

**‘Beauty Magic’:**

**Deceptive sexual signalling and the evolution of ritual**

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**Frontispiece** Deceptive sexual signalling: the ritual leader of the Maasai *eunoto* wears red ochre and his mother's jewellery (photo Fisher 1996: 24).

Strike [the dingo] with the tuft of eagle feathers [used in initiation]  
Strike [him] with the girdle  
Strike [him] with the string around the head  
Strike [him] with the blood of circumcision  
Strike [him] with the blood of the arm  
Strike [him] with menstrual blood  
Send [him] to sleep,...

South Australian shout for running down dingo,  
M. Mauss, *Body Techniques* (1979: 103),  
citing Teichelmann and Schürmann (1840: 73).

## ABSTRACT

This thesis examines the function of cosmetics, and their role in the evolution of symbolism. Ritual forms of cosmetic display are considered as extravagant or costly signalling within a framework of signal selection theory. It is argued that cosmetics, encompassing the spectrum of techniques for costly signalling with and through the body, constituted the earliest art form and primary medium for political and ritual mobilisation.

The thesis is divided into two parts. The first addresses the evolutionary processes by which humans became the unique symbolic culture-bearing species. Evolutionary ecological modelling is used to relate the energetics of encephalization to evolutionary change in two main areas: i) partitioning of reproductive and somatic effort by females to alleviate reproductive stress; ii) female reproductive physiology including mechanisms for extracting increased investment from males. This yields a specific hypothesis for the emergence of symbolism. Acute reproductive stress arising from encephalization in the late Middle Pleistocene intensified sexual selection pressures on females. This promoted a strategy of 'deceptive' sexual signalling: cosmetic manipulation of signals of imminent fertility, termed 'sham menstruation', among coalitions of females. Cosmetics, combining pantomime dance and bodypaint, formed the substrate of ritual and symbolic culture.

The second part of the thesis tests aspects of the model using a cross-cultural survey of historic ethnography of female and male initiation in sub-Saharan Africa. Standard Darwinian sexual selection theory is applied to formulate hypotheses on the variability in costliness of cosmetic usage by either sex. These costs are related to such factors as need to form reciprocal alliances with members of the same sex, intensity of sexual competition, and level of male contribution to the sexual division of labour. The 'sham menstruation' hypothesis for the evolution of ritual yields predictions in two main areas relating cosmetics to magico-religious symbolism. Firstly, the signature of ritual potency will be highly conservative, combining signals of imminent fertility with those of non-availability, linking blood-like cosmetics to 'wrong' displays of sexual and/or species characteristics. It is shown that this 'red' plus 'wrong' signal – usually comprising sexual inversion – remains a recurrent feature of sub-Saharan African initiation for both sexes. Secondly, ritually bounded communities identified by these 'deceptive' entities are a prerequisite for language to be founded on a basis of trust. This is demonstrated in case studies of the ritual acquisition of 'secret' language in female initiation schools.

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## CHAPTER ONE

### INTRODUCTION

#### 1.1 The problem of symbolism

The evolution of the uniquely human facility for symbolic communication, realised in such forms as language, art, myth and ritual, has probably been the subject of more ‘just so’ stories than any other sphere of human activity. Tooby and Devore (1987) discuss the criteria qualifying a model as scientific and therefore helpful in advancing the state of our knowledge. A scientific model should be framed within a coherent and well-trying body of theory; it should enable us to relate fields of data which were previously unrelated; above all, it must generate predictions which are testable in the light of appropriate empirical data.

A compelling account of the emergence of symbolism remains the great challenge facing modern Darwinism. The problem is most frequently framed in terms of the evolution of language (cf. Pinker 1994, Maynard Smith and Szathmáry 1995). In this thesis, I argue that the problem of language origins is inseparable from questions relating symbolic culture in all its forms, as the matrix of human cognition, to the evolution of human social organisation (cf. Chase 1999, and see Introductions to Hurford et al. 1998, Dunbar et al. 1999). What kind of social life makes symbolism possible and profitable?

Assuming we can build models addressing the evolution of symbolism in its widest sense, some difficulty arises over what constitutes appropriate data for testing those models. So much that is symbolic does not survive in the archaeological record – words, songs, games, dances, love-magic. In fact, by definition, the symbolic realm cannot be preserved. In the words of Chase (1994: 628):-

‘Symbolic culture requires the invention of a whole new *kind* of things, things that have no

existence in the 'real' world but exist entirely in the symbolic realm. Examples are concepts such as good and evil, mythical inventions such as gods and underworlds, and social constructs such as promises and football games.'

Chase (1999) pursues a distinction between 'symbolic reference', comprising language, and 'symbolic culture'. This he describes as 'the extension of symbolism beyond reference to the creation of an intellectual environment populated by phenomena that owe their very existence to symbolism and where every thing and every action has significance in an all-encompassing symbol system' (1999: 34). Gods, goblins, tricksters and rainbow snakes are examples of such phenomena; vested with moral and typically supernatural authority, they occupy a central position within most human symbolic systems. The two distinct forms of symbolism 'are inextricably linked today,' says Chase, 'but that does not mean we can assume that they appeared simultaneously in the course of human evolution' (ibid.).

It is too easy when working at the level of the hard evidence of palaeoanthropology and archaeology, the bones and stones, to take symbolism for granted – background to the onward and upward march of hominin progress. All too often, it may be assumed that hominins who were capable of making sophisticated tools and weapons, with the skills necessary to hunt large and dangerous animals, *must* have been communicating through symbols (e.g. Pitts and Roberts 1997). Against this, Chase offers a salutary reminder that there is no reason to suppose symbolism was ever essential to survival in Pleistocene environments (1994). What Chase terms 'symbolic reference' – language – is accepted as obviously and unproblematically adaptive (e.g. Pinker 1994). As Deacon puts it: 'Looking for the adaptive benefits of language is like picking only one dessert in your favorite bakery: there are too many compelling options to choose from' (1997: 377). The 'gods' and 'goblins' of 'symbolic culture', on the other hand, are readily deemed epiphenomenal (Pinker 1998, Mithen 1996), if not downright maladaptive (Dawkins 1993). A notable exception to this tendency, Chase (1999) enquires into possible adaptive advantages of 'symbolic culture' and sees them in solutions to problems of social organisation in very large human groups.

Deacon challenges the whole argument that being able to use symbolic reference automatically endows the user with forms of communication superior to or more efficient than normal primate gesture-call systems (1997:

378-9). He highlights the extraordinarily high cost of learning even a simple set of symbolic referential relationships, where it is 'necessary to invest immense effort in learning associations that aren't much use until the whole system of interdependent associations is sorted out' (1997: 378). Even 'a small, inefficient and inflexible symbol system' is difficult to acquire, needs external social support and forces the use of 'counterintuitive learning strategies that may interfere with most non-symbolic learning processes' (1997: 379). For these reasons, Deacon suggests, early symbol systems were probably 'fragile modes of communication' applied to a limited communicative domain, while the majority of social communication continued to be 'mediated by a more or less typical primate repertoire' (1997: 379). According to this view, if the first symbol systems offered no more efficient or flexible scope for communication than pre-existing call-and-display behaviours, the origin of symbolic communication is an evolutionary problem precedent to and separate from the origin of language. Neurologically and semiotically, says Deacon:-

'symbolic abilities do not necessarily represent more efficient communication, but instead represent a radical *shift in communicative strategy*. It is this shift, not any improvements, that we need to explain.' (1997: 379).

What is it, Deacon asks, that symbols can represent which primate or other animal call systems, for all their flexibility, cannot? His answer is that while anything present to the senses may be represented nonsymbolically, 'this does not include abstract or otherwise intangible objects of reference.' (1997: 397) The selection pressures forcing the need for such abstract reference, Deacon argues, were social and fundamentally connected to the problems of organising sexual access in complex multimale, multifemale evolving human groups. Widespread reciprocal altruism and cooperation in such groups could only be founded on a basis of genuine reciprocity at the level where it matters for reproductive success: sexual fair play. In particular, Deacon argues, rules about sexual access were vital for establishing cooperative provisioning as a stable strategy in human evolution. Only if a male was satisfied that he could leave a mate unguarded without risk of cuckoldry could he be an effective hunter. And only a social contract which ritually demarcated his exclusive mating rights could secure the asymmetric arrangement of exchange of food for sexual access. Symbolic culture, writes Deacon 'was a response to a reproductive problem that only symbols could solve: the imperative of representing a social contract' (1997: 401). The medium for communication of that contract was ritual.

While they hold widely divergent views of the timing of the emergence of symbolism, both Chase and Deacon place forms of symbolic culture that are *non-linguistic* centre-stage as mechanisms for securing human cooperation and reciprocity. Using game-theoretical models to explore the problem of enforcing social contracts, Maynard Smith and Szathmáry (1995: 271-3) also invoke ritual as a crucial means of socialization. Ironically, these rigorous ‘selfish gene’ theorists draw on radical Durkheimian notions of ritual as intense emotional experience that arouses group consciousness (see quote from Gellner in Maynard Smith and Szathmáry 1995: 272). Deacon similarly follows a classic Durkheimian argument that emotive, repetitive and collective ritual performance provides the scaffolding for learning symbolic associations (Deacon 1997: 402-3, cf. Durkheim 1947: 230-1, Turner 1967: 19-47).

To quote Durkheim himself: ‘social life, in all its aspects and in every period of its history, is made possible only by a vast symbolism’ (1947: 231). Maynard Smith and Szathmáry, naturally suspicious of group selectionist accounts, express their uncertainty: ‘the innate capacity to be influenced by ritual may have been individually selected, although we are not clear why it should so.’ (1995: 272) Is it possible to employ strict methodological individualism to model how human social life came to be organised through symbolism?

## 1.2 Costliness of symbolic behaviour

Deacon argues that symbolic communication was needed to refer to intangibles. From a standpoint in primate cognition, one major problem is why any individual should be interested in spending time or cognitive effort on things with 'no existence in the real world', things no primate can touch, taste, see or hear? As Deacon argues, the ability to hold in mind abstract symbolic associations may interfere with normal cognitive processes for dealing with a real world full of predators, threats from rivals, foraging and mating opportunities. Even if one individual, for reasons unclear, did learn a simple set of symbolic associations, the system can have no validity without 'significant external social support'. In language-training experiments, apes readily learn sets of symbolic relationships because they can converse with human trainers (usually about food in the fridge). With no such material motive, why would any individual bother to share their imaginings? And why would another waste time joining in the fantasy? The great apes, in particular, may display capacities to infer mental states from behavioural cues (Byrne 1995: 144). For purposes of mindreading, they may be able to model some aspect of the world as another individual sees it. But they put no time or energy into replication of one another's dreams, fantasies or illusions. While primates may individually fantasize or imagine events, no other individual shares these ideas.

Modern 'selfish gene' Darwinism has made its most crucial contribution to evolutionary biology through its focus on costs. Clearly, if we do not pose questions about the relative costs and benefits of symbolic behaviour, we cannot begin to evaluate selection pressures that gave rise to symbolism. Whereas non-human primates show little interest in one another's imaginings, humans regularly invest large reserves of time and energy in the production by ritual action of what I will term 'collective fantasies' or 'deceptions' (following Knight et al. 1995, Knight 1998: 75-6). Primates do not engage in 'collective deceptions'.

A great deal more is involved in human symbolic systems than arbitrary association of signs with referents. Sperber (1975: 17-34) challenges the assumption that symbols in mythic and ritual contexts carry coded 'meaning'. Highlighting the luxuriant redundancy, the infinite possibilities of recursive embedded 'meanings' and the essential unpredictability of these, Sperber views symbols as disproportionately costly means to an end 'whether this end be knowledge, communication or production' (1975: 4). Symbolism amounts to 'all activity

whose rationale escapes me' (ibid.). Sperber notes his diagnostic as "'That's symbolic.'" Why? Because it's false.' (1975: 3). In this view, symbolic systems function as loud noise or interference blocking and overriding signals from the real world – an 'assault' on cognition, as Bloch (1989: 127) calls it. Turner describes the liminal or anti-structural stage of ritual as deliberate sensory deprivation, involving removal from perceptible reality and immersion in counter-reality (1967: 93-111). Bloch offers as an alternative to Turner's notion of anti-structure the term 'anti-cognition' (1989: 129). Language itself cannot be viewed as a system for displaced reference to things in the real world. The metaphors which permeate human speech are literal untruths. Creative use of metaphor baffles all attempts to program artificial intelligence machines to conduct normal human conversation with its quota of jokes, allusions, slang and catchphrases. In speaking, we communicate via signals that are fictions, blatantly untrue with respect to perceptible reality, to listeners who are willing to probe for the intended meaning behind these fictions (Knight 1998: 81-4). The human facility for symbolism appears, by this account, to be a facility for manipulating – and sharing – deceptions.

