behaviour of non-human primates and their capabilities. The point was to reiterate an old idea that "civilization" is only superficial trappings imposed on a better, unspoiled nature; the ape became the metaphor for pristine goodness.

#### INTEGRATION ONE

Themes that have so far been presented are threads of the fabric of modern-day primate studies. Knowledge of non-human primates precedes any sort of "scientific" enquiry. Monkeys are deities before they are subjects; they are mythopoetic forms to link 'animal' with 'divine'; they are models for human anatomy before there is primate taxonomy. Attitudes about them blend with romantic, literary or political motive to form statements bearing only coincidental resemblance to the real thing. Yet science as we know it is formed. Its strictures include the absorption of previous attitudes and metaphors. A materialist view divides all of nature along traditional rungs of the ladder, the divisions now based on 'mind' - a subject at the very beginning of definition and research.



### THE MODERN ERA BEGINS

Systematic studies of apes, however, began with psychological experiments, such as the ground-breaking studies of Kohler in the 1920's on caged *Pan troglodytes*. His findings were consistent with the great ladder: even genius chimps would perform at the mental age of very young human children. His studies affirmed the mental distance between chimp and human, and affirmed the need for terminology which reflected that distance. To be avoided was the egregious error of anthropomorphism. Originally intended in a theological sense, anthropomorphism means the attribution of human form to the Deity. After 1830, it was used for attribution of humanness to non-human animals. While a term, anthropopathy, exists to describe attribution of human feelings, thoughts and motivation to the Deity, anthropomorphic has come to cover that extension to animals as well. Anthropomorphism in this sense, was then, and still is considered a violation of the scientific perspective in European-derived, but not oriental behavioural science (Asquith, 1986). In summarizing his life's work, Kuo, himself Chinese, and an iconoclast amongst animal behaviorists, identified the nature of this non-European contrast in mental pursuit: "Both the American animal psychologists and the European ethologists have made two basic assumptions: the uniformity of nature (environment) and the uniformity of behavior (1967:14)", and this error resides in epistemological limitations, as these researchers are:

... unable to free themselves from the bondage of the somewhat primitive and rather unfortunate Hegelian dialectical formulation, thesis and antithesis: mind vs. body, nature vs. nurture, innateness vs. learning, and so on (1967).

Psychology, as the study of mental abilities, was the locus of behavioural studies. Mentality is the quality or nature of mental action, whereas mentation is an attribute of the brain; it is mental action in itself, or the property of having mind. ('His mentality is keen' versus, 'is there mentation in the chimp?'). The distinction was not always followed, but the emphasis was on mentation in itself, extrapolated from the context of the organism. Psychology established norms of research consistent with the goals of science: to experimentally control a situation so that the variables involved could be tested for their contribution to the phenomenon under study. The first field primatologists were

trained as psychologists and went into the field to gain perspective on a subject with the explicit

intention to come back to the lab to study the phenomenon. In doing this they were adopting the anthropological design established nearly 100 years earlier. Furthermore, they were following the lead of ethologists like Lorenz and especially Tinbergen who had taught that studying subjects where they lived provided understanding of their life ways. In describing the structure of behavioural patterns of groups, the function, recent history and most importantly the evolutionary history of the pattern could be ascertained.

Ethology was the discipline that studied behaviour of animals and it did so with the assumption that behaviour is just another organ (Tinbergen, 1951). That meant that it was subject to the same rules of evolution as any other organ. Behaviour was taxonomically useful since it was species specific.

#### **ANTHROPOLOGICAL PRIMATE STUDIES**

This promising start to field studies went into a decline during the Second World War. It was expressly revived by anthropologists in the 1950s as a subject necessary to and legitimate within their domain. The reasoning was that such studies were cogent to an understanding of "man's cultural and social origins" (Hooton, 1954:187). "The New Physical Anthropology" was introduced by S. Washburn in 1951. It was 'new' because it focussed on the mechanism of human evolution, experimentation in studies of adaptation and the inclusion of genetics and population studies. Anthropological primatology was key to understanding human evolution, and its mandate was:

- (1) to reconstruct human evolution
- (2) as a model for human social processes.

