

# **The Social Group as Information Unit: Cognitive Behaviour, Cultural Processes**

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## **Introduction**

This chapter is about the social group as a unit of information. That information is of two kinds: it is biological, transmitted through reproduction by DNA (genes) and it is social, transmitted through reproducing of behaviour patterns (i.e., learning). Non-human primate communication can be viewed as the individual projecting images created by its self. These images, or representations code meaning, some of which is exclusive to the local group. Because non-human primates are cognizant of the reactions to their actions, they can manipulate their representations for a given outcome. Manipulation of representations, however, depends on commonly understood or more precisely, shared conventionalized meanings. Since these conventionalized representations extend over time within the local group, it is possible to recognize local group tradition, as well as the process by which tradition changes so that information is constantly renewed.

The focus of this chapter is on monkeys, primarily macaques, which are the monkeys I know best. The "facts" of the matter are occasionally

juxtaposed to narratives. These are intended to allow the reader to depict the scene, to actualize the facts, to recreate my experience which gave rise to theory.

Ben ambles into the open area at Caroline's Battery, crosses to the periphery and hops onto a stone bench. He rears onto his hind feet, head-up, scanning the horizon. He is intently listening. His pinnae move on his head, gathering the sound into his ears, his eyes are bright, his overhanging brow ridge creates a scowl. His concentration is contagious, so that some young ones nearby pip with repressed fear calls, bodies tense, mouths drawn back. They run to the shelter of their mothers. Some older females look at Ben. They sense his tenseness, and look around. They gather their infants onto their breasts and shuffle away. A fight breaks out in response to Ben's tension; the wraahing sounds intensify the mood. The hackles at Ben's neck tense; his facial muscles tighten still more. He gives a low throated bark; the young ones jump, climb, hop into the trees; some females move out of sight; some stay near him, looking in the same direction. They too bob up and down, rearing onto their hind legs as Ben has done. Two adolescent males run ahead, in the direction of Ben's gaze. Now I see it: a dog on his lead approaches. The monkeys watch closely as pipe-smoking master and frolicking dog make their way past the Battery, along the road. Ben gets off the bench, flops down before a female friend, and she begins to groom. At this signal, the group of barbary macaques goes back to less tense activities: feeding, grooming, sleeping while the young play.

Witnessing such interactions over and over again, reveals the profound integration of the non-human primate social group. Information one animal receives is passed throughout the group by looking at, by vocalizations, by hackles raised, by body motions. How one reacts depends on who one is, how many relatives one has, and who they are.

### **Monkey Society Defined**

A society is more than an aggregate of individuals. It is [1] characterized by being bounded in space - members of the group are integrated; relating to and related to each other more than to individuals beyond that demarcation. A society is [2] boundless in time, as the social group continues beyond the life of any member, so that it is characterized by [3] having generations: minimally, breeders and young. Primate societies exceed that minimum, with a post-breeding generation. A society is

characterized by its members exhibiting [4] "a degree of cooperative action based on their ability to communicate with one another" (Alcock, 1975: 403). Finally, a society [5] is an information unit, comprised of all the activities that have been stored by its membership. Storage is genetic, in the individual's DNA and social, in the individual's memory.

A non-human primate society is composed of individuals of different ages, and, generally speaking, for most of the year, of both sexes (there are some exceptions). Tenure in the group is variable, depending not only on the longevity of a species, but also on social process. In many groups of non-human primates, for example, one or the other sex leaves the natal group as sub-adults. Generally, however, the group will contain members of different generations: infants, newly arrived - the product of complex biological activity as well as patterns of friendship, courtship and mating - juveniles, sub-adults, and adults at various reproductive and social stages.

Each generation is constrained by social norms. Roles and frequencies of activities vary from age-grade to age-grade. Infants, for example, will not be protectors; adults are generally not playful. Only adults are reproducers, and of adults, most of the reproducing is done by prime and mature adults; old adults may live past reproduction. Yet whatever the reproductive function, all the age-grades have social roles.

Infants are 'social adhesive.' The infant is born into a matrix that literally contains and centres on its mother, but is peopled with siblings, as well as lateral and lineal kin. The infant is attractive to the group, is sometimes passed around, is usually the object of soft stares, grooming attempts and general proximity behaviour. There is much vying for a chance to get near to the infant.

Charlotte sits with her newborn. She is weary, still streaked with blood, the umbilical cord dangles from her infant. She is approached from behind, the approacher, a female, makes cooing, crooning low-pitched noises so that, perhaps, her approach and person is known. Charlotte turns her head as if in acknowledgement, and tiredly lip-smacks. The female lip-smacks too, and begins to groom. Slowly, her hands wander across Charlotte's back, slowly, towards the infant. Charlotte knows this female; has lived with her for over a decade. She is not stirred. The female continues her slow, almost stealthy groom towards the infant. Reaching it, she grooms a caress,

but Charlotte breaks the contact with a slight move of her shoulder. The female quickly resumes grooming Charlotte's back.

The juvenile is at the first stage of independence and so at the beginning of learning social responsibility. Most of its time is spent in play, but play is not aimless; it is the work of the young. Play, being (in a general sense) exploration in a protected environment, allows for free variation. Through play the juvenile learns about itself, about the capabilities of others, about its relationships in the group. In addition, the juvenile, largely through play, develops new ways of doing things, even using its body in new ways like walking on its hands or covering its eyes; or discovering new foods or inventing new ways of preparing them. Play encourages flexibility as well as "certain aspects of learning ability" (Fagen, 1981: 476). The memorization of these patterns ensures an enlarged repertoire of motor movements, behaviour patterns, gestures, and the like which can be called upon under novel circumstances.

Juveniles are learning elementary adult behaviours. They may babysit infants and certainly most exuberantly give warning barks.

The crows are raucous this morning. Several swoop down from the peak. Three juveniles chorus a warning bark at their flight, but the adults know these birds and do not respond. The juveniles do not stop barking; rather they sort of wind-down.

The responses of the older monkeys inform the juvenile as to which situations are worthy of warning, thus training the juvenile to discriminate appropriate stimuli from unimportant noise.

Sub-adulthood is a bridge between child and adulthood. These adolescent monkeys are caught up in the tension between playing as a young one, and assuming adult behaviour. Capable of reproducing, the sexual movements they have been practising since infancy have new significance. But they are not allowed to participate. Social strictures by adults curtail their sexual maneuvers.

Jake is slim, his long limbs add fluency to his swagger. He is up on a rock when I first notice him, sunning, one lithe limb casually draped over the side. His eyebrows twitch, his pinnae move; he is only apparently casual. Every sense is taut. He is watching; waiting. The object of his attention appears over the edge of the wall below him. She is full-grown, a new adult. She hesitates at the top, then springs lightly to the ground. He

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is up. Looking in every direction, he jumps to the roadway. She stands, and presents to him. He rushes towards her, and begins to mount, placing his feet at her ankles, his hands at her hips. Suddenly, an adult female is there. She threatens him, forwarding her shoulders, extending her mouth, her eyebrows raised. He cowers, and runs off.