The salient feature of symbolic behaviours that manufacture such 'collective deceptions' – ritual, art, religion – is the heavy energetic demand of these activities. The 'disproportion between means and end' identified by Sperber is 'truly exorbitant in the case of ritual. When we think of the time, the tension, the passion and the expense necessary to put on the smallest ritual...' (1975: 8). Hunter-gatherer ritual activity has not been subject to rigorous time allocation studies comparable to optimal foraging analyses of subsistence behaviours (see e.g. Hawkes et al. 1991, Hill and Kaplan 1988). Yet from detailed fieldwork such as that on Ju/'hoan trance activity (Katz 1982), we can infer that people invest heavily in ritual. In the typical Kalahari case, this may occur all night long, normally continuing into the next night, more than once a month, with both women and men participating in highly energetic clapping and singing or dancing. They subject themselves to considerable stress in entering altered states of consciousness – having spent many years in developing the skills required. Around this activity they weave elaborate ideologies of experiencing death, changing into animals, and roaming across the desert to visit friends and relatives.

Hames (1992: 233) points to the conceptual problems of applying time allocation studies to ritual, political, social and 'non-economic' activities. Taking the common cross-cultural activity of ritual curing, in cases where

a curer receives pay, this can reasonably be classed as somatic effort. But in numerous cases, a curer receives

nothing 'even though he may chant to the spirits all day and night until exhausted and he may have consumed a considerable quantity of hallucinogenic drugs that took additional hours to gather from the forest and to process.' (1992: 233)

Perhaps, Hames suggests, the curer gains prestige, but what currency or proxy measure can be used to translate that prestige into reproductive fitness?

In the example of ritual curing, the expense falls on two sides. While the curer expends time and energy for no apparent gain, the patient, and other attendants, spend similar levels of time and energy engaging in the curer's fictions – the chants to the spirits, addressing an unverifiable 'other' world. From the hard-headed perspective of a chimpanzee this would be time-wasting. In this light, our ancestors appear not as the 'thinking ape' or the 'tool-making ape', but the 'gullible ape'. To account for the evolutionary emergence of such costly engagement with the symbolic realm, we need convincing answers to the following questions. What selection pressures promoted an interest in sharing and propagating conspecifics' illusions? Why did it benefit individuals to share in the unverifiable fantasies of others, rather than develop resistance to what Dawkins (1993) would describe as 'parasitic' memes? Can we model a systematic process in which hominins were driven to expend increasing time and energy on things that did not exist – 'deceptions' entertained by groups of individuals?

### 1.3 'Collective deceptions' as collective representations

The stress here on 'deception' is deliberate. My aim in using 'collective deception' is to aid integration of key Durkheimian insights on group or social cognition with modern Darwinian theories on primates as strategists possessing a 'Machiavellian' intelligence which may be employed in 'tactical deception' (Byrne and Whiten 1988a,b, Whiten and Byrne 1988). Despite hostile representations of Durkheim's work by some Darwinian psychologists (e.g. Tooby and Cosmides 1992: 25-8), he was extremely concerned with the interface between the individual's cognitive processes and what he called *conscience collective*. 'Animals,' he observed, 'know only one world, the one which they perceive by experience, internal as well as external. Men alone have the faculty of conceiving the ideal, of adding something to the real. Now where does this singular privilege come from?' (1947: 421). Lacking any adequate primatology, Durkheim attempted a materialist solution to this problem in *The Elementary Forms of the Religious Life*. The ideal or sacred could only emerge from a collective consciousness, a 'collective life' which 'awakens religious thought..because it brings about a state of effervescence which changes the conditions of psychic activity' (1947: 422).

How were 'collective representations' generated in the first place? How can a non-perceptible construct be sufficiently identical in the minds of members of any group to be labelled and collectively referred to? As Gellner (1992) notes, an extremely tight – 'compulsive' – constraint is needed to ensure that the concept be faithfully transmitted. Error of transmission would erode the process of collectivisation. How can I be sure my concept is the same as your concept, so that one label will summon up both? Durkheim's solution is that collectivisation occurs through a precise ritual sequence, demanding unity and synchrony of action, highly stereotyped, amplified and repetitive. In Durkheim's words:-

'individual consciousnesses are closed to each other; they can communicate only by means of signs which express their internal states. If the communication established between them is to become a real communion, that is to say, a fusion of all particular sentiments into one common sentiment, the signs expressing them must themselves be fused into one single and unique resultant. It is the appearance of this that informs individuals that they are in harmony and makes them conscious of their moral unity. It is by uttering the same cry, pronouncing the same word, or performing the same gesture in regard to some object that they become and feel themselves to be



in unison...[collective representations] presuppose that minds act and react upon one another; they are the product of these actions and reactions which are themselves possible only through material intermediaries. These latter do not confine themselves to revealing the mental state with which they are associated; they aid in creating it. Individual minds cannot come in contact and communicate with each other except by coming out of themselves; but they cannot do this except by movements. So it is the homogeneity of these movements that gives the group consciousness of itself and consequently makes it exist. When this homogeneity is once established and these movements have once taken a stereotyped form, they serve to symbolize the corresponding representations. But they symbolize them only because they have aided in forming them.' (1947: 230-1)

Durkheim's thesis implies that ritual is necessary for generating any system of reference to intangibles. Importantly, he considers this question in terms of 'moral unity'; the intangibles summoned up by ritual are morally authoritative – the 'totem', 'god', the emblem of the group. Speech can be defined in this context as 'cryptic mutual reference to intangibles' (Knight 1996). Undoubtedly, such a system of communication brings great benefits (Pinker 1994), but only on condition that the costs of using a system of displaced reference are overcome. These costs are the dangers of deception – reliance on uncorroborated information *from* others, and entrusting valuable information *to* others. On the grounds of 'tactical deception' theory (Byrne and Whiten 1988a), we cannot expect the requisite levels of trust to exist as a default. The question of origins of symbolic communication involves addressing the problem of how sufficiently widespread trust can be established throughout a speech community for speech to gain currency. As Durkheim argues, the difficulty in the process of collectivisation is ensuring fidelity of transmission. The problem of collective representation of intangible concepts is inherently a moral one. Communal ritual is the only possible medium for installing and maintaining morally authoritative constructs.

#### 1.4 Language as ‘an aspect of human sociality’

Human language is anomalous in the animal world as a volitionally controlled, conventional – and therefore, cost-cutting – signalling system. It is easy to see the benefits to be gained from adopting conventional signals in that all members of the communicating group are able to cut their energy costs. But ‘selfish gene’ methodological individualism reveals the problems that beset the evolution of conventional signals. If signals are cheap, where there are conflicts of interest, some individuals will be inclined to manipulate conventional signals dishonestly. This forces ‘honest’ signallers to prove their reliability by increasing the costliness of their signals. The requirement that signals be ‘hard to fake’ undermines any advantages of conventional signalling. Indeed, Zahavi (1993) argues that it is because of this dynamic that there are no conventional signalling systems in the animal world.

The problem, as Knight (1998: 72) puts it, ‘is that conventional signals depend on trust, whereas those animals intelligent enough to use such signals will also be clever enough to competitively exploit that trust’. Despite evident capacities for manipulating symbols (Savage-Rumbaugh and Rumbaugh 1993), chimpanzees have extremely limited use for conventional signals in the wild (Boesch 1991). The extent of the great apes’ cognitive development comparative to monkeys (Byrne 1995) contrasts markedly with the lack of parallel development in communicative ability (Ulbaek 1998: 39). Even among the higher primates, vocalisations remain under limbic, not cortical control. Because it is so difficult for monkeys and apes to vocalise dispassionately, their vocal signals are intrinsically more reliable, the cues they provide being emotionally governed and therefore ‘hard to fake’ (Burling 1993). The specific context in which primates do exercise their capacities for *cortical* control over vocal signals occurs in cases of tactical deception as, for instance, in the use of a leopard alarm call by a male vervet to distract and deter a potential interloper from joining the troop (Cheney and Seyfarth 1990: 213-4). Chimpanzees do not appear to falsify vocal signals in this way; it seems they lack even the limited repertoire of coded calls that vervets possess. However, they can successfully silence their vocalisations, as when patrolling near a neighbouring band’s territory, deliberately ‘shushing’ each other (Goodall 1986: 490-91). The paradoxical implication to be drawn from these examples is that speech as a system of vocal signalling under cortical control has a trajectory in the evolutionary past involving tactical

deception; yet, it has emerged as a communication system dependent on listeners who assume honest intentions (Knight 1998: 74-5).

These issues need emphasis because of the tendency among archaeologists, palaeoanthropologists and linguists to suppose that syntactical speech brings unconditional benefits. According to such ‘word-magic’ scenarios (cf. Cavalli-Sforza et al. 1988, Mellars 1991, Bickerton 1990, and see Pitts and Roberts 1997, Tattersall 2000: 14, Klein 2000: 27), once language had arisen by standard processes of natural selection (Pinker 1994, Pinker and Bloom 1990), all the benefits of symbolic culture were conferred on speech-possessing humans. Language, in this view, is the prime mover leading to the development of ritual, religion, art etc. Yet, theoretical linguists (e.g. De Saussure, Chomsky, see Pinker 1994) too frequently proceed from an ‘assumption of communism’ (Bourdieu 1991) – supposing that people are in egalitarian relation to each other and naturally co-operate to transmit and exchange ‘good’ information. As Nettle (1999: 217) puts it: ‘they have assumed precisely that which is most important and problematic: the social structure which makes language possible.’ The societies of our closest relatives, chimpanzees – and by inference of our ancestors – are riven by hierarchical differences of rank, and rife with competition for status, sex and resources. All the evidence of ape language experiments points to the discrepancy between apparent symbolic cognitive *capacities* of the animals and consistent absence of symbolic *performance* in natural conditions. Maynard Smith and Szathmáry (1995) regard the emergence of language and culture as one of a limited number of ‘major transitions’ in the way information is organised and transmitted from generation to generation. Nettle (1999: 216) notes the problem arising at each such transition: ‘even if the evolution of the larger unit (the cultural group in this case) will be beneficial to the entities at the lower level (individuals), its emergence will almost certainly be disrupted by selection for ‘individualists’ at the lower level’. Such individualistic competing interests would inevitably have undermined co-operation at the higher level of the group or speech community unless special conditions ‘obtained which suppressed or negated disruptive selection’ (ibid.).

Pinker (1994) has evaded consideration of social contexts by addressing language evolution at the level of mechanisms underlying speech acquisition and production, rather than at the level of selection pressures. Dunbar’s ‘vocal grooming and gossip’ hypothesis (1996, Aiello and Dunbar 1993) specifies concrete selection

pressures driving the evolution of preadaptations to speech in the context of increasingly complex social groups. As groups got larger, hominins no longer had enough time each day to service their alliances by standard primate means of one-to-one grooming. Vocal communication, eventually resulting in social information exchange, or 'gossip', took on the function of grooming as a more efficient means of social bonding. In this model, the selective force driving the evolution of larger brain sizes for hominins living in larger social groups is the requirement for 'Machiavellian intelligence' in dealing successfully with increasing numbers of social relationships. This implies that abilities for mindreading, manipulation and tactical deception co-evolve with linguistic abilities. Dunbar has not clarified the question of how, in these circumstances of selection for 'super' Machiavellian intelligence, sufficient trust can be generated between members of gossiping communities for second-hand uncorroborated information about third-parties to be accepted as reliable. Where such trust does not exist, recipients of gossip would have to run around double-checking their sources, driving up the cost of acquiring reliable social information, and undermining the efficiency of 'gossip' as a mechanism for bonding social groups.

Maynard Smith and Szathmáry (1995: 272-3) question the 'assumption that all individuals are initially equal' in their model of social contract enforcement. The problem is that enforcement by punishing defectors is costly, and freeloader individuals who do not bother with enforcement will benefit from the efforts of those who do (see Nettle 1999: 218 on Durkheim's recognition of this problem). Simple reciprocal altruism models are not an adequate account of the social cooperation needed as a basis for language. Social contracts can only be maintained through a group-wide policy of punishing those who fail to punish defectors (cf. Boyd and Richerson 1992). But what can replace a police force, judiciary and prison system in Pleistocene environments? Nettle and Dunbar (1997) posit a boundary-marker function for language or dialect. Use of a specific dialect identifies an individual as belonging to one group and *not* to others. Assuming that it is difficult to change one's dialect, this places a constraint on the individual's mobility. Freeloading strategies pay where an individual can move easily from group to group (Enquist and Leimar 1993). If it is not easy for an individual to move between groups, s/he may be deterred from cheating or freeloading. However, Nettle's model is problematic since it may be to an individual's advantage to retain the ability to move.

An alternative mechanism for delimiting group membership, and one which arguably precedes dialect variation in human evolution, is ritual. Knight (1998, Knight et al. 1995) uses the framework of signal evolution theory to argue that ritual necessarily co-evolves with speech. Human rituals demarcate the boundaries of social groups in all or nothing terms; any individual is either inside or outside a ritual coalition. Ritual – and only ritual – generates and replicates in the participants' heads a shared in-group self-representation (cf. Durkheim 1947: 205-39). Such ritually structured communities contrast starkly with the fluid and fickle alliances we know from primate politics (de Waal 1982). It is costly to join human ritual coalitions. Initiation frequently involves traumatic, permanent physical or psychological scarring that makes it impossible to leave one such community and join another. Between members of a ritual community who have signalled their commitment at high cost – individuals who demonstrably share the same 'gods' – the necessary trust will exist for habitual use of the low-cost, conventional signals of speech. On this basis, Knight argues that an ingroup/outgroup evolutionary dynamic drove the emergence of 'ritual' signals for group-on-group relations, speech for within-group 'conspiracy'. This turns on its head the idea that language is the prime mover in establishing symbolic culture. On the contrary, it is the ritual structuring of coalitions that provides the matrix for language.