Understanding the process of becoming human required knowing the antecedents, on the assumption that the behaviour of current non-human primates was closer to that of their ancestors and therefore underlay human behaviour, since their ancestors were our ancestors. The fact that each line has been independently seeking its fortunes for millions of years was not taken as relevant. Whether or not non-human primates could be used as models for humans has remained controversial (Tooby and Devore, 1987).

The father of modern primatology, Clarence Ray Carpenter, extended interest in non-human primates two ways: first, he went down the Scale

of Nature and studied gibbons and howler monkeys. Secondly, he studied them in the field rather than the lab. Drawing from his training, he clearly wanted to avoid anthropomorphism in the study of non-human mates, and in order to avoid anecdotal reportage, he included statistical testing to ensure that observations were not chance phenomena. Findings from laboratory and field were both to be judged "in the scientific courts of appeal" by the criteria of "relevancy, adequacy, reliability, validity, and significance" (Carpenter, 1950:1008). Ethological notions of species specificity of behaviour went unquestioned: group size, social structure, diet, even interbirth interval were considered to be part and parcel of the species' profile. It would be several decades until these aspects were seen to be variable depending on history, personality and local circumstances. A decade later, methods had not changed substantially. Schaller was asked to compile the results (1965) from a poll of conference participants on how to go about studying non-human primates. A good study, he found, would include:

- (1) An ecological survey...
- (2) Detailed observations into the social life of a selected group...concentrating on obtaining the species' repertoire of behavior with quantitative data.
- (3) ...experimental procedures, either in the field or the laboratory, to elucidate those points not readily clarified by observation alone. (1965:623)

At the same time, ethologist and mentor to the field, Niko Tinbergen (1963) was establishing the logic of how to study animal behaviour. The implications for methodology were inherent. Description is the first step, followed by a search for explanations of the behaviour described (Hinde, 1983). There are four logical types of explanation: (1) immediate causation, (2) development, (3) function, or (4) evolution. Robin Dunbar differentiates their meaning thusly:

In asking why one monkey grooms another, we might be asking for an explanation in terms of: (1) the motivations or other physiological or behavioural factors that prompted it to groom another individual (a question about proximate causes); (2) the experiences it has had during its lifetime that prompt it to groom in a given way or to groom only certain individuals (a question about ontogeny or development); (3) the purpose being served by its grooming another individual (a question about function); and (4) the sequence of changes in behaviour

that led to the evolution of grooming in that species (a question about evolutionary history), (1988:3).

The need to establish the level of inquiry had been seen as critically important to the progress of biology a decade earlier (e.g., G. Williams, 1975). The contrasts between proximate (near; current) and ultimate (evolutionary) causation blurs however; what the animal does in the here and now is considered to affect its reproductive history, and therefore evolutionary role. Hence proximate causes and evolutionary history are not neatly distinguished.

The objective of early research had been base-line descriptions of species, (inventories or *ethograms*) from which, eventually, general behavioural and evolutionary laws could be derived. Objectivity demanded a vocabulary and a way of doing things; what the researcher was going to be objective about was not the concern. Carpenter set out some of the issues involved in the methodology that would satisfy this aim (1965:25). Observation was the chief instrument -- not hypothesis formation. Observation however, had to be rigorously structured. Bias easily worked its way into observation, even by mere movement of the observer's head choosing to look at this, rather than that. Disturbance of the animals would alter the results. A strict protocol would make observations more replicatable -- a criterion of the scientific method. Documentation with cameras, tape-recorders etc., increased reliability since the captured images and sounds could be re-examined "forever". Inter-observer consistency was to be achieved, and repeated observations of behaviour were to be made. Note that a major assumption here is that the behaviour will repeat: observers can return and see the same behaviour again (same players, same stimuli, same observers, same context). That is, that behaviour, like clockwork machines of an earlier time, is 'lawful', following patterns according to knowable principles. Non-human primates were to be studied in order to elucidate history and process of the human condition. interest in social evolution encouraged research into the group as social environment.