Adulthood is the longest period in a monkey's life; and monkeys can live to 25 years. It is not, therefore, a homogeneous stage and different field workers recognize different divisions of this period. Minimally, there are young, prime, mature and old adults. Young adults have a great deal in common with sub-adults, but are emerging from that transitional stage. Depending on species, these young animals are adult at from 3-6 years (earlier for *Cercopithecus* and *Macaca*, later for *Papio*) and attain this stage when they are socially permitted to begin their reproductive and parental lives. With time, adults put on bulk, and are responsible for most of the breeding. They become increasingly more conspicuous politically (Mason, 1986). Mature adults are socially and politically prominent, even though as maturity advances, reproductive activity diminishes, while pigment spots, greying, growths, and extra bulk appear. Descent into 'old' is noted by increased fragility, arthritis, tooth loss, deterioration of vision, and marked decrease of reproductive activity. Old monkeys, however, retain a surprising degree of social and political vitality.

Bridget can barely see. Her brow ridge is so overgrown, it flops in front of her eyes. Like a person with bifocals, she must tilt her head back to get a proper view. She has trouble with sunflower seeds because her incisors are worn down to a nubbin, but she enjoys sitting in the sunshine, cracking them in her molars, working the shells out of her mouth with her tongue. She is approaching the slope where the sun is now full and strong. Under the single tree, whose shade is most attractive, lie a young adult female, her infant, a juvenile, and nearby, a sub-adult male. Bridget sits and glances. Her mouth sets into a firm position and she glowers at the resting group. Getting up, she shuffles in her arthritic but resolute walk. The juvenile jumps into the tree, alerting the others who sit up abruptly, take in the advancing, determined Bridget and leave. Bridget has reclaimed 'her' tree.

Note that the active reproductive function of the animal occupies only a portion of a life: from (on the average) 4 years until about 15 in a lifespan that may stretch to 25. Is all that extra time (energy) about ensuring which

(genetic) template succeeds? Or is monkey life about sociality of which reproduction is merely a facet? If the purpose (plan, design) is about reproduction, what is life once the purpose is fulfilled? Clearly there is more content. It is sociality which gives the definition (significance, meaning) of life for gregarious primates. The actions, reactions and interactions of the members of the social group, categorized as friendships (Smuts, 1985), political maneuverings (de Waal, 1982; Mason, 1986), sexuality, nurturance, education - whatever - establish the content of non-human primate life. These constitute a network, a plasma which both binds the membership into an integrated unit and informs the members as to their relationships and roles within that unit.

### **Information Transmission**

Non-human primates differ from other mammals in several ways. They share with cetaceans and elephants a fetal brain growth trajectory that differs from all other mammals (Deacon, 1990). Relevant to the discussion here is the fact that the increased lifespan of primates is considered to be directly related to the amount of brain tissue. The ratio of brain weight to body weight at birth is typically 6% in mammals. In primates, however, it doubles to 12%.

This growth pattern probably evolved at the beginning of the strepsirrhine radiation in the mid to late Paleocene, initially as a means to reduce maternal reproductive investment in adaptation to a requirement for precocial birth in a strictly arboreal niche, coupled with a relatively restricted insect food resource. When a wider range of plant food resources became available, and body size increased, the Haplorhini, including *Tarsius*, retained the 12% trajectory while returning to a high level of maternal investment. (Sacher, 1982: 97-112.)

Increased care-giving, and a longer life span coupled with a large brain with an enormous storage capacity, identifies the disinctiveness of primate existence. The products of social interaction, that is, the patterns of behaviour are witnessed and memorised. Genetic products provide raw materials including rapidity of nerve impulse, emotional states, muscles, neurons, developmental schedules. Response to these products defines the self, and interaction between "selves" creates social behaviour. In turn, social

behaviour affects emotions, hormones, etc., in the self as well as in others, and so, a dynamic system is described.

Primate societies stand out amongst mammals generally in having time depth. A non-human primate will likely have a living grandparent, and in some protected environments, a great-grandparent as well. All these relatives contribute to the society as information unit. With several generations present at the same time, the amount of information and variety of it becomes virtually infinite. Information is transmitted from generation to generation in at least two ways: biologically by the transmission of templates for protein synthesis and socially through the assimilation of patterns of traditional behaviours. Conventionally discussed as dual, even opposed functions, in reality these constitute a singular process - development. This is a complex, unified process which engages genetic products in the individual's progression within the context of its ecological and social environment. It is therefore that the organism has its individual, ontogenetic history and its group history by the moment of birth. This explains both the similarities the neonate shares with others of its kind and the differences unique to itself. Development is a dynamic process; it is highly responsive to information received at any moment. Templates can only operate on the information or resources they receive. Cascading events are governed by the paths or channels they occupy - and - whatever gets in them.

The rocks in the stream near TaiPo road, thick with trucks and cars in the all-day rush hour, were darkened with gasoline that had been poured to control mosquito larvae. "Little Mama," nicknamed for her activity that breeding season, came down from the branch overhanging the road and drifted towards the stream where she jumped onto a rock, and lowered her mouth to reach the water. When next we saw her, some months later, she cuddled a infant whose hands and feet were malformed into "lobsters' claws."

Transmission of information has both radical and conservative modes. In biological transmission, mitotic replication ensures the conservation of patterns that, assumedly, have been tried and tested. Recombination, on the other hand, which occurs during the process of meiosis, as well as mutation, provides 'new' information in each generation. While it may be interesting to

explain a variant of a trait, *variation* itself is a given. Social transmission of information is analogous. Societies have older generations which guarantee the perpetuation, through reinforcement for example, of patterns that work.

Mark ambles towards Wilma and hunkers down beside her. He places his left hand on little Rosemary at Wilma's teat, and his right hand on Wilma's back, repeatedly clutching her fur. He is "nattering" - opening and closing his mouth with quick tongue flicks and drawing of his lips back and forward - with Wilma at little Rosemary. Each time the infant, pulling away from the teat, makes a sucking movement, which is too pursed, but at least has an open-and-close-the-mouth component, Mark and Wilma repeat their rapid natter. By the third day of her life, Rosemary returns a natter when it is directed at her. Her expression of the pattern is awry, the muscles not yet controlled, but her intent seems clear: she only clomps her mouth open and close in response to the social natter.