A strong tradition in social anthropology has followed Durkheim in arguing that collective ritual action forms the basis of the moral efficacy of language (e.g. Douglas 1973, Rappaport 1979, Bourdieu 1991, Knight 1998). This school can be aligned with speech-act theory (Austin 1978), currently the most influential branch of linguistic philosophy. Words, according to speech-act theory, are not just labels for things. Utterances have force to the extent they invoke appropriate authority, which depends on being spoken in appropriate context. A whole class of expressions – 'performatives' – execute acts. Their power resides in 'nothing other than the *delegated power* of the spokesperson' (Bourdieu 1991: 107). Ultimately, authority derives from ritual legitimation. Language can only have force within a ritual community. An expression such as 'I promise' conveys no information; it has force only to the extent the community binds the speaker to the words. All purportedly honest statements in language are effectively preceded by a silent performative 'I swear that...'. In critical contexts, such as swearing in a witness in a courtroom, this is ritually enacted: the witness is required to place her right hand on the Bible when entering the witness stand.

This brief discussion of language as ‘an aspect of human sociality’ (Knight 1999: 228) has considered the problems inherent in a system of volitionally controlled conventional signals. Human language has emerged from an evolutionary background of primate vocal and gestural ‘play’ (Knight 2000). Among primates, some measure of cortical control over vocalisations is exercised primarily in instances of ‘tactical deception’. Language involves a ‘conspiracy’ between speaker and listeners, a mutual agreement to engage and ‘play’ with a string of fictions or deceptions. Does language therefore have a necessary relationship with ritual, the generative source for such communal deceptions? This argument casts doubt on the usefulness of Chase’s conceptual distinction between ‘symbolic reference’ and the gods and goblins of ‘symbolic culture’. Those morally authoritative intangibles appear vital for establishing the social conditions in which purely conventional reference can operate. This supports Deacon’s position that the original function of symbolic communication was to refer to intangibles, and that this arose as a solution to specific social problems.

### **1.5 Darwinian models of religion**

Before proceeding on the basis that supernatural, morally authoritative intangibles perform a vital function in human adaptive strategies of symbolic communication, I will review the alternative models proposed by Darwinians. Virtually all other Darwinian theories on religion see gods, goblins, tricksters and rainbow snakes as epiphenomenal or maladaptive. Chief representative of the latter view, Dawkins (1993) regards such intangibles as parasitic memes on the model of junk DNA or viruses. Mithen (1996, 1999) views religion (and its major medium of art) as a spandrel or by-product, arising from the human evolved capacity for ‘cognitive fluidity’. Pinker (1998) offers an erudite ragbag of ideas about religion rather than a coherent argument, but basically follows Boyer’s theory (1994, 1996, 2000) of the selective transmission of ideas which violate our intuitive models of the world. Boyer himself is silent on the issue of religion as adaptation, or dismissive of the possibility such a question could be framed. He concentrates on processes of transmission of cultural representations in the most sophisticated and rigorous of the models presented here.

For Dawkins (1993), humans are indeed ‘gullible’ apes. Extreme selection pressures for flexibility of intelligence and learning processes result in a brain which, especially during our extended childhood, is sponge-like in its receptivity to ideas. Children must soak up all the skills and social knowledge they will need

as adults. Unfortunately, this leaves them vulnerable to colonisation by a whole host of infectious ideas such as 'Jesus, son of God', 'Virgin birth' or even, 'wear baseball caps the wrong way round'. Brains provide fertile ground for self-replication by these parasites.

But Dawkins' model poses more problems than it solves. Copying playground fashions in baseball caps is easy for a child to do, and if it is exploitation by a 'meme', after all, it's fairly harmless and may even be helpful in winning friends and making allies. But the propagation of an idea like 'virgin birth' is not simply a matter of leapfrogging between brains. It comes with a massive support structure via church and school involving centuries-old religious iconography, prayers and Marian hymns. Dawkins might respond that this is a supremely successful meme-complex which has colonised the brains of powerful and influential figures of the past. But essential to the transmission of these parasitic memes is a domain which Dawkins never considers – costly ritual experience. It is impossible to conceive of Virgin Mary without going to church, seeing the icons, hearing the priest, kneeling down to say Hail Mary. The question we need to ask is how ritual functions as a mode of transmission in the Dawkins' 'god-memes as parasites' model (1993)?

Those memes which, according to Dawkins, are most parasitic, useless and damaging to the individual – memes such as 'god', 'rainbow snake' or 'virgin birth' – appear to demand the loudest of signals propagated through the costliest of rituals. Huge reservoirs of energy are expended by ritual collectives in elaborate and highly conservative performances. The parasite model assumes that this expenditure of energy is of no benefit to the individual hosts who incur the costs. To the extent that human hosts have to invest time and energy to transmit and propagate these parasitic memes, we would expect the hosts to mount increasing resistance to exploitation by such memes. Selection should favour increasing cognitive immunity rather than susceptibility in individuals. By a parasite/virus model, those memes which are associated with the costliest signalling/transmission should mutate very rapidly to overcome developing resistance in the hosts. But on the contrary, memes like 'virgin birth' or 'rainbow snake' have been replicated as stable collective deceptions with extraordinary fidelity of transmission for thousands of years. Religious wars have been fought over heresy, that is, precisely the issue of mutation and faithful transmission. These 'memes' show the very opposite characteristic to the rapid evolution of viral parasites. Costly ritual works to promote fidelity of transmission

and eliminate random mutation of 'god-memes'. This leads to a paradox: the mode of transmission (ritual) of a parasite (rainbow snake) is very costly to the individual host, which should promote evolution of immunity; at the same time, ritual constrains the ability of the parasite to evolve to overcome that immunity.

But why is ritual required for transmission of parasitic magico-religious memes? Vocal speech, in contrast to ritual, is energetically cheap; the cost to the host of transmitting a parasitic meme via speech would be correspondingly small. Selection pressures on the host to develop resistance to transmitting memes would be slight. We can allow a 'god-memes as parasite' model if god-memes require only speech for their dissemination. However, although speech is cheap to transmit, the accurate decoding of speech requires concentration on the part of listeners. Unlike ritual signals, those of speech are conventional and cryptic; they lack force unless cognitive effort is made to decipher them. The question then is: Why make this effort if the signal stream is invaded by parasitic memes? If listening is costly, why listen to useless information? Selection would favour the evolution of mounting cognitive resistance in listeners to information of no benefit. Increasing listener resistance would demand – as the condition of parasite-transmission – the emergence of increasingly ritualistic, repetitive, costly signalling. We are returned on logical grounds to our initial assumption: it is only via ritual that exploitative magico-religious memes can overcome listener-resistance sufficiently to achieve replication.

If ritual is the required mode of transmission for god-memes, then we are led back to the logical absurdity above: the costly mode of transmission of the parasite promotes host-resistance, while apparently constraining the parasite's ability to mutate and overcome host-resistance. Logically, the parasite model breaks down.

Although Dawkins makes much noise about religion, he has no pretences to anthropological knowledge of how religions actually work. The archaeologist Mithen, by contrast, has done important work in confronting evolutionary psychologists with the real evidence from archaeology and palaeontology of the Palaeolithic. His *The Prehistory of the Mind* is a major contribution towards integration of these disciplines. The basic thesis is that the minds of Early Humans (all those before moderns) were characterised by domain-specific intelligences – separate domains governing social, technical and natural history intelligences – while Modern Humans alone evolved 'cognitive fluidity' enabling access and transfer of intelligence between the domains. One consequence



of this ‘merger’ was the production of anthropomorphic artefacts, thanks to the combination of social intelligence and knowledge of animal behaviour, with technical intelligence (Mithen 1996: 164-70). Mithen (1996: 165) links these paintings and statues of therianthropes to totemic religious constructs. There is no very adequate explanation of the selection pressures driving the merger of natural history and social intelligence, in particular. Mithen hints at the possibility that alleviation of female reproductive burdens by improved male provisioning may have been part of the story (1996: 192-4, 209, referring to Knight et al. 1995). But it is not quite clear how selection promoting combined social and non-social intelligence in female brains would help male hunting abilities. Mithen cites evidence from African and Canadian hunters that anthropomorphising animals helps humans to predict their behaviour (1996: 168-9). Some contradictory evidence is provided by the case of Temple Grandin, an autistic woman who became an outstanding expert in cattle behaviour, largely because being autistic she was unimpeded precisely by any tendency to anthropomorphise (Baron-Cohen 1995: 139-43, see footnote 6).

But aside from this question of whether an Inuit hunter would really be more successful if he called a polar bear by the name of his granny (Mithen 1996: 188), there is a need for a more rigorous approach to the way hunter-gatherers actually play with anthropomorphic ‘collective deceptions’ (see Knight and Power 1998: 130). With Bushmen, there are two main ritual occasions involving ‘pretend play’ as animals. One is trance activity, which is probably depicted in defunct traditions of rock painting as a transmutation of men into animals. Trance generally would occur after hunting, possibly helping to relieve social tensions connected with meat distribution. A man would be too exhausted to hunt after experiencing trance. The other occasion is the menarcheal rite, the Eland Bull dance. Placing a girl in a hut on starvation rations and dancing around her in a communal pretence of being elands mating with an Eland Bull is not well-designed for improving hunters’ knowledge of eland ecology. But it may well be designed to motivate men to go hunting (as the Bushmen say it is).

While Mithen is equivocal as to whether anthropomorphic art and religion had initial adaptive value, he is more definite in arguing that once cognitive fluidity was in place, it gave rise to spandrel behaviours ‘that have no functional value at all – such as many aspects of religious thought and behaviour’ (1998: 132). The problem

with this position is again the huge costs involved in activities which, Mithen admits, are universal and persistent in human cultures. From a viewpoint of cost-benefit behavioural ecology, why bother once any adaptive value is lost? Mithen uses an illustration of the spectacular Sungir burials of 28,000 BP (1996: 175), where one male corpse is smothered in delicate ivory beads representing 2,000 hours of work (White 1993). In a more recent paper (Mithen 1999: 164, and see 1998: 132), Mithen acknowledges the high costs of ritual and its vital role in communicating and sharing counter-intuitive religious constructs. Only through impressive, memorable and costly signalling will such ideas be imprinted – precisely because they are counter-intuitive (n.b. this is directly opposite to view of Boyer, below). Like Dawkins, Mithen suggests that ‘the majority of the people for the majority of the time’ would be better off without this ‘expensive activity’ (1998: 132). Why then don’t they resist it? Where Dawkins sees us at the mercy of acute virus attacks by god-memes, Mithen considers religion as a con trick in the reproductive interests of ‘dominant individuals (often males)’ (ibid.). Such men ‘may maintain their own power bases by manipulating the minds of other disadvantaged individuals by promulgating beliefs in religious ideologies’ (ibid.). While it is reasonable to argue that some individuals may profit from religion or ritual more than others, it is not reasonable to expect that the majority will continually incur severe costs for the sake of a minority’s benefits. We return again to the problem of enforcement. In pre-state societies lacking the police, prison or torture cells of the Spanish Inquisition what can compel? If, as Maynard Smith and Szathmáry suggest, we have been individually selected for susceptibility to collective ritual experience, surely this occurred in Pleistocene environments where coalitionary strategies of ‘counter-dominance’ (cf. Erdal and Whiten 1996) militated against exploitation by any single dominant individual? It is impossible to imagine undergoing the painful experience of trance, which renders the trancer helpless, in a society riven by primate-style political rivalries. It can only happen if people trust each other. In fact, the extreme vulnerability of trance behaviour could be seen as a demonstrative signal of complete trust.

Pinker’s short discussion of religion in *How the Mind Works* (1998: 554-558) contains some *ad hoc* remarks about why particular religious schemes may pay some individuals in certain circumstances. For instance, ancestor cults might be appealing to people just about to become ancestors (but why should the other guys be interested?); religion is a con trick by certain individuals with sleight-of-hand; food taboos could demarcate groups (but how do we model this arising as a result of individualist strategies vulnerable to freeriding?);

initiation rites are painful and costly deterrents to freeriders. Again, this last idea makes a potentially testable hypothesis, but is it group selectionist or can we offer a strict selfish-gene account? Pinker does not deal at all with issues of the universality and costliness of religious behaviour, nor the question of ritual susceptibility. A psychologist rather than anthropologist, Pinker derives his ideas from Boyer's cognitive theory of religion. I will focus instead on Boyer.

The cultural anthropologist Boyer is the most serious Darwinian working on religion. His aim is to investigate how cognitive processes constrain and determine the cultural representations that are transmitted as religious ideas (1994). Until recently, he has avoided tackling questions of evolutionary function and origin, which leaves a significant problem unaddressed. Nevertheless, his cognitive theory has real importance for any attempt to build a model of symbolic origins.