But the methodologies employed were not considered sufficiently rigorous. Jeanne Altmann (1974) proposed a set of instructions on how to properly study primates. A mathematician, she had studied baboons on the open plains of Amboseli (Altmann and Altmann, 1970). She labelled the observation of behaviour as currently practised "*ad libitum*" sampling, which means 'according to desire', suggesting that the vagaries of interest, not rigorous protocol determined when a note would be taken. She



affirmed the quantitative nature of all behaviour studies, grounding the methods in the tradition of positivism. This early 19th-Century philosophy argued that the methods of natural science should and could be extended to social issues and phenomena.

Altmann's critique had a major impact. Subsequent to its publication, all primate studies followed one or another of the several techniques she described. Over the years, however, the distinctions between sampling methods have faded, and most researchers now use some variant of choosing a particular animal as informant (the focus animal), or scanning the entire group on fixed time intervals for whatever is the subject of interest (see e.g., Paterson, 1992b). In addition, it is generally acknowledged that visibility and not methodology determines what can be recorded, so that "opportunistic" rather than "*ad libitum*" is the more appropriate term. This is not just a casual distinction. 'Opportunistic' contrasts the natural experiment with the lab experiment. The verbiage in which even our methods are couched reflects the need to neutralize language in the pursuit of objectivity -- the stated goal of science.

#### THE SEARCH FOR NEUTRAL LANGUAGE

Couching description in terms that would be used by humans of or about other humans is considered an illegitimate form of discourse. Given the pre-existing determination that non-human primates are 'lower' animals on a scale where humans are the top, utilizing terms appropriate for humans distorts the statement about their 'lower' relatives. Even when primatologists were talking about cultural processes, that is, about the social development of patterns of behaviour unique to a local group, the terminology sought was chosen because it had no human connotations.

"Conformity" was introduced by K.R.L. Hall (Hall, 1968) because he considered it more neutral a term to describe the regulators of primate social behaviour. It is parallel to rules, regulations, laws and custom in human societies. The parallel term 'specia' coined by Imanishi in Japan (Asquith, 1986) did not gain currency in North America and Europe, probably because the term is morphologically and phonetically too close to 'species'. "Dam" and "infant" were introduced to replace mother and baby to avoid seeing within their relationship bonds of attachment parallel to ours. "Love", that is attachment or bonding to the mother, was empirically studied first by Harlow, later by his co-workers and students because such a phenomenon could not be referred to or accepted in the domain of non-human animals without objective proof. It is still

illegitimate to speak of 'love' in non-human primates although 'bonding' is acceptable.

Negative anthropomorphism (or 'speciesism'), the non-attribution or withholding of traits to non-human primates when these assuredly exist, has not been as carefully constrained. We need to avoid overzealousness in attempting to be neutral lest we obscure abilities that exist in other animals. The search for a neutral language has been uneven; sexist language has skewed our interpretation of events. A significant example of this came in a discussion of baboon behaviour, where Hall and DeVore (1965) noted that males form coalitions, but a few pages later, females gang-up. While the term, alloparental behaviour, supersedes mother-care or father-care, 'aunting behaviour' -- a term coined by Thelma Rowell in the early 1970s -- is still used, although 'fostering' is preferred. Clearly, the only language available is our own (Fedigan, 1982); clearly, we cannot reach past the boundaries of our selves and cultures to experience in the first person what another person -- let alone non-human primate -- is feeling. Where the boundary between 'human animal' and 'non-human animal' is not distinct, as for example, in Shintoism or Buddhism, this dilemma is said not to exist (Asquith, 1986). To the European derived individual, however, this is the existentialist dilemma.

#### PROBLEMS WITH PARADIGMS

The tension represented by 'opportunistic' and '*ad libitum*' is that between language and number: a proverbial Abel and Cain. Language is taken to be imperfect but personal; number is valued as pure reason and objective. The cults of number are legion: from Pythagoras to the Kabbala, the mysticism of number is pervasive. So too is the mythology of number, which holds that to code objects and events numerically, and to manipulate them in formulas, removes those objects and events from the plane of emotion, and thereby brings them a step up towards reason. In truth, however, does one feel less for the lab monkey called "R2D2" than if it is called "George"?