## Learning

Monkeys educate by modelling. The purposive or willful instruction of motor behaviours or the inculcation of manners assumes an agent who actively teaches these things. Since the motivation to teach cannot be ascertained in non-human primates, it must be assumed that it is not present; that teaching per se does not exist in prosimians and monkeys. As with Rosemary learning the social natter, activity of the young can be stimulated, directed and reinforced so that it comes to approximate adult behaviours.

Monkeys are active learners, but apparently, not teachers. They imitate, that is they observe, remember, and interpret what others do. The stored knowledge then becomes part of the individual's repertoire, available whenever appropriate. Imitation, means duplicating or copying. It is creating a mental image, a representation. The process of imitation is subjective; the individual absorbs and recreates an image filtering through its 'self' The 'self' is an amalgam of life history to the moment: development, genes, experience, and whatever. Because all the components in the developmental process of one individual can never be identical to those in another individual, the 'self' must be unique. It follows then, that two witnesses of an action will have slightly different versions of the same thing.

The timing of the appearance of the learned behaviour is not predictable, because absorption of the pattern may not be observed by the



researcher. It is therefore that early ethologists proposed ready-made behaviours (Fixed Action Patterns) that would appear in full detail at the suitable stimulus (Trigger Releasing Mechanism). This was a lock-and-key metaphor of stimulus-response. But watching monkeys watching monkeys gives the observer another option. Since non-human primates have vast storage capability, the time span between behaviour observed and re-enactment of the remembered image, can be very great indeed. The witness of the process of imitation suggests this mechanism.

A sub-adult stands looking down the road. He looks down the road, then up, then places his right hand over his eyes, and jauntily ambles in a curious three-legged stride down the road. A juvenile has been watching from the vantage point of the wall. Once the sub-adult is gone, the juvenile takes his place at the top of the road; covers his eyes, and in that odd gait, follows the leader.

### **Information and Cognition**

The imitation of motor patterns encourages physical development and may extend the repertoire of motor movements. The absorption of abstract patterns, however, has also been attested. Cognitive maps are mental representations of the environment. In Gibraltar, the once-a-year trek to retrieve ripe prickly pears, some distance off the usual forage track was led by an old female sensitive to the environmental cues that suggest the immediacy of fruiting time and proceeding, apparently, according to a mental representation of the destination.

The young juvenile is bopping alongside its mother, rather distracted on this hike by unaccustomed sights. This is a route I am told the monkeys take only once a year, when the prickly pear is in season. An older female leads the way: Ben, the new leader comes after, with a mixed-aged bunch. The progression takes them a distance from their usual area. They follow each other in a wide swathe, but with no particular logic; everyone seems to know where everyone else is. I wonder what cue they are using to know the pears are ripe and wonder about how many others also hold a variant of this mental map. The juvenile has kept up with his mother, taking in, it seems, road signs to mark the way.

Investigations of hamadryas baboons (*Papio hamadryas*) indicate that foraging is done with a representation of the environment - a map (Sigg,

1986; Sigg and Stolba, 1981). Cognitive mapping has been observed in apes (e.g., Galdikas and Vasey, this volume) and has been experimentally affirmed in higher primates by Menzel and his co-workers, and is sufficiently sophisticated to permit translation of visual information about the location of food objects from a two-dimensional monochrome screen to the three-dimensional living area (Menzel, 1991, 1979, 1978; Menzel and June, 1985; Menzel and Wyers, 1981). Representations of environmental information are socially communicated - either indirectly as when a monkey directs troop movement, or directly as when, in Menzel's experiments on this subject, a chimpanzee informed his group as to the exact location of some food object

(Menzel, 1971). Communication of environmental images even has semanticity - originally found in vervet monkeys, where Struhsaker identified discrete calls for danger from different sources (Seyfarth and Cheney, 1981; Struhsaker, 1967.)

Yet having emphasised that learning - even of complex information - proceeds by observation, storage and imitation (Hall, 1963; Itani, 1965; Jolly, 1966; and see Galef, 1976 for a partial review), qualification is due. A mother removing food from an infant's mouth or hand, distinguishes for it what is edible; a male tapping a female on her back, pushing her towards her infant as if to get her to pick it up in the presence of another monkey, seems to be cueing her. Young males, sensing the arrival of an intruding animal look to the leader male with a warning 'wraah' as if to inform him: Some information is apparently conveyed with intent.

Rosemary again:

At the tender age of one week, Mark takes the infant Rosemary and places her before him on the ground. He moves backward away from her, about half-a-meter away. Lowering his head to look right at her, he natters to her. Only a few days into her life, little Rosemary is conversant with this positive social statement, and returns the natter while making incompetent crawling motions towards Mark. With a gait somewhere between a pull and a hop, she struggles towards him. When the gap between them is slightly narrowed, Mark steps back and Rosemary starts to crawl towards him again. With any interference from a juvenile, or solicitous individual, Mark scoops the infant up, nattering all the while.

The time depth of three or four generations conserves prior knowledge, and ensures a large behavioural repertoire. The older animals

are the repository of information that has been tested. Their remembering of tried-and-true patterns ensures a repertoire suited to the particular situation of that local group. Still, the young cannot learn all they need to learn from others. Even amongst humans who rely on stored information that is transmitted without agent, that is, the written word, much learning comes from individual discovery. In the exercise of their bodies, young monkeys discover their capabilities and limitations. They adopt strange postures: walking on the backs of their hands, or with one limb off the ground; they perform radical behaviours: leaping off nine meter trees into water; they utter novel sounds, or sequences of sounds; they explore their surroundings: investigating insects, poking at holes; and they explore relationships: wrestling with each other, approaching infants to touch or attempt to carry, playing at sexual contact with monkeys older and as often, younger than themselves (Bruner et al., 1976; Fagen, 1981). Information within a society changes, even mutates from such rediscovery. New patterns emerge through the play behaviour, discovery, experimentation and interpretation of the young. Enactment of remembered patterns however, is filtered through the individual's being. It is to be expected that each enactment will be different to any other, as, by analogy, pronunciation of words gives phonetic variation without altering the meaning of the word. The variations in pattern are what makes information dynamic. Each transmission transforms the information (Sperber, 1985).

Donald is not the brightest of vervet juveniles. We know this from watching him with Debbie. She has invented a swing game, employing humans and Donald can't follow. First, she climbs up the human, and pushes one arm, so that the perceptive human will extend the arm. Next she sits, then slides backwards so that her knees grip the arm, and she crosses her arms across her chest, gripping her shoulders with opposite hands. The human is supposed to sway the arm, so that Debbie gets to swing. Donald tries. He gets as far as climbing the human, and is helped into prodding the arm into place. He gets into the right leg position, but he can't deal with both arms crossing so one crosses, the other hangs down. The swing-through is therefore imbalanced and Donald gets irritated, scratches and runs off.