The ideas that come to populate religious systems, says Boyer, will be those that violate our intuitive ontologies (1994: 113-9). And these ideas will be acquired without any requirement of transmission (1994: 114-6). To take the simple example of a ghost that walks through walls, all humans will notice such a concept; it is salient because it counters our intuitive models of physics and biology. From what we know of the properties of animate and inanimate objects, it should not happen, so the idea is 'attention-grabbing'. Since all humans share the same ontological assumptions in the course of their cognitive development, this idea will arise without any special effort of transmission. However, the concepts that will become most widespread and stable in a population of religious representations are those that combine this *counter-intuitive* quality with other characteristics that *confirm* our intuitive ontologies, and especially those that offer what he terms 'inferential potential' (1994: 120-1). This means that the representations or concepts should be in some ways human-like, enabling us to apply 'theory of mind' since they 'activate a powerful modular capacity for mentalistic accounts of behaviour' (Boyer 1996: 83). For instance, Greek gods and heroes have supernatural counter-intuitive qualities – they live for ever, make themselves invisible, change shape and so on – but they get drunk, fornicate and tell lies like everybody else. Alternatively, an inanimate object like a mountain may be imagined as having a body and properties of animation enabling us to understand its 'behaviour' as a live object. Because of the combination of inferential potential with counter-intuitive salience, it is both easy and natural, and funny and

interesting to conceptualise these beings. Hence the ideas will become stable and widespread.

Notice that Mithen proposed exactly the opposite with regard to counter-intuitive religious constructs. Mithen suggested that high-cost ritual was able to overcome difficulties inherent in transmitting concepts that offend our intuitive models. The memorable and impressive features of ritual action or anthropomorphic religious artefacts were needed to implant alien concepts. By contrast, Boyer claims that 'religious ontologies need very little actual transmission in order to be reproduced from generation to generation' (1996: 94). All people need is some nudging with 'specific cues that indicate which aspects of their intuitive ontological expectations are violated by the religious entities postulated.' (ibid.) Give people the funny bit, and they automatically fill in the rest with minimal conscious effort. Can these views possibly be reconciled? Do Boyer's 'specific cues' in fact represent significant ritual effort to direct joint attention to intangibles? Steeped in fieldwork on ritual among the Fang, Boyer knows well that 'ritual episodes are obviously crucial to the acquisition and transmission of religious representations. They provide situations that constitute, modify or strengthen the subjects' religious representations' (1994: 186). In light of Sperber's remark on 'the tension, the passion and the expense' needed for even the smallest ritual, there seems to be some contradiction here with the view of the ease and 'naturalness' of religious transmission.

One of the problems is that by focusing exhaustively on the level of cognitive mechanisms for transmission and acquisition of religious ideas, Boyer is deliberately blanching out questions of politics and exploitation in religion. After all, humans as Machiavellian theorists and mindreaders will be probing for the intentions behind such manipulation of their intuitive models. Why don't they resent and resist having time wasted on things that don't exist? We can readily imagine that a chimp who actually saw a ghost pass through a tree would be surprised and intrigued. The trouble is that no chimp ever does see it. What social or political conditions encouraged our ancestors to begin playing with such fantasies? Boyer's theory fits neatly, given a modern mind, but avoids addressing how our minds became that way.

In his latest formulation, Boyer (2000) approaches the problem of functional origins of religious concepts. He suggests that cognitive capacities for social interaction introduce further selection on supernatural concepts. Certain supernatural agents, most closely connected to morality, group identity or ritual, are tacitly presumed to

have access to information crucial to social interaction (2000: 208). These he terms ‘full-access strategic agents’ – basically, imagined entities who know everything about everybody. Boyer himself poses the critical question: ‘why would people assume that something in the world, over and above the real agents they deal with, has strategic information?’ (2000: 210), and then evades his own question by saying it is more important to work out why some accounts of such imaginary entities are selected rather than other accounts. From an evolutionary perspective, this is not satisfactory. All other primates, apparently, are hard-headed realists. In the wild, they waste no time and energy on such shared fantasies. In Machiavellian primate politics, it is above all necessary to keep track of who exactly has what strategic information about whom. Imagining omniscient beings could only confuse that issue. We need to ask, why construct such beings in the first place? Surely issues of politics – competition for mates and resources – are crucial to these developments. While it is important to examine cognitive constraints and mechanisms, a complete account of the evolution of religion cannot afford to ignore social contexts.

In a critique of Sperber’s work on symbolism as cognitive mechanism, Strecker observes: ‘Sperber has throughout looked at symbolism only from the receiving side of things’ (1988: 36). Trying to keep unobtrusively in the background as an ethnographer, Sperber ‘has asked “What happens when I try to digest a symbolic statement?”’ (ibid.). Strecker wonders why Sperber never turned the question around and asked, “What happens when someone cooks and dishes up a symbolic statement?”’ (ibid.) Sperber’s cognitive theory, says Strecker, does not relate to creation and production of symbolism. A virtually identical criticism could be levelled at Boyer. Both treat minds as cognitive processors of concepts that are already ‘out there’. In his discussion of ritual, the main mechanism for getting concepts out there, Boyer aligns it with animal ‘ritual’ noting, as any Darwinian should, the ‘obvious similarities’ in terms of stereotype, repetition and rigid sequencing (1994: 189). He considers it as a ‘behavioral modality...some aspects of which are probably fossilized versions of animal displays’ (1994: 222).

Ritualization in animal behaviour has been central to the development of signal evolution theory (Krebs and Dawkins 1984, Zahavi and Zahavi 1997). Symbolic communication involves a repertoire of signalling systems – language, art, ritual. So theory of signal evolution must be applicable in building models of symbolic origins.

Signal theory focuses on the interaction between signaller and receiver, accounting the costs and benefits for both sides. It especially highlights that the costs incurred on one side or the other will be altered according to conflicts of interest between the two. From a standpoint in signal theory, it is impossible to blanch out the politics of communication. By trying to apply the theory to symbolism, we may be able to resolve some of Boyer's contradictions regarding ease of transmission.

### **1.6 Darwinian signal evolution theory and symbolic communication**

Krebs and Dawkins usefully define communication as 'the means by which one individual, the actor, exploits the muscle power of another, the reactor' (1978, 1984). According to this body of theory – as amended and refined by Zahavi (1987), Guilford and Dawkins (1991), Maynard Smith (1991; 1994) and others – signals in the animal world can be costly or cheap. They can also be deceptive or honest. In conflict situations, reactors seek proof of honesty in each other's signals. Zahavi (1987) has shown that a signal's discernible costs can nonetheless guarantee its honesty by tapping and hence testing the very reservoir of quality that the signal is attempting to advertise. Signals can, then, be 'honest' but only about the physical quality (health, stamina, strength etc.) of those emitting them. Signals dependent upon convention – always less costly than full display – may permit external reference but afford opportunities for cheating and so tend to be ignored. Deceivers may still use occasional coded signals provided cheating is sufficiently rare. But where conflict is endemic, coded signals become phased out and even cheats must opt for what look like self-evident, costly displays of signaller quality. Advertisers typically emit conspicuous, multi-media, repetitive signals ('peacock tails', aggressive 'threat' displays etc.) designed to exploit the perceptual biases of receivers and thereby overcome their 'sales resistance'. Such signals, being costly and redundant, bear all the hallmarks of 'ritualisation' (Krebs and Dawkins 1984).

Where interests are shared, however, everything is different. Signallers and receivers may cut mutual costs, including the costs of time-consuming signal evaluation (Guilford and Dawkins 1991), by allowing an element of convention into even competitive 'quality advertising'. Low-cost warnings of predators can evolve between group-living animals since they are likely to be believed. If it pays the listener to respond to a signal, it will be straining its ears or eyes so that the signaller has no need to produce a loud blast of sound or bright colours

(Krebs 1991). The outcome is signals of diminished amplitude and conspicuousness – ‘conspiratorial whispering’ (Krebs and Dawkins 1978; 1984; Krebs 1991).

Darwinian theory locates the evolutionary roots of speech in selection acting upon co-operative individuals. Over the generations, listeners in the human case have evidently needed to know: otherwise they would not have evolved such specialised neurophysiological adaptations for decoding messages accurately at low amplitudes, requiring minimal redundancy and at astonishingly high speeds (Lieberman 1991; Pinker and Bloom 1990 and refs.; Pinker 1994). Admittedly, the system *can* be used for lying; indeed, reliance upon speech renders listeners highly vulnerable. But in view of the low-cost, conventional design features of the system, internal deception can be ruled out as a factor driving its evolution.

By contrast, ritual in human cultures demands disproportionate energetic investments. Like their animal counterparts, human rituals are loud, multi-media displays, stereotyped and prone to massive redundancy (Rappaport 1979: 173-246). They are also characteristically illusion-inducing or ‘deceptive’ (Lattas 1989, Fernandez 1984). The difference is that animal manipulative displays are individualistic and competitive, whereas their most potent human counterparts in traditional cultures are quintessentially *collective* performances. They demarcate social relations of power, identifying groups with common interests and setting them in opposition to other groups (Leach 1954; Cohen 1985). But despite this collectivity, they are also highly manipulative performances. Human groups throughout recorded history have exploited others by using elaborate ritual to overcome their victims’ ‘sales resistance’. To the extent that such performances convey honest information, it is in ostentatious display of their very costliness – demonstrating the organisers’ ability to bear such costs (cf. Zahavi 1987). We might infer – in view of the energy expended in relation to the paucity of reliable information conveyed (Sperber 1975: 8) – that such rituals arose as *coalitions of conspirators* strove to ‘exploit the muscle power’ of others who tended to resist the message.

Human symbolic communication involves signalling that ranges from the extremely co-operative to the highly exploitative. If we attempt to relate these two patterns within an evolutionary framework, they appear at first sight to be mutually incompatible. If the relationships at the root of symbolic origins were exploitative, how could they have been cooperative at the same time? A further paradox ensues if we apply Durkheim’s thesis

that communal ritual alone can ensure moral unity in constructing collective representations. How is it that 'deceptive' or exploitative signalling provides the foundation of moral authority?

### **1.7 Zahavi's 'handicap principle' and ritualization**

The 'Handicap Principle' (Zahavi and Zahavi 1997) argues that signals evolve because a receiver has an interest in assessing the quality of a signaller, and the signaller benefits from being assessed by the receiver. Both parties may reduce their costs through signals: for instance, by assessment of threats they could avoid dangerous fighting. But this will only work if the signals are honest, otherwise the party suspecting dishonesty will call the cheat's bluff and force a fight. To be a reliable or 'hard to fake' index of quality, a signal must be costly; only a high quality individual will be able to bear those costs. The idea of the handicap lies in the cost of the signal: it is a burden which some individuals will be able to bear better than others. In the application of the theory to ritualization we can see how 'handicapping' really works (Zahavi and Zahavi 1997: 64-8).

Huxley (1914) coined the term 'ritualization' for the process by which movements that serve as signals are derived from movements that originally served some other function. This generally leads to extremely formalized, elaborate and stereotypically exaggerated movements. Ritualization starts to evolve because one individual is interested in picking up information about the behaviour of some other individual – whether it be prey, offspring, a mate, a rival. The observer tries to detect some cue anticipating the likely actions of the animal observed. For instance, if a prey animal lifts its head, the predator knows it may be about to look around and so freezes. At this point, the observed movements are not signals – they convey information but are not performed for that reason. Krebs and Dawkins (1984) describe this as 'mind reading'. Once observers have evolved to pick up specific cues, it may then pay the observed individuals to exaggerate those movements to make sure that they are seen. Once such exaggeration evolves, designed to convey information to a receptive observer, the movement becomes a signal. There is a cost to the signaller in that the movement may lose its original intrinsic usefulness, but the benefits come from the information conveyed. For instance, a prey that signals to a predator it has been spotted may not have to run away. The way that the movement becomes exaggerated depends on what quality the signaller is advertising to the receiver. To be of interest to the receiver the signal must be linked in some indexical way with the real quality of the signaller. For instance, the 'stotting'



of a gazelle reliably indicates how fit it is and how quickly it could run away. The reason for the formalizing and stereotyping of the movements is that receivers want to compare the quality of different individual signallers, while signallers will individually seek to prove their worth and at least that they are better than someone else. Because everyone signals in the same way, receivers can easily judge the differences in quality of individuals. If they signalled in different ways, observers could not easily compare them. Standardisation enables the 'handicapping' of signallers, placing them in a reliable rank order of quality. By Zahavi's model '*uniformity within a species – ritualization – evolves out of the competition members of a species engage in to demonstrate their differences*' (Zahavi and Zahavi (1997: 68). Observers drive the evolution of reliable and uniform signals.