Post-modern textual analysis has demonstrated that all writing is 'text'. A scientific document is no less a mental creation than a poem; its use of language, its discourse, no less a function of the writer -- gender, age, ethnic identity, etc. -- than is polemic. While we understand "science" to be a special activity of mind, bound by rigorous constraints to ensure validity and replicability, it is nonetheless an activity of mind. What to describe and how to analyse are choices lying within the

researcher, and are based on scientific values current in his/her culture, and even his particular moment (Feyerabend, 1975).

The current paradigm in biology and animal behaviour, termed *Sociobiology* to describe the extension of natural selection to processes of societies, paradoxically uses a form of discourse that has heretofore been considered forbidden in discussing animal motivation. Analyses use terms heavily laden with contemporary cultural meaning. Terms like 'deceit', 'machiavellian intelligence', 'kidnapping', or 'altruism' are used to describe non-human behaviour. Protestations are made that terminology is only metaphor, and not to be taken literally. Nevertheless such words bring with them their symbolic impact. Moreover, negative terms are permissible but positive terms are considered anthropomorphic (Fedigan, 1982). Monkeys may 'cheat' or 'sneak' but not love or help. The notion of a society based on mutual assistance is explicitly denied since the society is the locus for competition between individuals striving to promulgate their own genes at the expense of another member -- the more so the greater the kin distance.

However, cooperation has been recognized in baboons and chimpanzees (Strum, 1981; Teleki, 1981). Most recently, the reproductive system of callitrichids, for example *Callithrix jacchus*, is apparently based on cooperation, where the single breeding female receives the cooperation of others in the raising of her multiple births (Abbott et al., 1993). In fact, cooperation is undoubtedly at the basis of the origin of multicellular life, as Margulis has amply demonstrated (e.g., Margulis and Sagan, 1986). Currently, arguments are being made that suggest that the nature of non-human primate life depends on 'cultural' processes -- whether these are termed 'traditions' (Burton, 1972; 1992), 'culture' (McGrew, 1992) or 'species' (Asquith, 1986). Reynolds (1986:56) argues that monkeys lack culture because "There is no book to which monkeys can refer for guidance in social situations, nor is there a body of laws that gives clear indications of when behaviour has to be punished." What he neglects here, however, is that it is only when enormous amounts of variation on a situation exist that laws require codification: each member in a small society can know all other members, and all regulations pertaining. And there are regulations. Rules of conduct are precisely those described in analyses of social organization.

Social behaviour is the outcome of the network of interactions between members of a group. The actions of the group members are the result of the individual development and personal history of each mem-

ber. This is the opposite of a mechanistic view, which sees animal behaviour as the outcome of the cogs and wheels turning (Singer, 1994, 1981). Acceptance of the complexity and subtlety of primate social behaviour requires a re-thinking of methodology appropriate to study the beings that generate these societies. Since behaviour accordingly is not mechanically located in the genes, but rather in the capacity for storage, recall, fusion and innovation of memories (Burton, 1992; Seyfarth and Cheney, 1992), it seems appropriate to develop methods that integrate rather than atomize, that recognize context and the individual in the context. Is the social behaviour of non-human primates, then, restricted to quantitative analysis?

### **Integration Two**

There are different ways of looking at things; of finding out why and how they operate as they do. Underlying the different ways (methods) are philosophies that sculpt the methods. The development of social science is a relatively new phenomenon. At its origins was the positivist impetus to develop a science equivalent in robusticity to those sciences that investigate physical reality. The development of statistics in the same period (late 18th early 19th centuries), supported the view that behaviour could also be described and analysed objectively through the conversion of events to numbers. Quantification would make inquiries about social behaviour objective and congenial to scientific inquiry. The early promise of Positivism was not realized. There was recognition that the number of variables that could pertain to a single behavioural event was enormous. In addition, there was increasing awareness of the ineffable -- the unknowability of phenomena. It is clear how much H and how much O must be joined in what ratio for water to be the result. In social behaviour, the factors themselves cannot be identified. Husserl's reaction, termed Phenomenology, argued that because the variables pertaining to events and activities were unidentifiable, quantification was inappropriate for the study of human thought and action.