## Representation of Self

Observation, imitation and interpretation, is the way non-human primates *represent* themselves to others. Representation means the creation and enactment of images. Image is used here in a broad sense to include feeling states and actions, as when - in the non-human primate context – the self conjures an image by moving in a particular manner towards another individual. Enactment stimulates the recipient viewer to remember, recreate, and interpret these images, to produce, as Rumbaugh and Fate suggest, "...a new topography in the pattern of behaviour" (1984: 570). The storage and recall of innumerable environmental images is the hallmark of non-human primate mental activity and, according to Griffin (1976; 1984) a necessary condition for awareness.

At whatever mental level, non-human primates are aware of their representation of themselves, as well as of the representation of group normative behaviour. Representation of self in non-human primates has two aspects: on the one hand, it is the construction of an image for projection. There is however, a more passive aspect which is the reflection of oneself without manufacture. This is termed self-image and reveals how an individual feels about itself; how it is prepared to engage others, to interact. Self-image in non-human primates is testable. Mirror experiments have shown that the great apes respond to their reflection as a representation of their selves (Gallup, 1970; Suarez and Gallup, 1981; Patterson, 1978). They recognize the form before them as unitary with their sensibilities. Monkeys, however, do not indicate a similar ability under test conditions (Anderson, 1984; Gallup, 1982; Gallup, 1970). Does this mean they do not convey an image of self (Gallup, 1982)? Perhaps not. In experiments with macaques using mirrors, I was taken with the nature of their response to the viewed form. The form was a representation of another monkey of a particular age/sex/status group. Since the field of view was circumscribed by the mirror itself, the reaction of the monkey was specific to the reality s/he perceived. Hence what was being tested was the way the subject reacted to a kind of individual: a young adult male seeing a young adult male, reacted with fear grimace and appeasement gesture; a sub-adult male, responded to a

sub-adult male with a play face; one old adult female responded to her mirror-image with lip-smacking; another equally old, with a threat. Clearly what was seen was a representation of an age/sex category: not an individual. The viewer had no visual antecedent relationship with the unknown image. The reaction, therefore, literally reflected the viewer's engagement to 'the stranger,' hence, what was being tested was the representation of self the viewer projected in that second aspect: the reflection of self without construction. Confirmation of field observation comes from laboratory experimentation of this capacity. Yoshikubo prepared slides of rhesus monkeys grouped into classes based on shared characteristics. Results suggested that the monkeys were able to conceptualize a "...class of not rhesus monkey" (1985: 298), that is, to identify their own group as an entity distinct from a group of another species.

But the non-human primate perceives the reaction to its action (Burton, 1984; Cheney and Seyfarth, 1990; Seyfarth, 1987; Shafon, 1976). That information becomes part of a pool of data concerning the image that was projected whose elements include: the animal's self, the receiver's reaction to that self as projected, as well as the elements of the representation that elicited the reaction. However mentally processed, then, the non-human primate has become aware of the projection, and can manipulate this representation to manufacture an image. There is a segment of film, for example, on the baboons of Gombe (Swan Productions, 1975), where a young adult male, 'The Stranger,' having moved in on the local group, is backed into a lake by two young males. He has nowhere to go. Another step backward, and he is clearly vanquished; his bid for place in the group is lost. Instead of moving back, however, he leans forward. His repositioning alters the projection of himself, and the two young males back away. The 'Stranger' can stay. Similarly, even known individuals can become "strangers" by recreating the image of themselves. This is what occurred when an adult female macaque from Gibraltar threatened a subadult male. In the ordinary course of events, he would have lip-smacked in return or fled from her. Instead, he threatened her; he was tense and his threat was tentative. The adult female however, reassessed the image and backed away.

In some fashion, his holding his ground, his projection of a self at variance with her expectations, recreated a being which required a new response. Sometimes, the recreation of one's representation requires drama. The classic case concerns the chimpanzee, Mike, and the tin gasoline drums. Recasting his image as a noisy, awesome male, produced a new representation and thereby permitted him ascendancy to a new role (Goodall, 1986.)

Acknowledgement of the immediate consequence of an act may well have been the historical basis for the evolutionary capacity to make constructs of futurity; reflexive capacity, once

..."gotten from the 'inside' to the 'outside,' that is, transformed from solely mental images to externally visible signs made in behaviour or sounds that broadly represented individual reflexive products, then an evolving primate population would be able to share quickly and widely among themselves the several versions of the consequences of present and past behaviour for the future of not only solitary individuals but the entire population (Williams, 1972: 240-241).

Yet non-human primates do not acknowledge evolutionary time. They exist within personal time; they live within bounded time and space. Time is yesterday whose memories are stored; today is sensible: what is currently known, felt, experienced. Tomorrow is likely not an abstraction for them. At best, the future exists as a goal currently held. Seen after the fact, it appears that a non-human primate has developed a complex strategy over time to effect a purpose: there is doubt that this is what actually occurs.

Rather, the memories evoked by an immediate image prompt the animal to perform. Thus, in political machinations, the monkey acts today for an outcome or goal that is prospective; but the moment of its occurrence is always the present.

### **Role Behaviour**

Role behaviour is social conduct defined by reciprocal expectations (Benedict, 1969). The roles are tasks performed or fulfilled by occupants who must meet (at least minimal) expectations of how the role is performed. A case in point is the local pattern of male-care amongst the *Macaca sylvanus* in Gibraltar, where male involvement with infants is significantly greater in

extent and duration than it is with conspecifics in Morocco (Burton, 1972; Deag and Crook, 1971), and where, since babysitting is a male role, young females are kept away from infants so that young males may learn their role. While the interpretation of the male-care role has certainly depended on the practitioners of it, the behaviour pattern has repeated over generations.

In Kowloon, one local group exhibits another interesting tradition of babysitting. This group has two old female Bear macaques (*M. thibetana*) who look after the infants of the long-tailed macaques (*M. fascicularis*) in their mixed group (Burton and Chan, 1987). Long-tail type females, therefore, do not babysit. The task is left to the old ones, because the expectation of that role is clearly delineated.

Because roles are conventionalized expectations of traditional behaviour, manipulation of roles for political outcomes occurs. Clearly, manipulation implies intent: a conscious use of information in order to obtain a goal. There is now ample recognition that such behaviour does occur in non-human primates (e.g., Byrne and Whiten, 1988).