What bearing might such a process have on the evolution of human ritual and symbolism? Ritualized movements are displaced from their original function; in a sense their 'meaning' is different from what it once was. Even though real information is being conveyed about intentions, there is a level where the 'meaning' of the movement is deceptive or illusory. Receiver and signaller share mutual benefit in engaging with or probing behind that 'illusion'. If we could invoke a 'handicap' ritualization process involving *coalitions of signallers*, we would have a framework for collective engagement with some form of illusion. The standardisation and uniformity of ritualized movements would also yield Durkheim's requirement of ritual as generator of collective representation/deception.

Such a process would be driven by observers who were interested in receiving reliable and uniform signals of quality from signalling coalitions. Among animals, receivers and signallers could be of different species (predator-prey) or different generations (parent-offspring). But the most likely arena for evolving human ritual behaviour is clearly in sexual conflict and competition. This conforms to Deacon's argument that symbolic reference to intangibles will be needed to solve the social and reproductive problems of complex multimale, multifemale evolving human groups. Deacon (1997: 379-84) invokes sexual selection processes of ritualization in his account of the 'shift in communicative strategies'. In particular, he argues, maintaining pair-bonds against this complex social background will lead to exceptionally rich and elaborate communicative processes between the sexes (1997: 383, and see Møller 1997).

Given this arena, there are only four options for the evolution of coalitionary ritual displays:-

1. male coalitions display quality to male rivals;
2. female coalitions display quality to female rivals;
3. male coalitions display quality to female potential mates;
4. female coalitions display quality to male potential mates.

1 and 3 can be collapsed together as two sides of the same coin – male-male competition with female choice. Similarly, 2 and 4 represent female-female competition with male choice. In crude terms, application of signal evolution theory brings us to two basic scenarios for evolution of ritual behaviour, one of principally male coalitions, the other principally female coalitions, with a possibility of a combination of both.

Which of these cases is going to generate reference to intangibles and the construction of counter-reality?

### **1.8 Alexander's group warfare as sexual warfare**

Machiavellian intelligence theory argues that encephalization is driven by increasing social complexity. Whatever selected for larger group sizes among early humans selected for larger brain sizes. Alexander (1989) proposes that the key pressure to increasing group size was the threat represented by other human groups. In group-on-group competition, large, well-organised groups would replace small, poorly organised ones. A notion of 'morality' arises as a judgement of loyalty and commitment to one's group (Alexander 1987, 1989).

Warfare is obviously a promising candidate for development of the ritual coalitions we are looking for. Threat displays that replace real fighting are one of the main kinds of ritualized animal behaviours. As soon as we realise that the key resource males would fight over would be reproductively valuable females, then we have a sexual selection model of the kind outlined above. This sounds highly plausible. It falls into line with the majority of 'just so' stories of human evolution, given their assumptions on phylogenetic grounds of male kin-based coalitions (e.g. Foley and Lee 1989, Wrangham 1987, Tooby and DeVore 1987, Rodseth et al. 1991). So, let's run it.

Ritualization is driven by observers, in this case, rival males of opposing groups. They will be probing for cues to qualities like size, strength, numbers of the displaying coalition, quality and quantity of weaponry – how symmetrical and well-polished the handaxes – and indications through uniform movements like dancing of the ‘morale’ of the opponents. The trouble is that these qualities will *have* to be advertised in ‘hard to fake’ terms, that is in ways that correspond to perceptible reality. Rival males will not be the slightest impressed by token handaxes, or token members of the coalition; offered such substitutes, they will scent weakness and force a real fight. Singing and dancing might be media for such signalling, but this really amounts to loud noise and energetic activity indexical of real fitness: nothing is driving signals that access another world counter to perceptible reality. No intangibles, no collective deceptions will interest rival males. Can intangibles fight?

However implausible it looks, we need to explore the other possibility: female coalitionary display. The extraordinary thing is that as soon as we try it this way, symbolism explodes. It is simply an emergent property of the forms of signalling females will be driven to use – deceptive sexual signalling.

How can this happen? We start with the same group-on-group conflict, with males fighting for access to females. But here instead of male coalitions prioritising an *offensive* strategy to grab females from other male groups, they prioritise a *defensive* strategy of hanging onto and sticking by reproductively valuable sisters. Sisters gang up with mums and aunties to give core female kin coalitions. Simply, males as defenders don’t let their sisters go, except at a price: exploitation of the muscle power and labour of outsider males. What signals will evolve?

Here, the observers are outsider males interested in access to fertile, reproductively valuable females. They will cue into any sign of youth and reproductive value. But among a bunch of females who are pregnant and lactating, the ones the males will be most interested in will be cycling. The cue to that is menstruation, a reliable index of upcoming fertility. Females will respond to this male interest, and begin to ritualize menstruation as an exaggerated and amplified signal. Above all, they will need to secure and protect the most vulnerable target females, and surround these with song and dance, exaggerating the key signal with blood-coloured cosmetics. Pigments used as blood substitutes are already ‘deceptions’, although they refer to some blood that is really there. Full-scale intangibles and collective deceptions arise from the signals females put

across to males to say ‘No Access!’. Where a female chimp in oestrus signals to a prospective mate ‘I am the *right* species, the *right* sex, and this is the *right* time’, defiant human female ritual coalitions signal the reverse of that: ‘We’re the *wrong species*, animals not human at all! We’re the *wrong sex*, males not females! And this is the *wrong time*..but soon it might be the right time. We’re menstruating.’ Females do not need language to say this. In fact language as low-cost conspiratorial signalling will be useless for negotiation with outsiders who need to be impressed. They will use ritual pantomime to dance just as Kalahari Bushwomen do as Eland Bulls during the menarcheal rite.

Do outsider males maintain an interest in such extraordinary signals? By giving in and colluding with these ‘deceptions’ they get to go hunting, provision their mates and raise encephalized offspring. If the performance of ‘wrong species/wrong sex’ dances by cosmetically decorated female coalitions is a good indicator of how well organised that coalition is and how well they would support offspring, then males will actively choose to invest in precisely those females, driving the formalization of the rituals.

Here we only need to note that increasing social complexity drives the need for large brains, and large brains increase the reproductive burdens on females. The onset of symbolic signalling will correlate with the pressures of costs of encephalization on evolving human mothers. Just as Deacon argues, it is reproductive problems that will force complex signalling to maintain pair-bonds in large multimale, multifemale groups, generating symbolic ritualization. Deacon focuses on the need to secure social contracts or collective agreements about sexual access. But such contracts imply an initial condition of collectively agreed ‘No access’ – something completely novel in primate societies. The above strategies of female coalitionary display are designed to establish exactly that. The logical outcome of these processes yields an array of phenomena familiar from hunter-gatherer ethnography: brideservice, taboos on sexual access including incest taboos and prescriptive marriage rules, menstrual taboos and aligned hunting taboos (see Knight 1991). The emergent intangibles are anthropomorphic (cf. Mithen) and counter-intuitive (cf. Boyer). It generates ‘pretend play’ (cf. Knight) and ‘cognitive fluidity’ (cf. Mithen).

## **1.9 Thesis outline**

As ‘just so’ stories go (cf. Tooby and DeVore 1987), this rough and simple model has advantages. It is framed wholly within signal selection theory. It relates fields of data in palaeontology (evidence of encephalization and robusticity), archaeology (evidence of cosmetics) and ethnography (sexual taboos, puberty rites, totemic religious constructs) previously unrelated. And, crucially, it points to relevant areas of empirical data for testing. The aim of this thesis is to pursue the possibilities of testing this model of ‘deceptive sexual signalling’ as the proto-symbolic strategy. The following outlines the areas of concern.

Firstly, the process is driven by female response to heavy reproductive costs as a result of encephalization. What alternative physiological mechanisms and reproductive and social strategies are there for alleviation of those costs? What is the predicted timetable for early symbolic strategies? Chapter 2 focuses on the energetics of encephalization and Chapter 3 models female mechanisms for raising male investment.

Secondly, how does the model of deceptive sexual signalling relate to other Darwinian models for the evolution of language, social cooperation and the sexual division of labour? Chapter 4 outlines the key predictions of the model, and discusses its compatibility with other specific applications of Machiavellian intelligence theory, reciprocal altruism theory and costly signalling theory.

Thirdly, the model indicates that the earliest ritual tradition should leave archaeological traces in the form of mineral pigments, specifically an industry of blood-red cosmetics. Is this evidence there and does it appear at the expected period? Chapter 5 reviews the model’s predictions in the light of the archaeological and fossil records.

Fourthly, what kinds of symbolic ethnographic data are appropriate for testing and what kinds of tests can be formulated from the model? The formalization in the evolution of ritual signals should lead to strongly conservative elements of signalling – fossilized sequences, as Boyer might put it. Durkheim’s (and Gellner’s) arguments about the requirement of compulsive constraint on the transmission of an intangible construct also suggest strong conservatism of ritual tradition, while Boyer’s view on the stability of counter-intuitive phenomena with inferential potential supports this. We can expect, then, that even beyond hunter-gatherer societies in evolutionary contexts, certain rituals will conserve elements of the earliest symbolic constructs.

Chapter 6 will focus on evidence of cosmetics used in sub-Saharan African puberty and nubility rites.

Fifthly, the model argues a relationship between sexual signalling by females and exploitation of male labour. Chapter 7 adopts a behavioural ecological approach to analyse variability in ornamentation and costliness of initiation ritual between the sexes, again using a sub-Saharan sample.

Finally, in Chapter 8, I investigate case studies of secret ‘language’ in Bantu female puberty schools as a mechanism of alliance formation. This interface of linguistic and ritual signals in modern contexts may illuminate the politics of communication in early language communities. Is language to be modelled as reciprocal exchange of (social) information, or as trade of relevant information for status? What ultimately determines relevance?

## CHAPTER 2

### THE ENERGETICS OF ENCEPHALIZATION

The purpose of this chapter is to review theoretical models on the energetic challenge of encephalization. What selection pressures drove encephalization? What adaptations enabled evolving *Homo* to meet the metabolic costs of increasingly large brains? In particular, how did encephalization impinge on female reproductive and social strategies? There are two basic ways in which selection could act on females to alleviate costs of reproduction. Firstly, it could operate on how a female partitioned her own reproductive and/or somatic effort – how much energy she expends when and for what end – leading to change in physiology or life history variables. Secondly, it could affect social and sexual strategies, leading to novel forms of cooperation including allocare for large-brained offspring. Prospective candidates as allocarers or sources of extra investment may be kin, probably related females, or non-kin, probably actual or potential mates. Evolutionary change in life history parameters may alter the cost/benefit trade-offs for individuals apart from the mother of the offspring to act as carers, but such changes presumably commence with shifts in behavioural strategies. These shifts may then lead to an interactive feedback process as new developments in life history patterns, resulting from the initial behavioural changes, lead to increased benefits for allocare strategies.

Theory on the energetic challenge of encephalization should illuminate the archaeological and palaeontological records of hominin evolution. What can the fossil record tell us about changes in rates of encephalization at different stages of *Homo* evolution? Are there alternative lines of evidence linking periods of reproductive stress for females with major shifts in dietary or social strategies? Finally, if proto-symbolic forms of communication, whether ritual or language, arose in response to reproductive stress experienced by females, when are these predicted to emerge?

## 2.1 Selection pressures

Evolution is the outcome of the balance between costs and benefits (Dunbar 1998a). Because of the very high costs of maintaining a large brain, it is 'intrinsically unlikely that large brains will evolve merely because they can' (Dunbar 1998a: 179). Instead, they will evolve 'only when the selection factor in their favor is sufficient to overcome the steep cost gradient' (ibid.).

Brain tissue is metabolically expensive, requiring large and constant supplies of oxygen and glucose (Milton 1988: 299, and refs.). An adult human brain accounts for 2 % of body weight, but 20 % of basal oxygen uptake and energy expenditure (Foley and Lee 1991, citing Passmore and Durnin 1955). The mass-specific metabolic rate of the brain is some nine times higher than the mass-specific metabolic rate of the human body as a whole (Aiello and Wheeler 1995, citing Aschoff et al. 1971). Since the brain grows very rapidly in early life for humans, while other organs keep pace with body weight, an infant's brain accounts for as much as 60 % overall basal metabolism (Aiello et al. in press).

In his review of the major hypotheses on the evolution of large brains in primates, Dunbar (1998a) enumerates four classes: epiphenomenal, developmental, ecological and social. Epiphenomenal explanations (e.g. Finlay and Darlington 1995, Gould 1975) argue that large brain size is an inevitable by-product of large body size (and larger parts of brains a by-product of larger brains). Dunbar dismisses these arguments on the grounds that they fail to address the factor of cost. Evolving a larger brain may necessitate a larger body to deal with the increased overall energy turnover, but that does not imply that evolving a larger body necessitates a larger brain. We are still no clearer about why certain species, such as hominin ancestors, are able to afford a brain mass higher than predicted for body size (Jerison 1973). Developmental arguments, principally the Maternal Energy hypothesis (Martin 1983, 1996, Keverne et al. 1996a, see below), tell us about the constraints that have to be overcome for large brains to evolve, rather than why those large brains do evolve. This leaves ecological and social classes of explanation (Dunbar 1998a).