Scholars in the humanities suggested that perspective of observation profoundly affected knowledge of it. The observer or "interpreter" accepts that research actually begins with what one is and already knows. The observer or "interpreter" applies the accumulation of experience and understanding ("Pre-understanding") as s/he engages the problem. There is consequently a loss of "the aura of objective validity" (Stent, 1985). The caution used in carefully focussing the research and choosing

the methods of gathering information, are balanced with the sure knowledge that the data gathered is relative to the moment, the location, the question selected and one's self. Hermeneutics, which arose as biblical interpretation, emphasized that looking at is not the same as looking from, and that to truly understand a phenomenon, the perspective must shift away from the viewer to that of the individual viewed.

Hermeneutical analysis means appreciating the context in which "implicit meaning is embedded before one can uncover hidden meanings in any of its parts" (Stent, 1985). This, of course, presumes that the one viewed is sentient--thinks and processes thoughts as well as feels. By the 1970s phenomenology and hermeneutics were being discussed in the context of non-human primates, because field workers in the 60s were presenting data that confirmed the sentience of their subjects.

#### **METHODOLOGIES**

Researchers need to establish credibility. They do this on the basis of (1) their background knowledge of the subject matter as revealed in literature review; (2) by clearly focussing the research question; (3) by the methods that they employ, which assure the audience that while the subjects may not be controlled, the subject matter has been. 'Quantitative' and 'qualitative' research techniques are approaches to research questions. Typically, quantitative research is identified with the "scientific method", a series of steps generally listed as:

- (1) definition of the research problem: establishing the hypothesis
- (2) producing operational definitions
- (3) designing research methodology
- (4) gathering data
- (5) analysing data: testing the hypothesis
- (6) acceptance of [go to (7)] or rejection of [go to (1)] the hypothesis
- (7) writing the report

Scientific method depends on statistical treatment of data for verification as it assumes that "...events and statistical regularities are fitted into a causal network..." (Pratt, 1989:105). The goals include testing hypotheses and being able to generate predictions on how phenomena operate. The subject material is broken down into constituent parts with which the researcher can deal, that is, which can be controlled, or more importantly, experimentally tested. Statistics supposes that the world is divisible into

categorizeable units; that the definition of these categories is isomorphic (the same as; natural) with the phenomenon under study, and that therefore patterns of association between these categories and populations as defined by the researcher, can be measured. However, the causal network developed from these associations, is "...largely an abstraction" (Pratt, 1989:105).

Clearly, a researcher would wish to have an analytic description that corresponds to the phenomenon under study; reconstructing behaviour from statistical inferences may unwittingly, and even undetectably, falsify the picture (Pratt, 1989). Researchers note the enormous variability in performance in experimental tests as a function of time of day, sampling procedure, or ineffables (Tartabini and Simpson, 1986). The inconvenience of non-human primate processing of information produces 'noise' in the system. Behaviour is irrational and less amenable to statistical procedure that is based on fair chance. Primate groups are typically small - below the requisite size to which normal distribution assumptions easily apply. Thelma Rowell, an uncontested doyenne of primate studies, notes in this regard that "... primates never come in large enough numbers to be able to validate an assumption of a normal distribution, the people who study them were forced to recognize individuality..." (Rowell, 1991:255). The impact an individual makes on a society has major consequences: if she is the only breeding female, as in some callithrichids, the genetic information of the group is skewed in her direction; if she is an innovator, a new tradition will add to the repertoire of information in the group. Marshall and Rossman (1989:147) address this issue when they state:

Positivist notions of reliability assume an unchanging universe, where inquiry could, quite logically, be replicated. This assumption of an unchanging social world is in direct contrast to the qualitative/interpretive assumption that the social world is always changing and the concept of replication is itself problematic.

How wise indeed was the Greek philosopher, Heraclitus, (born about 535 BCE) who noted that we cannot step into the same river twice because the waters are always rushing in upon us.