Frances is fully mature now; at her prime. She is perhaps the doyenne of the females in her group. She moves easily between individuals and sub-groups; is groomed by almost everyone. She readily approaches Sam, as doddering and crochety as he appears. Some days ago, four young males came - invaded - from the other group. They killed Jim in a fight. He lost his footing and tumbled down the cliff, crushing his skull from the impact. Amongst the four young males was Jake. Still nervous, he was noticeably tense, ready to jump or run at any moment. Frances spent some time quietly approaching Jake. She nattered, and flopped down inviting a groom. He responded, tentatively, with quick grooming strokes and not for long. The situation round and about required too much attention. But Frances was persistent. For days she kept approaching him, grooming him, asking to be groomed. When her perseverance earned his trust, she began to approach Sam and groomed him. She would then go to Jake and groom him, and alternating between one and the other, she was able to decrease the distance between them, bringing them within a couple of meters, until finally she left them an arm's length apart. Her mediation worked: Sam allowed Jake to groom him, and Jake became the new second male. (*M. sylvanus*)

The determination of which individual occupies what role is apparently a local phenomenon, with age-based decisions more prevalent than sex-based ones (Burton, 1977). Outside of the biological roles of

progenitor and progenitrix, the basic social tasks, rearing the young, moving the troop, protecting the troop and maintaining group cohesion, could be filled by either sex (Burton, 1977).

Learning established patterns is a complex process. As the monkeys mature, their observation of what other animals do within the group establishes traditional norms or conformities, and defines roles. The young enact what they have observed. The performance of the action is refined by older monkeys who discipline the younger, channeling, modelling, constraining their behaviour so that it comes closer to resembling accustomed patterns. Two factors effect learning a role: [1] the size of the group and [2] personality. Access to information and therefore acquisition of it, depends on its visibility. The larger the number of animals in the group, the more an individual's view will be a small sample of the total. In the two local groups of barbary ape in Gibraltar, each individual could know each other personally, whereas at a primate centre holding 300 conspecifics in France, some individuals, would probably never be observed by others. The expression of their role, then, would not be available for copy by some individuals. The size of a group constrains the number of roles a given individual may have. The larger the group, the greater the role specification - protector may be a different role from leader, etc. - and the more copies a particular role will have. In a large group, the number and kinds of role models increase. In such circumstances, the choice of model(s) to imitate is hard to determine. What makes the player of a role visible may be his/her relationship to the viewer, his/her status in the group or sub-group, his/her age, or more ineffable individual attributes, and even chance.

### **Personality**

"Personality" (Poirier, 1972) in non-human primates is a composite of development, genetics, physiology, experience, awareness and, simply, unknowables. An individual then, is a singular phenomenon. The understanding or "reading" and consequently, the expression that individual will give to a role will be unique. That interpretation, however, cannot overstep local norms, because there is social sanction: others will behave negatively or not respond. Some individuals within a group, for reasons of personality alone, have more



prominence than others. Their actions are recorded whatever their quality.

Sweetpea is running pell-mell through the group. The juveniles and infants scatter before her. She runs up to her mother, who gently threatens this juvenile, and sits down, catching her breath. The giant of a female bear macaque (*M. thibetana*), who is her mother, sits eating quietly. Several adult animals approach, and the mother threatens them all, with a minimum of energy in her gesture: she barely opens her mouth or even lifts her brows. They startle and move back. Sweetpea leaves her mother, and rushes up the hillside behind, her goal a young juvenile who is swinging on a liana. Sweetpea grabs the little monkey's foot, and bends over to mouth it, till the juvenile, losing its balance on the swaying liana, squeals. The warning 'runnh' sound from several animals around her, sends Sweetpea dashing back to the ground near her mother. This formidable female raises her head, and glances about, extending her protection to her devil-may-care offspring. There Sweetpea attempts to tussle with a few juveniles, but unwilling to play with her, they scamper off. A human with a young child passes by, and Sweetpea, her mouth agape, her forehead pleated in threat, rushes to the child, grabbing at its clothing. Sweetpea's mother stands to face the human, once again according her recalcitrant offspring the protection of her bulk.

Mark is old - somewhere past 20 chronological years. His incisors are gone; his brow overgrown. His shuffling walk suggests arthritic joints. Sometimes it seems his hearing (or his judgement?) is not so keen: the younger male Barbary Apes (*M. sylvanus*) prod him, cue him into reacting. A sub-adult misbehaves, chasing a juvenile, grabbing and mouthing him. The juvenile vocalizes in distress and Mark looks over in that direction. The sub-adult catches Mark's gaze and as if struck in punishment, he releases the juvenile and dashes off. Over in the other group is Sam. He is every bit as old as Mark and just as aged. A sub-adult crosses the area in front of Sam. He is chasing a juvenile, and catches him. He mouths it, and the juvenile utters a distress vocalization. Sam looks at the sub-adult, who continues to distress the juvenile. Sam emphatically threatens the sub-adult, with mouth and eyebrow statements. The sub-adult carries on. Sam leans forward, his shoulders bobbing, the sub-adult continues to ignore him. Finally, Sam lunges towards the sub-adult, who drops the juvenile and flees.

The contribution the individual makes to the definition of the role, the personal interpretation, comes to be part of the repertoire - the behavioural options available to the members of the local group.

Because the adult retains its knowledge of its play patterns, its discoveries and what it has observed, the society is ensured a large repertoire of motor movements, social interactions, gestures, and the like. Because a primate society is age-graded, information is dynamic. There is a mechanism to retain accepted traditions, as well as adding new material. Accepted traditions are retained in the performance and modelling of behaviours by older individuals; new elements (alterations) and new patterns (innovations) are introduced largely due to the activities of the young.

The smaller the group, the greater the impact of new ways of doing things; the more likely they are to be noticed, conventionalized and included into the traditions of the local group. Inclusion occurs synchronically, through observation and imitation of one generation by the other, or diachronically, as the inventors age and remember. The number of animals in the group influences the visibility of any one of its members. Carpenter early recognized this effect of number on relationships within a group when he used the simple formulation:  $N(N-1)/2$  to show how group number determines the number of dyads, hence the combinations of relationships. The number of roles and the number of players for the role and the representation or image of how the role is to be played, will be more variable with increasing group size.

Sperber has noted that "Representations ... tend to be transformed each time they are transmitted" (1985: 75). Individuality or personality in non-human primates is a concatenation in development of genetics, experience, perception, choice and ineffables. What image a given animal picks up from the representation of a particular role enacted by the incumbent, is unpredictable. The manner, therefore in which that individual will itself perform the role is idiosyncratic within the bounds of local tradition. Indeed, the very act of storing the information about the role, and recalling its representation alters it (Sperber, 1985). Of course, in the re-creation of the behaviour, should the animal exceed permissible norms, "retribution" will come in the form of not being responded to or incurring negative response. But within the range of intelligibility, is the space that accounts for non-biological change within the patterns of behaviour.

Variability is a function of the number of members in the group, whose several interpretations slightly alter the conventions.