In testing between ecological and social hypotheses for the expansion of the primate brain, Dunbar (1992, 1995) used neocortex ratio (volume of neocortex to volume of the rest of the brain) as the most appropriate



measure of brain evolution. He identified three versions of ecological hypotheses. The first, dietary, argues that frugivory imposes higher cognitive demands than folivory; the second, mental mapping, suggests that larger home ranges or longer day journey lengths require greater memory; and the third, extractive foraging, highlights the special skills needed to process certain kinds of food. Percentage of fruit in diet was used as an index for testing the dietary hypothesis, while both home range size and day journey length were used as indices for the mental mapping hypothesis (Dunbar 1992). How much any species' diet requires 'extractive' foraging is more difficult to quantify, but Dunbar (1995) utilised Gibson's classification (1986) of primates by level of skill required for extracting their diet. Relative neocortex size in anthropoid primates did not correlate with any of these ecological indices, but correlated strongly with social group size used as a measure of social complexity (Dunbar 1998a: 181-3).

Commenting on Dunbar's comparison between measures of environmental and social complexity, Byrne (1995: 221) acknowledges that 'the selection pressure for this neocortical enlargement was most likely a social one.' The neocortex appears to play a major role in processing the information required by primates to handle social relationships. Hence, neocortex size places a constraint on group size (Dunbar 1992). But does this arise because there are limits on memory for relationships, or is it a problem of skills needed for manipulating information about relationships? Dunbar cites a number of additional lines of evidence that 'point to the fundamental importance of social skills in the detailed management of social relationships' (1998a: 185). These include the correlation of frequency of tactical deception with neocortex size (Byrne 1995: 220); and the correlation of the proportion of lifespan spent as a juvenile with relative size of non-visual neocortex, as well as with social group size (Joffe 1997). Joffe argues that where selection has favoured increased neocortex size as a response to increased social complexity, it has also selected for an extension in the juvenile period to enable learning of complex social skills (1997: 603). Other evidence underlines the involvement of the neocortex in manipulating coalitions: as neocortex size increases, the relationship of male rank with mating success is progressively undermined (Pawlowski et al. 1998); moreover, neocortex size correlates closely with grooming clique or effective alliance size in primates and humans (Kudo and Dunbar in press). Keverne et al. (1996b) relate the expansion of the 'executive' brain in primates, largely under the control of maternally imprinted genes, to the cognitive challenges of social life in female kin-bonded primate societies.

The 'Social Brain' hypothesis appears adequate as an account of selection pressures for monkey intelligence. In Byrne's view, however, 'social complexity does not explain the intellectual difference between monkeys and apes' (1995: 221). We can presume that a great ape common ancestor had no intrinsic need for greater social intelligence than did monkeys, since their descendants today live in groups of comparable size and complexity to present-day monkeys (Byrne 1995: 221, 232). Byrne argues for reconsideration of environmental challenge as the driving force in selection for the insightful intelligence characteristic of apes (ibid.). Extant great apes face such special challenges: orang-utans in arboreal locomotion; gorillas in forms of food-processing; and chimpanzees in tool-making, a trait presumably shared with the last chimp/human common ancestor. The only brain measure that separates great apes from monkeys is 'raw weight of neocortex' (Byrne 1995: 220). Byrne suggests that 'the sharp intellectual differences subsumed under the label "insight" require a *critical* cortical size' (ibid.). Joffe and Dunbar (1997) observe that the generally linear increase of the visual area with increasing size of non-visual neocortex drops off with the great ape clade. This implies that, once neocortex volume is above a critical threshold, 'disproportionately more capacity can be dedicated to non-visual areas of the neocortex' (Dunbar 1998a: 189). This argument from spare capacity 'might explain why apes appear to be capable of the additional cognitive processing associated with mind reading, whereas monkeys are not' (ibid.). Byrne refutes the idea that special ape abilities are restricted to the social arena (1995: 224-5). Comparison of social and technical or practical intelligence is problematic: 'the two domains are often hard to separate, and in practice they often intertwine (1995: 224). Selection in the great ape ancestor for ability to plan may have been applicable across domains. Mithen (1996: 210-3) proposes a model of the evolution of primate intelligence marked by oscillation between generalised cognitive flexibility and specialised or modularised intelligence. Recurrent 'switching from general-purpose to specialized designs' may be a feature of evolutionary processes in general (Lake, cited by Mithen 1996: 212, 260n.19). In this view, the great ape common ancestor is seen as a supreme generalist, prior to the onset of an evolutionary trend to increasing modularisation. This trend culminated in the domain-specific intelligence of *Homo erectus* and archaic *Homo sapiens*, according to Mithen, while modern humans were characterised by a return to a cross-domain generalised intelligence.

Nevertheless, differences between monkeys and apes in the social domain are telling. The presence of basic 'theory of mind' appears probable in chimpanzees (Povinelli and Nelson 1990, Povinelli 1994, Povinelli and

Preuss 1995, O'Connell 1996, Byrne 1995: 144) and possible in other great apes. Close inspection of the plot of mean group size against neocortex ratio shows apes lying on a separate grade from monkeys, themselves separate from prosimians (Dunbar 1998a: 184-5). 'It is as if,' notes Dunbar, 'apes require more computing power to manage the same number of relationships than monkeys do, and monkeys in turn require more than prosimians do.' (1998a: 185) Whiten (1990) characterised selection for Machiavellian intelligence as a 'spiralling pressure as clever individuals relentlessly selected for yet more cleverness in their companions'. This scenario of an intelligence arms race implies that problems of social manipulation will act as a brake on group size enlargement even as brains get bigger.

It is arguable that encephalization in a great ape common ancestor could be linked with a shift from the old world monkey default, and presumed ancestral, state of female philopatry. Larger-brained primates tend to have longer reproductive events (Lee 1999: 127). As brains enlarge, females are faced with the energetic problems of increasingly costly offspring, while males are faced with problems of gaining access to females with longer interbirth intervals. Hence, female fertility tends to become a scarcer commodity. This factor may tip the cost/benefit equation for male-male affiliation as male coalitionary alliances strive to control long-term access to females who are fertile at rare intervals, and in particular to stave off other potentially infanticidal males. A trend of male kin-bonding in association with longer interbirth intervals is found not only in catarrhines, where 'patrilineal' African great apes compare with matrilineal cercopithecoids, but also in platyrrhines. Interbirth intervals among female affiliative *Cebus* range from 14-26 months, while male affiliative *Ateles* shows a range from 17 up to 50 months (Robinson and Janson 1987: 76). Increasing effectiveness of male coalitions in defending long-term access to females may account for Pawlowski et al.'s (1998) finding that male rank correlation with mating success is negatively related to neocortex size. Females themselves should actively choose those males most adept at deploying coalitions to protect them against possible infanticides

We can infer that the chimpanzee/australopithecine ancestor of 4-6 mya (Horai et al. 1995, Adachi and Hasegawa 1995, Takahata et al. 1995) was male philopatric and the most encephalized primate of its time, with significant tool-making skills. While the evidence for brain size of chimpanzee ancestors is non-existent, and

only fragmentary for hominin ancestors of 4-5 mya, the early australopithecines (3-4 mya) maintained an essentially ape grade of encephalization with a marginal drift upwards. E.Q. estimates for fossil hominin taxa (Aiello and Dean 1990, Foley and Lee 1991) place australopithecines on a par with modern chimpanzees. Alongside evidence for ape-like life history parameters (Conroy and Vannier 1991, Smith 1993, 1994), this suggests a fundamentally ape-like lifestyle among the early australopithecines (Foley 1995). The first major shift in grade of encephalization is seen in fossils of c.2 mya, following the advent of genus *Homo*, with cranial capacities ranging up to 750cc, more than twice the volume of modern chimp brains. These are followed very shortly afterwards by specimens of *Homo ergaster*, dating 1.6-1.8 mya, with cranial capacities of up to 850cc.

Hard fossil evidence is lacking for the crucial phase of encephalization between 2-2.5 mya, during which at least three identifiable *Homo* species emerged (Wood 1992, but see Wood and Collard 1999a,b). However, the first stone tools appear at this time (Wood 1997, Kimbel et al. 1996, Semaw et al. 1997, Heinzelen et al. 1999). Also implicated in this stage of rapid brain enlargement is the development of a more advanced form of bipedalism (Walker and Leakey 1993). More complex sensori-motor control requires a larger brain, allowing for 'more nerve tracts and more integration between those tracts which permit separate firing of smaller muscle groups and more complex coordination of function' (Aiello 1996). Selection pressure for increase of sensori-motor control, enabling tool-making, tool use and fully committed terrestrial bipedalism, may be equally as important for the evolution of encephalized *Homo* as social complexity (Aiello 1996). Whichever factor contributed the initial kick towards encephalization in genus *Homo*, onset of lithic technology, advanced bipedal locomotion or increasing social complexity, it is probable that all three factors shared the same underlying trigger – environmental change.

## 2.2 Effects of environment change

Drier conditions in Africa from 2.8 mya (deMenocal 1995, Behrensmeyer and Cooke 1985) forced change from the still significantly arboreal adaptations of early australopithecines towards fully terrestrial adaptations in later hominins (Foley 1987). These biogeographic changes in both eastern and southern Africa (Bromage and Schrenk 1995) drove the development of efficient bipedal locomotion as a response to the thermoregulatory demands of travel in hotter, drier habitats (Wheeler 1991a,b, 1992, 1993). Associated with the shift to drier, open country environments would be new dietary strategies as resources were distributed differently (Foley and Lee 1989, Milton 1999a). As high-quality plant foods became more difficult to obtain, the major available sources of high-energy foods were carbohydrate-rich roots and tubers (Hatley and Kappelman 1980, O'Connell et al. 1999), and animal foods, including not only scavenged carcasses but fish and shellfish found in Rift Valley lake and river systems (Broadhurst et al. 1998, Stewart 1994). Acquisition and processing of such foods promoted use of new technology, requiring expertise and skillful coordination. Hence, pressure for improved sensori-motor control, arising from more arid conditions, could have forced encephalization. We can also infer that hominins exposed to walking long distances in more open environments, in competition with other scavengers, including conspecifics, would have needed to bunch into larger groups for mutual protection. Among primates generally, terrestrial species show larger effective group sizes than arboreal species, owing to predation risk (Foley 1987, Dunbar 1988). So, drier conditions and the decline of forest environments lead to a direct pressure for increasing social intelligence.

DeMenocal (1995) suggests that 'some Pliocene (Plio)- Pleistocene speciation events may have been climatically mediated' (cf. Vrba 1996). The beginning of the Pleistocene (from 1.7 mya) is characterised by further aridity. Appearing at 1.8 mya in the fossil record, remains of *Homo ergaster* are found in this drier, open savanna environment. By contrast, earlier australopithecines and paranthropines, contemporary to *H. ergaster*, have been found in the vicinity of wetlands (Reed 1997). *Homo ergaster* is the first hominin to show the same overall body proportions as modern humans, with especially longer legs (Walker and Leakey 1993). This was a dedicated biped 'lacking all of the features in its postcranial skeleton that indicated arboreal locomotion in the earlier australopithecines' (Aiello 1998). Its relatively small teeth (McHenry 1988) and jaws

(Wood and Aiello 1998) reflected a fundamental change in diet, probably involving ‘significantly greater amounts of animal-based products’ (Aiello 1998).

The need for diet of high quality can be linked directly to encephalization. Whatever was fundamental in selecting for larger brains in *Homo*, the important question of how the energetic costs of those brains were met remains. The relationship between diet and brain expansion has been framed in terms of specific nutrient requirements (e.g. Crawford 1992) and quantity of energy needed to fuel brain growth and maintenance (Martin 1983, 1996, Armstrong 1985, 1990). It is expected that major shifts in brain size would be accompanied by major changes in diet. Aiello and Wheeler (1995) proceed from the observation that, even though our brains are over a kilogram larger than would be expected for an average mammal of our body mass, our basal metabolic rate (BMR) is as expected for that average mammal. Their Expensive Tissue Hypothesis (Aiello and Wheeler 1995, 1996, Aiello et al. in press) resolves the paradox of how adult humans maintain large brains without an increase in BMR. Besides the brain, there are four other energetically expensive tissues in the body – the heart, kidneys, liver and gastrointestinal tract – which account for just under 70 % of total BMR but less than 7 % of total body mass (Aiello and Wheeler 1995). The relationship between diet and the metabolic requirements of the brain can be understood in the light of the energy requirements of the other expensive organs. It is the combined mass and energy requirements of all these tissues which should determine adult BMR. One way to support an unusually large brain while maintaining average or expected BMR is to significantly reduce the size of one or more of the other ‘expensive tissues’. While the human heart, kidneys and liver are all about the size expected in a mammal of human body size, the increase in mass of the relatively large human brain is more than compensated for by the reduction in size of the splanchnic organs (liver and gastrointestinal tract). At 900g less than expected, the reduction in mass of the splanchnic organs more than offsets a brain size some 850g larger than expected, with virtually all the shortfall taken up by the gastrointestinal tract (Aiello and Wheeler 1995).