In a recent paper (1992a), Paterson attempts to model the relationship of genes, behaviour and culture in non-human primates. Genes produce proteins that form structures becoming physiology. Behaviour, however, is not reducible to biochemical process, as biochemical imperatives can be

overcome or ignored in favour of social requirements. In a CBC film on baboon, Strum shows a male who 'sacrifices' a sexual and politically important relationship with a "dominant" female for caring for a "friend's" infant (Strum, 1992). His consternation is evident; his choice considerable; his motivation beyond biochemical explanation. The ineffable nature of an individual, however, derives from its reactions to some situation based on its personal history and the history of its social interactions. Schaller once remarked (Schaller, 1987:xi):

but to interpret another culture, one which cannot speak and which leaves no artifacts, requires more than skill with vital statistics and glib scientific notions.... (ix)

If a scientist takes too much vocal pride in objectivity, beware. Observing is subjective: the animal described is only an illusion created out of a personal perspective, based on which questions are raised, which facts written down, which information ignored. ...asking different questions will create a different animal. The conspicuous, easily described behaviour is turned into statistics; the difficult but no less real behaviour tends to be ignored or considered irrelevant. To describe another being takes not merely reason and fact, but also empathy and intuition.

What methodology is amenable to the analysis of so complex a phenomenon? In the past several years, there has been a growth and extension of what are termed 'qualitative' techniques. These are methods of gathering and analysing data that depend on context. Long used in social/cultural anthropology, qualitative techniques rely on observation of a phenomenon within its setting because it is the entire context that lends meaning to that phenomenon. Male care amongst the macaques of Gibraltar and North Africa, for example, is concerned with nurturance of the young. The enactment of this behaviour, however, has meaning only within the context of the local group where the development of the pattern, its expression and its social significance as a tradition is defined (Burton, 1972; Burton and Bick, 1972.)

In qualitative research, the observer strives for context so that the phenomena under investigation are not "adulterated" (Bryman, 1988:58). S/he is more concerned with the 'natural experiment' than a controlled experiment (Bernard, 1988). The researcher avoids imposing his/her own conceptual viewpoint on the social processes under consideration. While research is grounded in theory, the open-ended format of research per-

mits the retention of context and holism. Bryman (1988:61) summarizes the characteristics of qualitative methods as:

- (1) seeing through the eyes of the subjects
- (2) describing—forming a verbal picture
- (3) retaining the context, ensuring holism that is "An undertaking to examine social entities in their entirety" (p.64)
- (4) emphasizing process, e.g., social life is processual
- (5) flexibility and lack of structure (but not of rigour) in research design
- (6) rejecting a priori theory and concepts, working inductively, from the material to theory.

Malinowski encouraged anthropologists to get down from the veranda to mix with the natives and developed a method called (1) "participant observation" to reflect that knowing a people and their customs can only be achieved by participating in their realities. Reality, or meaning, is constructed from the interpretations of individual members of the society and their interactions: a fear vocalization, for instance, derives its meaning from the context. It may be a reaction to a snake, or it could be deception of some fellow group member (Cheney and Seyfarth, 1991). A monkey mounts another: the meaning depends on who mounts whom (is the mounter, for example, a male? an adult?). Is the behaviour reproductive, or reassurance or dominance?

Some techniques of qualitative methods resemble quantitative methods in their attempt to control the research situation: (2) interviews and (3) questionnaires are two such methods. (4) Content analysis, which is concerned with the meaning or style of doing something, is a technique found in both quantitative and qualitative approaches as well. Other methods in qualitative research follow an open-ended format. These include: (5) the case study, a tight focus on a given individual or situation, (6) proxemics, the analysis of the use of space, by a group and by its members, (7) kinesics, body movements and the meanings of them, (8) historical analysis including documentatation about the society under study, (9) life history, a form of the case study more concerned with tracing the individual over time, (10) unobtrusive measures (inferences drawn from materials related to activity, such as fruit cores beneath a tree denoting that this fruit has been eaten from this tree) (Marshall and Rossman, 1989). The purpose of these methods is to avoid the contrivance, the manipulation, of the experimental situation (Bryman, 1988; Marshall and Rossman, 1989; Harrē in Bryman, 1988; Berg, 1989; Bernard, 1988),



because, as Rowell (1967) noted, interference with or constraining the subjects, affects them. Rhesus macaque or baboon mothers usually carry their older offspring dorsally. In caged situations, however, Rowell observed that they carried these older offspring ventrally, because cage-door hatches were too low. Consequently, the research result, while having the appearance of verity, of objectivity, even of replicatability, may be far from the actual expression of a behaviour.