### **Innovation**

Changes in new patterns may be merely alterations or modifications in already existing forms - slight adjustments, or interpretations. Changes, on the other hand, can also be *wholly* new, that is, a novel association of elements. The term "innovation" has been used in the relevant literature to convey both meanings, unfortunately, too often without clarification. However, the consequences of *innovation* are different to those of alteration. The acceptance, for example, of a wholly new pattern will be different from modifications in an established one. The meaning of the term 'innovation' is therefore restricted in this chapter to refer to the introduction or creation of a totally new *pattern*.. Changes in elements of an existing pattern or tradition, are alterations or, simply, modifications.

The analogy between biological and social transmission of information has been drawn above, in order to highlight the fact that information transmission is conservative and radical at the same time. In social behaviour this is a function of the generational structure of a non-human primate society. There are "mitotic" and "meiotic" parallels: replication by the older generation of stored behaviour patterns represents conservation of information. It is usually the younger generation (e.g., Jolly, 1985) which introduces new information, with innovation analogous to mutations and meiotic intrachromosomal recombinations, that is, crossovers, which realign genetic information. The juxtaposition of established elements creates a new statement. Modifications are analogous to simple meiotic interchromosomal recombination, i.e., Mendelian independent assortment: the association of parental chromosomes.

The analogy underlines the regularity of this process: recombination regularly (but not invariably) happens in meiosis; replication regularly happens in mitosis. The generational effect in a society also gives that regularity. Following the analogy with meiosis, behavioural innovations are most often due to associations of already existing information. Mutation is rare and not often incorporated into the information-set whether as genes or

traditions. The biological analogy is limited, however, in that young animals, of course, can faithfully replicate behaviour patterns and older animals can innovate.

When it is older individuals that innovate, it is often due to ecological pressures (Hauser, 1988). A recent example of the development of an innovation amongst mature animals comes from the "Pump House Gang" of baboons (*Papio anubis*) on the Kekopey Ranch, near Gilgil, Kenya which prey on a variety of animals. Changes in predatory techniques have been documented since the group was first studied (Strum, 1987; 1981). After three years of predation on accidentally found animals, a new pattern of "....

elaborate searching, stalking and chasing ... complex hunting" (Strum, 1981: 274) developed from the previous casual stalking and capturing. Then the pattern of a single animal hunting gave way to coordinated efforts: baboon males chased Thomson's gazelles toward other hunters, and several kills resulted from sequential chases" (Strum, 1981: 275). The proximity of infants to females who were interested in eating meat gave an impetus to the dissemination of this tradition. "Schooled," as it were, at their mother's side, their "...observation, investigation, and imitation resulted in meat-eating for infants of all ages" (Strum, 1981: 280). The relationship of infant to adult male also influenced infant participation, and hence potential absorption of this pattern.

...on one occasion several infants attended a kill with a male with whom they associated regularly. They had no special relationship with the male feeding on the carcass at the time and did not approach it or him. For over 45 minutes they stayed near their male associate, and when the previous consumer finally left and the second male took the carcass, the infants immediately rushed toward him and the meat, investigating the carcass and feeding on scraps that were nearby. (Strum, 1981: 280)

Eventually, the male baboons began to actually share the meat from the kill with females, moving aside to let a friend have a bit (Strum, 1987).

The first, and classic example of this process of innovation and tradition development, was observed several decades ago on Koshima Island, Japan, in a provisioned troop of *Macaca fuscata*. A 16-month-old female departed from the usual behaviour of rubbing sand off potatoes provided to

the troop on the beach. She began washing the potatoes in the sea prior to eating them. This innovation, over time, spread throughout the troop. After four years, half the troop were regularly washing their potatoes, and by the end of nine years, 71% of the troop were habitually doing this (Frisch, 1968). The route by which this innovation was disseminated is interesting. The inventors, the young, were the first to imitate the behaviour which then spread to the older ones. Speed of assimilation of an innovation depends on who innovates. Some individuals, because of their personality, age, role, status or affiliations within the group will be more noticeable than others. Hence, their behaviours are more likely to be observed and imitated. The significance of the contribution of such noticeable members to the group is that their ways of doing things over time may become essential to the group.

Note that it took four years for half the troop to regularly use the potato-washing innovation. This is not only because it takes time for imitation of an imitation to diffuse through a group, but because another process is also involved. As monkeys age, they take with them into adulthood the knowledge (innovations included) they learned as young. Hence, even without imitation by one animal of another, that which was radical, and perhaps even unacceptable to the older generation becomes part of the repertoire of the troop as the young become old. The example shows how new elements are incorporated into the catalog of behaviours over time. Thus change is part of the system, and variability is the corollary or consequence. Innovations are learned as part of the group's conformities, and the absorption of these construct local ways of doing things: tradition.

### **Tradition**

The argument over whether or not non-human primate societies have traditions has tended toward the affirmative. After a decade of evaluation of deme-restricted patterns in monkeys and apes alike (Kawai, 1965; McGrew and Tutin, 1978; McGrew, Tutin and Baldwin, 1979; Goodall, 1986; Strum, 1975), it seems that: "The capacity to acquire a given technique through learning plays a role similar to that played by genetically controlled behaviour in lower species in ensuring the continuation of some behaviors... (Goodall, 1986: 562).

Traditions are patterns of behaviour that are endemic to a local group and that are acquired by social transmission from one individual to another and from one generation to another. Many traditions that have been witnessed concern food acquisition, as with the Japanese macaques (Kawai, 1965), or termite hunting amongst chimpanzees (Goodall, 1986), or hunting behaviour amongst baboons (Strum, 1975). Some observations have been made on tool-use amongst apes (McCrew and Tutin, 1978; McCrew, Tutin and Baldwin, 1979) or the development of social traditions, as in male-care in barbary macaques (Burton, 1972; Burton and Bick, 1972). The actual number of witnessed, confirmed, and fully described traditions remains small and has limited the discussion of Tradition in non-human primate studies. It may well be that this limitation is due to the inability of the observer to witness tradition.

Traditions are the conformities or social dictates which members of a group obey (Hall, 1968). Amongst these are when and where to play; which individual is available as sexual partner; whom to sit next to; what food is edible; where food may be found at certain parts of the year; who raises the infants, and so on, so that the roles that individuals occupy are defined by social norms (Burton, 1977). A group's traditions defines the set of conventions by which it operates including foraging, socialization, hierarchies and role behaviour.

Traditions are conventionalized representations. Built from reactions, and reactions to reactions within the local group, these conventionalized representations, over time, constitute that group's tradition. Representations are information and a non-human primate society is a dynamic system of information. It is dynamic because in non-human primate societies the delicate balance between stability and instability is a permanent state. The tension between the conservative forces of replication, of reduplication of tried-and-tested patterns which are stable, is in dynamic opposition or synergism with the forces of mutation, of radical change, which are unstable. The oldest members of the group stabilize information, while the young, particularly through their patterns of play, introduce new elements. Because typical primate groups are comprised of three generations, the conservation of pattern is balanced with the introduction of new elements. As long as the oldest member of the group can

retrieve a stored image, that representation can potentially be conventionalized and inducted into the group's tradition. Part of the social value of the old in a primate society lies in this storage capacity (Rowell, 1966). Remembered in turn by the youngest member of the group, traditions can have considerable time depth.