By the Expensive Tissue Hypothesis, selection for larger hominin brains required concomitant reduction in the size of the gut. But size of gastrointestinal tract is constrained by dietary quality (Martin et al. 1985, MacLarnon et al. 1986, Martin 1990). Whereas large guts are needed to process foods with large bulk and low

digestibility (Milton 1993), relatively smaller guts are required for smaller quantities of highly digestible food. According to Aiello and Wheeler, 'the relationship between relative brain size and diet is primarily a relationship between relative brain size and relative gut size, the latter being determined by dietary quality' (1995: 207).

A high-quality diet in turn requires larger foraging areas (Clutton-Brock and Harvey 1977, Lindstedt et al. 1986) with increased overall energy expenditure (Leonard and Robertson 1992). As hominins were forced to travel further to obtain the necessary resources, they came under increasing pressure to conserve water and energy in relatively hot, dry habitats. Wheeler (1991a,b) shows that bipedalism could reduce the thermoregulatory demands and water budgets of a hominin in an open country environment by cutting down the heat load on that hominin at midday by 60 %. As the factor of thermoregulation selected for more efficient bipedalism, this feeds back on whatever initially selected for larger brain sizes, forcing further reductions in gut size. Hence, in this feedback loop, increasing need for high quality diet increases the need for efficient long-distance locomotion, increasing pressure for encephalization.

According to the thermoregulatory model, smaller-bodied hominins would have been less well adapted to travel in relatively hot, open environments (Wheeler 1992). *Homo ergaster* shows an increase in average body mass of some 50 % over the australopithecine range (cf. McHenry 1996, Kappelman 1996, Wood and Aiello 1998), which is a further indication of more dietary protein (Cachel and Harris 1995, and see Walker 1993). Brain enlargement in *H. ergaster* reflects the increase in body size. E.Q. estimates (Kappelman 1996, and see Foley and Lee 1991) show early African *H. erectus/ergaster* in the same range as specimens attributed to *H. habilis* (KNM-1813) and *H. rudolfensis* (KNM-1470). Using models of primate bioenergetics, Leonard and Robertson (1992, 1997) estimate daily total energy expenditure (TEE) for fossil hominin taxa. Larger body size, together with changes in subsistence strategies in more open environments would have led to disproportionate increase in TEE for *H. ergaster/erectus* compared with earlier australopithecines.

Selection pressure for encephalization, with concomitant reduction of gut-size, and for increasing or maintaining body size could place conflicting demands on an animal with plant-eating ancestors. Increasing body size for mammals with a plant-based diet 'is generally associated with a decrease in dietary quality'

(Milton 1999a: 11). Such a trajectory is seen in the evolution of gorillas and orang-utans which because of their large size can, when necessary, subsist on very poor quality foods (ibid.). While chimpanzee ancestors remained restricted to areas where they could still maintain high-quality ripe-fruit diets, human ancestors, faced with more arid and seasonal environments, pursued a novel strategy allowing them to increase both body size and relative brain size (Milton 1999a). Hominin ancestors, Milton argues, incorporated animal matter to provide essential nutrients, leaving space in their relatively small guts for digesting calorie-rich but nutrient-poor starchy plant foods (1999a: 18).

Changes in body size, dietary strategy and consequent energy budgets would have impacted differently on females and males. McHenry's study of sexual dimorphism in fossil hominins (1994, 1996) reveals a 'proportionately greater increase in size of the *H. erectus* female' (1996: 101). While male *H. erectus* is about 50 % larger than his *Australopithecus* ancestors, female *H. erectus* is more than 70 % larger. Hence, reduction in sexual size dimorphism in *H. ergaster/erectus* does not necessarily reflect relaxation in male-male competition, since selection on male body size did not relax. Instead, it is more likely to result from female adaptations to meeting reproductive costs of producing larger-brained offspring.

A tradition represented by Isaac (1978) has viewed *H. erectus*, with its 'modern' body form and stone tools found in association with faunal assemblages, as a cultural and economic prototype of modern human hunter-gatherers. Such models assumed at least incipient 'nuclear family' forms of social organisation with some sexual division of labour stretching back through the Pleistocene. The most recent challenge to such assumptions (O'Connell et al. 1999) synthesizes life history theory with evolutionary ecology of present-day foragers. It argues that the earliest social division of labour arose to meet female requirements and involved social cooperation between females of different generations. The evolution of *H. erectus* can be modelled as 'a result of climate-driven changes in *female* foraging and food-sharing practices' (O'Connell et al. 1999: 462). These changes, suggest O'Connell, Hawkes and Blurton-Jones, 'may not only have had important effects on ancestral human ecology and physiology, but could also have provoked the first fundamental move away from hominoid life history patterns' (1999: 462). Here, I will discuss specific maternal strategies in response to encephalization costs before reviewing the 'grandmother' hypothesis.



## 2.3 Specific female adaptations to reproductive costs of encephalization

*Homo ergaster/erectus* of both sexes would necessarily have been affected by a trade-off of relative brain size and gut size – mediated by dietary quality – and by scaling up of body size to meet demands of thermoregulation and efficient bipedal locomotion. But rearing larger-brained offspring would have specific effects on females, leading directly to change in allocation of energy between somatic growth and maintenance, and reproductive effort. Not only would an adult female of an encephalized *Homo* species have to meet the increased metabolic cost of supporting her own brain, but also the increased metabolic requirements of her offspring (Foley and Lee 1991). These extra costs can be offset by reduction in gut size of both the female and her offspring, but only if the adult succeeds in obtaining the high-quality diet that can be digested by her smaller gut. The larger foraging area needed to provide high-energy foods implies an increase in travel costs and overall energy expenditure. Given requirements for greater efficiency in travelling longer distances and in carrying dependent offspring, it is clear why female *H. ergaster/erectus* was selected for larger body size.

There is a further advantage to large body size for maternal energetics. In large-bodied species the neonate is smaller relative to the mother. Hence, lactation is relatively (per unit bodyweight) a lesser energetic burden (Martin 1984, Lee and Bowman 1995). Nursing human mothers need 1.3 times the energy they require when not pregnant (Prentice and Whitehead 1987). This is low compared to other primates during lactation: baboons, for example, require 1.5 times their normal intake (Altmann and Samuels 1992, cited by Lee 1997). Among the energy-saving mechanisms evolved by human mothers is the reduction of BMR during gestation and probably also lactation (Prentice and Whitehead 1987). Costs of energy transfer between mothers and suckling infants can also be buffered by the mother's ability to store energy in the form of fat reserves. The level of body fat in human females is high compared with other primates. This feature is likely to have evolved in females of encephalized *Homo* species of the Plio-Pleistocene, as a mechanism that enabled mothers to subsidize their reproductive costs in lean times. The cooling and drying of the climate at that period (Behrensmeyer et al. 1997, Vrba et al. 1996, Cerling 1992) would also be associated with increasing seasonality and periodic resource-stress (see Chapter 3).

Especially significant for the evolution of the human lineage were marked changes in life history pattern. These

include a) development of secondary altriciality in infants, that is extending the period of rapid foetal growth rate of the brain after birth (Martin 1983, 1990); b) the emergence of childhood as a unique stage of human ontogeny, defined as the period when the offspring is weaned but still depends on adults for food (Bogin 1997, Laird 1967); c) delay in sexual maturation and later first reproduction, associated with reduced adult mortality and larger body size (Charnov 1993, Charnov and Berrigan 1993); and d) the evolution of long post-menopausal lifespans (Hawkes et al. 1997). Fundamentally, large human brain size necessitates human growth prolongation (Finlay and Darlington 1995). But asynchronous or independent development of different brain regions and need for plasticity may also underlie retardation, especially where this involves extension of early phases (Leigh and Park 1998). Foraging and dietary strategies constrained by gut size determine energy available for brain metabolism. So shifts towards human life history parameters should begin with new foraging behaviours. O'Connell et al. (1999) view these life-history changes as a package, driven by environment change, which led to the emergence of *H. ergaster/erectus*.

### 2.3.1 Secondary altriciality

The human neonate has been described as 'secondarily altricial' (Portmann 1941, cited by Martin 1990) because of its extreme helplessness, relative immobility and heavy dependence on maternal care. This is a consequence of the rate of brain development after birth (Martin 1990: 425-6). In precocial mammals, the foetal brain:body growth trajectories change after birth, with the brain growing far less rapidly in relation to body size (illustrated in Martin 1990, Fig. 8.29). By contrast, in altricial mammals, the foetal brain:body growth trajectories continue for a period after birth. Secondarily altricial human neonates take this to an extreme, with the foetal trajectory of rapid postnatal brain growth and slow body growth sustained for 12 months from birth. Human neonates have large brains (relative to body size) compared with other primates (Martin 1983, Harvey et al. 1987). This relatively large neonatal brain size combined with a high postnatal brain growth rate enables adult humans to achieve the highest encephalization quotient of all higher primates (Bogin 1997: 79). The size of the neonate brain is necessarily constrained by the dimensions of the pelvic inlet. In a comparative analysis of cephalo-pelvic dimensions across a range of social mammals, Martin (1983) calculated that an 850 cc adult brain size could be attained by any hominoid given the mean postnatal growth

rate for living apes by extending the foetal stage of growth. At adult capacities above 850 cc, the size of the pelvic inlet of fossil hominins and living people does not allow for sufficient foetal growth. Therefore, the human-like pattern of extension of brain growth at the foetal rate after birth will become established. Adult brain capacities above 850 cc are first seen in *H. ergaster*. Taking pelvic dimensions of the sub-adult male 'Nariokotome' boy (WT-15000) as a baseline, models suggest a degree of secondary altriciality was present in *H. ergaster/erectus* populations of 1.5-1.6 mya (Shipman and Walker 1989, Walker and Ruff 1993).

Although human infants up to a year show a rapid brain growth rate, our overall rate of brain development is retarded compared with chimpanzees, our closest extant relatives. A chimp neonate has 47% of adult brain mass, with adult mass achieved at 4 years. Neonate modern humans have some 25% of adult brain mass, and by 4 years have achieved 84% (Passingham 1982, cited by Foley and Lee 1991). Foley and Lee (1991) calculate that human infants up to 18 months of age are 8.7% more energetically costly than chimpanzee infants, owing to their high level of encephalization. This estimate may need to be modified if offset by reduced metabolic costs of gut tissue in human infants (Foley 1995). But it represents a considerable additional energetic burden to the mother who must provide all the extra energy required until her offspring is weaned.

Foley and Lee ask whether 'increasing energetic costs associated with the expansion of the brain may have pushed hominid growth patterns in the direction of delayed maturation' (1991: 68). They estimate costs of brain maintenance from 0-5 years for hominin taxa across a range of different growth trajectories. The fundamental assumption in their analysis is that absolute brain costs for modern humans represent a ceiling for hominins. At chimpanzee rates of growth, australopithecines and paranthropines lie comfortably below the threshold of costs of brain maintenance in modern humans. But for genus *Homo* 'costs begin to exceed those of modern humans' (Foley and Lee 1991: 228). A neonate with 47% of the adult brain mass of *H. habilis* (ER-1813) or *H. rudolfensis* (ER-1470) has greater energetic requirements than a modern human infant. After the first year, however, given chimp growth rates, the cost of early *Homo* offspring falls below that of modern humans. If growth rates are shifted 25% of the way between chimpanzees and modern humans, then costs of brain maintenance in an early *Homo* neonate lie close to the modern human threshold while costs for 1-5 year olds fall well below. For *H. ergaster* and later *H. erectus*, costs of the neonate considerably exceed modern

human levels given a 25% shift from chimp to human growth rates. Only with a shift of 75% towards human growth rates are *H. ergaster/erectus* neonates accommodated within the modern human energy budget. Archaic *H. sapiens* costs exceed the modern human threshold at all stages (0-5 years) given a 75% shift in growth rates.

Foley and Lee's analysis implies (1991: 68) that genus *Australopithecus* did not depart from ancestral ape patterns in their growth rates. It also shows that the shift from ape to human growth rates 'would have occurred initially in the earliest phase of infancy' (ibid.) since it is the cost of neonates in early *Homo* that rises above the modern human threshold. The shift from ape to human rates would have started with genus *Homo*. Fully modern growth rates would have been established within the last half million years among archaic *H. sapiens* as well as late *H. erectus*.

The effect of delay in maturation is to reduce *per diem* costs of brain maintenance in encephalized offspring. This alleviates maternal energy budgets, especially in the early phase of lactation. Martin's Maternal Energy Hypothesis (1996) proposes a link between the basal metabolic rate of the mother and the brain size of her developing offspring. Most of the growth of the brain is completed at an early stage. In mammals, the energy supplied by the mother in pregnancy and lactation supports this 'main phase of brain development' (Martin 1996: 154). The influence of the mother's energy turnover on the offspring's developing brain and ultimate adult brain size can be modified by altering the length of gestation or the period of lactation (ibid.). Human mothers have increased energy turnover relative to chimp mothers, but not sufficiently to sustain chimpanzee growth rates. Delay in maturation indicates a constraint on the energy available to evolving hominin mothers, 'leading to selection for an energetically less demanding strategy of increase in the duration of growth' (Foley and Lee 1991: 70). A higher quality diet, necessitated by their smaller guts, would have enabled hominin mothers to increase energy turnover. But, selection for slowed-down growth rates and extended immaturity in *Homo* 'suggests that mothers were indeed under energetic and time budget constraints which could not be compensated for entirely by shifts to higher quality diets.' (ibid.) According to Foley and Lee, this implies that alternative sources of support, such as male provisioning or allomothering by female kin, were lacking at least for early *Homo* mothers.