Not all of the enumerated methods are appropriate in the study of non-human primates. Clearly, those methods that rely on the special properties of humanness, especially language, cannot be utilized with non-human primates other than Great Apes. These include numbers (2), (3), (1) and to some extent (4) above. Life history (8) has been used in conjunction with (2) and (3) when seeking background and history about non-human primates and their locale. Recently, tests on individuals, such as personality tests, have been successfully extended to the Great Apes, even in the wild (Buirski and Plutchik, 1991). Content analysis (4), however, might have its utility in a study, for example of grooming, where style, duration, frequency, and donation of the grooming are the content assumed to have meaning that can be interpreted. Grooming amongst barbary macaques in Gibraltar, for instance, varied for duration, frequency and style depending on the relationship between the participants: you groom individuals you do not like as well more often, but closer individuals longer. A rough massage type of groom is sought by some whereas others prefer those groomers who will do a gentle hair-part and pick.

The case study (5) is in fact, a primary form of primate study. In primatology, it is called a "focal animal study" (Altmann, 1974; Paterson 1992b) wherein a particular member of the group is followed extensively; is seen (in anthropological terms) as "ego" so that the point of view is shifted to that animal's perspective. Where possible, the animal's life history (9) is included or forms background to a study. Proxemics (6) and kinesics (7) are useful techniques in ascertaining relationships between members, especially of captive groups (e.g., Hornshaw, 1992, 1985). In confined conditions, where ecological variables are limited, the use of space or the individual's own movements reflect directly on the animal's choice of where to locate itself with reference to those constraints. A group knows something about the health and perhaps even self concept of another by how s/he carries her/his head or tail, the speed of the gait and the like. Wherever possible, background history (8) (including here, (2) and (3)) of the particular group should be documented. Since groups

change over time, sampling at any given moment will alter the researcher's view of patterns; the greater the time depth, the more the sample of observations can be evaluated. The landscape, after a typhoon, will alter resources and change routes previously taken. Group structure amongst *Alouatta palliata* at Caño Palma in Costa Rica, for example, changed radically when a neighbouring landlord cut down a number of his trees, severely restricting movement through that terrain and grouping patterns. Similarly, in Kowloon amongst the synanthropic hybrid macaques, alterations to the major road through the reserve in the late 1980s brought into visual contact and conflict individuals who had been able to avoid each other by careful navigation through the forests in that crowded area. At the same time, arboreal pathways between parts of the range were temporarily eliminated, altering resource availability, and therefore dietary patterns.

Non-human primates too are subject to their personal and group histories. The absence, for example, of a single animal from a group can significantly alter its behaviour. Demographic factors, and therefore biological factors, change due to such historical vagaries (Dunbar, 1987). The loss of one animal may affect grooming or foraging patterns, dominance interactions or alliances, and impact on individual members of the group.

Qualitative research depends on drawing inferences from observations, as with technique (10), Unobtrusive measures. Plant remains beneath a tree in the rain forest at Caño Palma gave my students and me testimonial to the fact that a group of elusive spider monkeys had been feeding in this location when that *nance* tree was in fruit. While exact detail of which member by age and sex ate what part of the plant is not available, the evidence at least suggests constituents of the diet. Fecal remains on the tops of peaks in the mountains of Huashan, Guangxi gave two students testimonial to the fact that a group of elusive leaf eating monkeys (*Presbytis francoisi leucocephalus*) had spent time at those remote locations. While exact details of which member by age and sex had been present was not available, the evidence at least suggested the range of the group.