In his discussion of local traditions and "cultural" transmission in non-human primates, Nishida suggests that social knowledge is "lost when the individual dies" (1987: 463). But he disregards the fact that however transient a behaviour, its performance, its action time leaves an imprint on whomever has observed it or knows about it. As these are remembered, the time factor extends to the duration of that storage system - i.e., until the last animal who witnessed the last performance of that action dies. The action-memory that is the result of behaviour, then, has a reality because it potentially continues to effect others. It is the source of social networks, hierarchies, patterns of foraging, nest building, socializing, aggression. To that extent, it is *transcendent* because the effect goes beyond the individual creating it. The behaviour or sum of behaviours, while a function of organic being, muscles, bones, hormones and cells, exists beyond the organism that behaved within the memories of those who witnessed it. The set of conventions which is the weave of the social fabric is unique to a local group.

### **Manipulation of Representation**

Shared representations constitute a set of information local to a particular group. Manipulation of shared communicative elements occurs, and indicates the ability to utilize representations for purposive or specific goals (Burton, 1984; Cheney and Seyfarth, 1985). Manipulation of representations depends on socially agreed upon representations, that is, forms of communication and behaviour that are responded to in regular or ritualized ways. These constitute the conventions of a group. Socialization is the intergenerational transmission of culture (Williams, 1975), where "culture" is understood as group local "information" (McFeat, 1974). Socialization is the process of maturation within a group such that witness of, and ultimately replication of conventions ensure information transfer, with relatively little noise or distortion in daily circumstances. The more clearly

an individual knows patterns, the greater the guarantee that information will be transmitted as sent. Socialization is the process whereby group local patterns or conventions are assimilated. By altering conventions, an individual can achieve a goal. Manipulation of one's conventionalized representation is commonly done. Typically, an individual employs gestures belonging to another age/sex category. A particular response to this gesture is expected. Utilization of an inappropriate representation itself, therefore, represents a sophisticated awareness of cause and effect based on prediction of outcome (Gouzoules, Gouzoules and Marler, 1984). This is particularly so if an individual utilizes an infantile gesture because these are obligate stimuli.

I am watching three *Cercopithecus neglectus* monkeys this morning. The adult female, Bella, is chewing some delectable bit of banana; her juvenile, Beebee is lolling around. The adult male is sitting, doing nothing in particular. Beebee's gaze wanders rather directedly towards the male, her father, and then to me; to her mother, then to me. Suddenly, she shrieks, and I am surprised that she uses an infant's shriek. The male rushes at me; his threat is frightening enough - even with bars - that I back off.

This powerful stimulus apparently obliged the adult male to respond by charging the intruder. The juvenile employed a conventionalized representation for a goal; the adult male conformed to a public representation in fulfilling his role. This anecdote appears to support Sperber's (1985) contention that other animals cannot disbelieve what they perceive or decode, because the adult responded to what appeared to be an infantile cry. Other information however, suggests that what occurred here is considerably more complicated: the adult male apparently chose to respond to the juvenile as if the communication was bona fide.

Surely, having lived with the juvenile for some time, and knowing the noises that infants make, he will have known that what the juvenile was uttering wasn't "true." The ability to manipulate information with strategic intent, that is, to deceive, is documented under experimental conditions (Byrne and Whiten, 1988; Goodall, 1986; Woodruff and Premack, 1979; Menzel, 1971). Success at social manipulation depends on knowledge of and "insight into the social networks of a group" (Strum, 1987: 121). What this



monkey anecdote suggests however, goes one step further: the receiver evaluates the representation, and evaluates the transmitter as well. Hence, the response is qualified. Manipulation is a term preferred to "Machiavellian Intelligence" as it is a neutral one which does not judge the motivation in assessing the act. The ability to manipulate a representation stems from a more general primate ability. Primates are unique in having several visual centers (Passingham, 1982), and in their ability to quickly associate images and thereby to predict situations. It is the ability to PREDICT which is the fundamental ability underlying primate intelligence. Manipulating images is a subset of this ability, a facet or derivation of which is the ability to deceive.

Non-human primates do make mistakes, however. A threat face directed at a particular monkey may be disbelieved, and the threatening animal approached anyway. Perhaps some quality of the gesture, some meta-quality, modified it to mean "I look as if I were threatening but am not." On the other hand, it may also be that the receiver simply misinterpreted, or chose to appear to misinterpret, and approached anyway. If the sender then attacked, we would know the threat face was intended and the receiver had misjudged: the act of approaching, however, may alter the behaviour of the sender, confounding interpretation. The classic example at this level, is the non-threat yawn. The primate clarifies the representation by covering the canines with the upper lip: it "reads" therefore, "disbelieve that I am threatening." One part of an expression, such as the eye component, can belie what another part, such as the mouth component is stating (Zeller, 1980). Thus, a macaque female can threaten with the eyes but lip-smack simultaneously. The viewer receives a single message which is understood as a meta-representation precisely because it is ambiguous. The doubt cast upon the image is derived from the juxtaposition of incompatible elements. Repetition of this juxtaposition conventionalizes it.

### **Tradition Drift**

The traditions of a group, then, are not static. There is a drift in a group's traditions as patterns diverge from each other over time or space: group A is different to its descendant group A, or its fissioned group B. Tradition Drift (Burton, 1972; Burton and Bick, 1972) comes about for a

variety of factors: [1] there is variation in the production of conventions; [2] innovation occurs; [3] the presentation of representations by some individuals by virtue of age, sex or status, are prominent and are observed; [4] the caprice of memory stores some representations and not others. The concept of Tradition Drift contrasts with what Eggan (1963) and others before him (e.g., Herskovits, 1948) termed cultural drift. This idea was presented as an adaptationist explanation and described as "...a regular series of changes in social, political, economic and religious institutions, a series which has a definite direction" (Eggan, 1963: 253) and this direction of change was due to "...selection as a result of internal adjustment of the interests of various groups within the society" (Op. cit: 254). Tradition Drift is the non-biological parallel to the genetic process: an alteration in the pattern of information which is not due to Natural Selection (Suzuki et al., 1989). In this, the notion contrasts with Wilson's use of it:

The component of divergence based purely on differences in experience can be referred to as tradition drift (Burton, 1972). The amount of variance within a population of societies is the sum of the variances due to genetic drift, tradition drift, and their interaction. (Wilson, 1975: 13-14) [italics mine]

That is, agreeing that Tradition Drift accounts for differences between groups, Wilson goes on to relegate those differences to random sampling error of the genetic endowment of individuals which, he argues, determines social behaviour.