The research questions establish the *protocol* to be followed. The protocol includes not only the methods to be employed, but the sequence (Spradley, 1980) or priorities to be given occurrences, events, phenomena and observations during the "continuous clock" notation. The protocol establishes what daily information must always be gathered: date, weather, observer, duration of observation, contact hours, locations etc. If the special interest is sibling relationships, then during the course of

note-taking, any such interaction takes precedence over any other activity occurring. The protocol may require the interposition of interval (or Time Allocation) sampling to ensure equalization of data acquisition on certain activities, individuals or locations. It provides the discipline, for example, to sample every ten minutes on the hour, recording whatever X is doing; or what every visible member is doing; or whatever is going on at X location. These samples can be used to check against observation bias and to ensure that the observer is alert to recording everything required by the research question and protocol.

The logic of Time Allocation is that by sampling representative acts (for example eating, playing), the percentage times an activity is done can be substituted for the percentage of all time spent in those activities. A constraint on Time Allocation is sampling a "...sufficiently large number of representative acts..." (Bernard, 1988:281). This number is hard to determine. In a primate's life, would that be eating or playing over five years? 10 years? The usual 18 months? In team work, where the members have been trained in a similar fashion, the protocol assigns tasks to each team member so that, e.g., one may record while another dictates; or one may video according to the direction of another; or each will observe the same activity to later attempt to ascertain what really happened. The protocol also provides the researcher's daily cycle.

Returning from the field is time for thought, transcription, reflection and preliminary analysis. To minimize recording bias, a chart that records entries by time against activity, (or individual or location) assists in evaluating whether or not the allocation of Time Samples is skewed. The absence of any tick marks under the category "play" or "juvenile" for samples taken from 10 a.m. to noon, would alert the observer to ask "am I not picking upon everything? or Why is this activity/age group not represented? The daily Log is entered; foci and activities for the following day recorded and the personal Diary written. Ancillary tools such as video, which ensures 'verbatim' recording of events, (although of a limited frame), enhance triangulation. Context is assured, and re-examination of observations can ensure precision. How many animals were really seen? Did the mother nip the infant before or after she heard a squeal? Was that a directed yawn?

"Triangulation" is a term reflecting the complementary use of quantitative and qualitative techniques. Derived from navigational science, (Denzin, 1978 and Rossman and Wilson, 1985), it brings together several sources of data to bear on a single point (Marshall and Rossman, 1989),

and refers to the use of more than one method of investigation (Bernard 1988; Bryman, 1988). In the early 1980s, Bargar and Duncan (1982) demonstrated that research is fundamentally nonlinear, despite the illusion created by the formalization of research in, for example, journal articles where research is presented as logical. At base, research must be intuitive (Bargar and Duncan, 1982) to describe nature itself, which is nonlinear (e.g., Berge *et al.*, 1986).

This combining of research techniques is natural to and productive in primate studies. Recording observations using the technique of the continuous running clock with Time Allocation (Bernard, 1988) sampling at specific intervals, is one such combination. This permits the preservation of the context while superimposing a discipline. The day's field observations are transcribed onto computer where possible, and preselected categories of information (grooming, or feeding, or socialization) are extracted into appropriate databases or spreadsheets for subsequent statistical analysis. That is, material inherently quantifiable will be treated that way: how many times did Popeye groom Fatty? How many thrusts to ejaculation for the *M. fascicularis*? for the *M. thibetana*? For the hybrids? What part of the *Machilus* or fig tree is eaten? By whom? When? and at the same time, material that gives the texture and quality of their life is retained. What was Brit's impact on the long-tails' feeding behaviour? Why does Popeye excite a grooming frenzy from all females in Fatty's group irrespective of age?

### **Integration Three**

In this paper I have traced the search for objective techniques in the study of non-human primates. Increasing awareness of the intricacies of non-human primate social existence warrants searching for techniques that satisfy the subject matter. Departure from forms of research that reduce the complex web of interactions to isolated threads has a long history in Anthropology. It is time for a return to qualitative methods and to holism in the study of primate social behaviour.

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