In any particular case the genetic and tradition components will be difficult to tease apart and to measure. Even if the alteration in social structure of a group is due to a behavioral change in a single key individual, we cannot be sure that this was not predisposed to the act by a distinctive capability or temperament conferred by a particular set of genes. (Ibid: 14)

Certainly, the act or behaviour must stem from its biological basis, must work within its morphological constraints, but the act and the consequences and products of the act exist in their own right. Behaviour, as Piaget succinctly put it, is the "motor of evolution" (Piaget, 1978: 146) - not its consequence. Tradition Drift is a social process.

Biologically, all individuals in a group are not equally relevant, since biological transmission of a non-human primate group is effected by a small

number of individuals. Whatever the original or absolute size of the group, the Effective Population Size is a much smaller fraction. Biologically, the probability of any member of the group being expressed in the next generation is a function of the number of genes it shares with the actual reproducers. This means that the representation of the group depends on a few.

For the social system, however, the individual has a different meaning since all associations, that is transfers of information, are equally relevant, despite the fact that not all individuals in a non-human primate group are equally visible. Hierarchies of age, gender or status, do mean that some members of a group are more prominent. Hence, as the Japanese experiments with the diffusion of new foods in a troop showed more than twenty years ago (Itani and Nishimura, 1973), innovation by a prominent individual spreads rapidly through a group. Innovation, however, regularly spreads because the innovator is in close association with relatives and peers and others who imitate its behaviour (Fagen, 1981). In this fashion, young individuals can be the source of the diffusion of novel information. It is not their prominence, but their associations which make them relevant. Whereas, however, the number of fertile matings is a reducing number, the number of associations is multiplicative (as witness Carpenter's formula for dyads above). Hence, in terms of social impact, all associations, that is transfers of information, are equally relevant and each individual is significant to its group.

As a metaphor for a non-biological mechanism, Tradition Drift explains differences between groups. The metaphor is helpful in evoking the notion of generational fluctuations with no preordained direction; no intent or purpose. Traditions change, not because it is good, bad or indifferent or even adaptive for them to do so, but due to the vagaries of the process of absorption and representation. As with genetic drift, change occurs dramatically in small groups, though given sufficient time, in any group (Suzuki et al., 1989). The metaphor ends there, however, because genetic processes involve *traits* subject to statistical predictabilities, while behavioural traditions are *patterns* - larger concatenations of integrated wholes, some of which allude the researcher's measurement. Then, too, Genetic Drift is truly a random process, that is, a statistical phenomenon where any item amongst

several has precisely the same probability of being included in any sample of N observations (Hays, 1973).

The factors effecting temporal continuity of a tradition violate this assumption. They include visibility, personality, affiliation, status, and age. Yet, there is no, and indeed there can be no evidence, either, that these components are "selected," that is, that a pattern as expressed by an individual has a direct influence on the number of offspring's offspring that survive. The influence of an aged personality, like Mark in Gibraltar, or Fatty in Kowloon, is undiminished despite his/her attenuated reproductive role. On the other hand, the genetic value, the future adaptive value of e.g. washing sweet potatoes as innovated by an older juvenile is, to say the least, obscure. That is because it is a proximate behaviour. For some biologists (e.g., Dunbar, 1988; Tooby and Devore, 1987) proximate behaviours are significant only in the service of evolutionary process. To those participating in them, however, proximate behaviours are the totality of existence. Having a new food source NOW ensures fullness NOW and another food source in the repertoire tomorrow. That in turn affects the number of animals within the group and the relationships between them and that series of consequences goes spiraling out and at the same time feeds back with new consequences - all of which are still proximate.

The relationship between the here and now and evolutionary process is a guess. Like religion, it becomes an article of faith, that the complex behaviours occurring in the presence of an observer, have meaning - value - only in the distant future. Renunciation of the importance and meaning of this life for some other "time" (heaven, tomorrow, evolutionary future) overlooks the impact of current activity on the nearby interval, and neglects the subject's reality. A monkey generation may be four or six years; its lifespan 20-25. That monkeys do not choose the mates for their offspring let alone their offsprings' offspring suggests that behaviour and even political machinations are about themselves and not merely promulgation of genes. Even political behaviours (de Waal, 1982; Mason, 1988) which can extend over several years' duration have their significance in that immediate future: both in the process, the machinations themselves, and in the outcome.

Joan strokes and parts Bridget's fur. Intent on her task, her hands move almost rhythmically. Bridget, relaxed, sits with eyes closed. Bridget's daughter is nearby. Wilma, Bridget's sister, sits a considerable distance away. It's been like that since last summer, when Joan began "courting" Bridget and keeping Wilma away, challenging Wilma but soothing Bridget with grooms and natters. Wilma is approaching now. Bridget stands, and, surprisingly, so does Bridget's daughter. They face Wilma, and the daughter, watching Joan, taking her cue from Joan's face, also looks at Wilma, raises her eyebrows, drops her jaw, threatens her mother's sister so she cannot come near. Joan has been following a young male as well. She sits with him, follows him, grooms him, is the active partner with the reluctant male. He walks with her, she strolls further and further away from the main group with him in tow. Are all these intrigues, this separation of Wilma and Bridget, this reorienting of Bridget's family towards herself, this alliance with the young male, is this about forming a new troop?

### **Conclusion**

Non-human primates live in a proximal world enmeshed in their interactions. Each member of a social group is the individual result of a long personal history. That history includes genetic templates for the manufacture of organismic substances - from bone to hormone - development in an ecological context and social community (maturation and socialization respectively) and results in the personality, the being which is, clearly, not just a summation of its parts. Group members learn the codes which constitute the repertoire of the group. While the individual is maturing, is developing, is being socialized, it is also active. That activity includes selection, imitation, manufacture, amalgamation, emphasis, innovation, and perception of representations. When individuals interact, the result is social behaviour. Regular patterns of doing things form traditions in a society. Non-human primates are capable of recognizing the impact of their representations and of manipulating them to some purpose.

Conventionalization of representations constitutes a local group's traditions. Over time, and through space these patterns change. Tradition Drift comes about due to a variety of factors: there is variation in the production of conventions; innovation occurs; the presentation of representations by some individuals by virtue of age, sex or status, are prominent and are observed; the caprice of memory stores some representations and not others.

Tradition Drift accounts for the differences between groups in their social behaviour. In addressing the question of what is the locus of social behaviour, Tradition Drift explains the process of behavioural differentiation between generations of a society, and between neighbouring, recently fissioned demes.

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