However, human mothers do not extend the period of lactation. In line with the maternal energy hypothesis, it

might be expected that as secondary altriciality evolved, mothers supplied the energy for offspring to attain larger adult brain sizes by weaning later. The cost of this strategy is that mothers with longer interbirth intervals would have lower reproductive success unless they could significantly increase their reproductive lifespans as a result of alleviating their energy budgets, or more infants survived. Human mothers do have significantly better infant survivorship than chimpanzee mothers (Gage 1998), but they may actually have a shorter reproductive lifespan (Gage 1998: 209). The reduction in infant mortality has not come about through lengthening interbirth intervals. Our ancestors evidently did not pursue that strategy, since human IBIs are shorter than those of great apes (Galdikas and Wood 1990). Lee (1997: 90, Fig. 2) shows range of IBI and mean weaning age across primate species. The highest mean weaning age is recorded for common chimpanzees at resource-stressed Mahale, and for orang utans, at over 60 months. Common chimpanzees at Gombe and Bossou show mean weaning ages of around 50 months, while bonobos, gorillas and Ju/'hoansi foragers fall below 40 months. Among African and other hunter-gatherers, the Ju/'hoansi are known for comparatively long IBIs (Lee 1972, Howell 1979, Blurton-Jones 1986, 1987). A study by Dettwyler (1995) found a median age at weaning in preindustrialized human groups of 36 months, confirming a review by Lee et al. (1991) which suggested an age of 36 months in 'food-limited' societies.

Lee et al. (1991) and Bowman and Lee (1995) show that human mothers wean before their infants achieve 3.0 times birthweight – an early stage of development compared with other primates (see Blurton Jones et al. 1999: 152 for discussion of human weaning/maternal weights). At weaning, human offspring are underdeveloped relative to other primates in terms of proportion of adult body weight and proportion of adult brain weight. Unlike primate juveniles, they are weaned before they can forage independently. Lee (1999: 131-2) identifies two major trends in postnatal growth strategies among haplorhine primates: one is to wean early and small after the mother has maintained rapid growth; the other is to produce a larger weanling at a slower rate of development. Humans appear to adopt elements of both these strategies. We do wean early and small, but we are constrained by energy costs to slow down maturation rates. Hence we cut back on time spent lactating and energy costs per unit time. To see how this can work, it is necessary to consider the evolution of the special human life history phases of childhood dependency, late maturity and postreproductive lifespans.

### *2.3.2 Childhood*

If weaned at around age three years, a human offspring still has about a third of total brain weight to make up (Cabana et al. 1993). A human mother can only wean relatively early if there are alternative sources of support for her child's energy-hungry and still developing brain. A child under 5 years old uses upwards of 40 % resting metabolism to maintain her brain (Leonard and Robertson 1992: 180, citing Holliday 1986). Childhood can be defined as 'the period following weaning, when the youngster still depends on older people for feeding and protection' (Bogin and Smith 1996: 705, and see Bogin 1997: 64). Bogin argues that childhood represents a human growth period uniquely derived among primates, inserted into normal primate life history schedules (1997: 78). In analysis of body mass growth data from 21 anthropoid primate species, Leigh and Park could not 'unambiguously resolve the issue of whether or not the period of human childhood is inserted into an otherwise ancestral trajectory' (1998: 343). But there are strong grounds for understanding childhood in terms of a dietary or feeding strategy, with important evolutionary effects on female reproductive rate (Bogin and Smith 1996: 707).

There are three main reasons why human children need special diets: their immature dentition, small intestinal tracts, and the energetic challenge of their growing brains (Bogin 1997: 77). The first cause stems from the overall delay in maturation. Relatively early weaning by human mothers leaves infants with deciduous dentition by the end of lactation. For primates generally, eruption of the first permanent molar tends to coincide with weaning, enabling juveniles to process their new diet and forage independently (Smith 1991a). But human children have to wait until age 5.5-6.5 years for eruption of their first permanent molar. They have difficulty processing an adult-type diet with their immature teeth. The second and third causes are connected in the light of the Expensive Tissue Hypothesis. A trade-off of brain and gut tissue is especially marked at this stage of life history to enable children to meet their special metabolic challenges (Aiello et al. in press). Children have 'a relatively larger disproportion between brain size and body/gut size than do adults' (Bogin 1997: 77). By slowing down growth of the intestinal tract, children make vital energy savings. But the constraint on this strategy is that a child requires an especially nutrient-dense diet that is easy to digest with her small gut. Bogin (1997: 76, 1988) reviews studies on malnutrition in children from weaning up to 5 years as a result of use of

adult foods. The foods involved (rice, maize) were calorically adequate for adults, but young children with small gastrointestinal tracts could not absorb enough energy. This caloric deficit led to undernutrition, developmental delays and growth retardation. In work on Amazonian nutrition, Dufour (1992, 1994) found that manioc-based diets were marginal for small children since they could not pack enough manioc with its poor nutrient quality into their guts. Supplements of animal fats and protein are vital for adequate micronutrients. Lack of micronutrients was identified as the main cause of poor child health in third-world countries (Calloway et al. 1992, cited by Milton 1999a: 19).

Children achieve full adult brain weight at 7 years (Cabana et al. 1993), by which time permanent dentition is in place. At this age, they become effectively 'juveniles' in the same sense as non-human primates, as independent foragers. Among the Hadza, for example, by age five, children are already contributing a significant proportion of their own food requirements (Blurton Jones et al. 1997). But for the period after weaning, children are reliant on the presence of older individuals able and willing to procure and prepare a special child-friendly diet. If the mother is to be relieved of the reproductive strain of having another offspring before her previous offspring can forage independently, this implies a social strategy of allomothering. According to O'Connell et al. (1999) and Hawkes et al. (1997), the prime candidate for filling this role would be senior female kin, leading to selection pressure for longer postreproductive lifespans. Life history theory predicts that slowing down of senescence and increase in lifespan would have the effect of raising age at maturity.

### 2.3.3 Delay in age of first reproduction

In Charnov's general life history model for stationary populations (1993), fitness is reduced to a simple product of probability of living to age of first reproduction and average reproductive success. Adult mortality rates determine the optimal age at maturity. Reduced adult mortality favours extended periods of growth before switching from somatic to reproductive effort. This is because larger body size results in 'higher net energy capture rate through time, which can be converted into a higher reproductive rate in adulthood' (Hill and Kaplan 1999: 409). When adult mortality rate falls, 'selection favours delayed maturity to reap the gains of larger size' (Blurton Jones et al. 1999: 150). In testing this model, Hill and Hurtado (1996: 341-73) showed that fertility was an increasing function of body size for both Ache women and men. They were able to use the model to predict weight and age at first reproduction for both Ache and !Kung (Ju/'hoansi) women. Chimpanzees necessarily stop growing earlier than humans and have an earlier age of first birth because of their relatively high adult mortality.

Harvey et al. (1987: 191) found brain size highly correlated with female age at first reproduction across primate taxa. They considered age at first breeding to be the intervening variable involved in the correlation of brain size and lifespan observed by Sacher (1959). When effects of age at first maturity were removed, the partial correlation between brain size and lifespan was low (Harvey et al. 1987: 192). Possibly, brain size relates to age at sexual maturity, and lifespan links to age at sexual maturity. The increases in body size and brain size for *H. ergaster/erectus* grade indicate the onset of delay in first reproduction, which implies concomitant reduction in adult mortality.

We can infer a probable evolutionary sequence of environmental change underlying selection for larger brain sizes. Large brain sizes, in turn, required change in dietary and foraging strategies, which promoted larger body sizes. Attaining greater body size implies delay of first reproduction, especially for Plio-Pleistocene females who appear to have come under pressure for disproportionate increase in body size. Delay in first reproduction can only be an evolutionarily stable strategy if adult mortality rates are reduced. Body size itself may alter mortality profiles, since bigger animals suffer less predation, but it is also likely that change in complexity of social strategies and organisation, associated with the increasing brain size, acted to alleviate adult mortality. In



chimpanzees, early adult mortality approximates 4 % per year, while in humans it is around 1.5 % per year (Hill and Kaplan 1999: 409). Why humans experience lower early adult mortality, say Hill and Kaplan (1999: 413), 'is an important question that may hold the key for understanding a variety of evolved human features'. However, palaeodemography of Middle to Late Pleistocene Neanderthal and pre-Neanderthal populations has indicated very high young adult mortality (Trinkaus 1995, Bermúdez de Castro and Nicolás 1997).

Fossil evidence of brain size and body size indicates longer lifespans in *H. ergaster* relative to Pliocene hominins and extant great apes (Smith and Tompkins 1995, Sacher 1975). This is supported by comparative analysis of dental eruption schedules in australopithecines, great apes and modern humans (Bromage and Dean 1985, Conroy and Vannier 1991, Smith 1991b, 1992, 1993, 1994). Smith (1993, Smith and Tompkins 1995) places *H. erectus* grade at an intermediate stage in the development of life history parameters between fundamentally ape-like australopithecines and modern *Homo sapiens*. In analysis of the skeleton and dentition of the specimen WT-15000 ('Nariokotome boy'), Smith (1993) found that, if a model of human growth rate was applied, the dental age (11 years), epiphyseal or skeletal age (13 years) and age judged by stature (15 years) showed marked discrepancy. She proposed a model in which *Homo erectus/ergaster* verged on adulthood at 14.5 years, at an equivalent stage of maturity to a chimpanzee of 11.4 years, or a modern human between 18-21 years. According to this analysis, Nariokotome boy, himself probably aged under 11 years at death, was growing up much more quickly than a modern human boy.

This conclusion has recently been challenged (Clegg and Aiello 1999). Using a sample of 10 subadults from the Spitalfields collection, Clegg and Aiello found similar disjunctions, not only between the ages suggested by each of the three maturity indicators, but also as compared with the known chronological age of each individual (1999: 87). Consistently, the Spitalfields children are small for their age predicted by skeletal development, whereas Nariokotome boy is tall for his stage of development.

Modern humans show a characteristic spurt in growth at the beginning of adolescence. In a comparison of chimpanzee and human growth curves, Gavan (1953, cited by Smith and Tompkins 1995) found that preadolescent humans have relatively suppressed growth, followed by a rapid 'catch-up' phase during the adolescent growth spurt. On the basis of WT-15,000's stature, Smith (1993) suggested that the human pattern

of relative growth suppression preceding a growth spurt had not yet evolved in early *H. ergaster/erectus*. Hence, WT-15000 looks too large for his age. Clegg and Aiello do not support this (1999: 93). Modern European (i.e. highly affluent) standards of maturation were applied to assess age in all these cases. The historic, post-agricultural urban population of Spitalfields are relatively small, while Nariokotome boy may represent a more affluent, better-nourished pre-agricultural standard. Tardieu (1998) assessed reshaping of the distal femoral epiphysis as a marker of adolescent growth, and, in the case of WT-15000, found this to lie clearly within the modern human range. She inferred that a growth spurt had begun with *Homo erectus* but that it was probably less pronounced and of shorter duration than in moderns.

The effect of the human growth pattern is to prolong the period of appearing juvenile. As Smith and Tompkins put it: 'an 11-year-old human male well under 5-feet-tall "pretends" to be more childlike than he really is' (1995: 272). This elicits caring, rather than competitive, behaviour from adults. If Nariokotome boy did lack an adolescent growth spurt, this implies that he had to fend for himself at a relatively early age, and was not still receiving protection or investment from adults. But this seems to contradict the trend towards reduced early adult mortality indicated by larger brain and body size.

The evolution of adolescence in human life history gives more time for practice of complex social strategies before embarking on the serious business of reproduction. Joffe (1997) highlights the cost of extending the juvenile period between weaning and sexual maturity for anthropoid primates. Why delay reproduction? The benefit of this delay in maturation may lie in the acquisition of social skills. Joffe investigated the relationship between developmental stages in primates and non-visual neocortex, the part of the brain 'implicated in cognitive memory and social problem-solving' (1997: 595). Only one developmental stage gave a significant result: the proportion of lifespan spent as a juvenile was positively correlated with non-visual neocortex ratio (1997: 599). Joffe also found a positive linear relationship between absolute juvenile period length and social group size. Among primates, social skills are largely acquired during the juvenile period. A longer juvenile period enables an animal to acquire the wider repertoire of social skills needed for living in larger groups (Joffe 1997: 603).

Among humans, adolescence is added to the juvenile period as a time for learning. This may be especially

important for gaining skills needed for effective first reproduction. Both human and chimpanzee females experience a lengthy period of subfecundity once they start to cycle (Hrdy 1999: 185). Bentley (1999: 179, Table 2) summarises data on wild common chimpanzees, showing a 1-3 year delay between reproductive maturation and first birth. This gives young females a chance to familiarise themselves with new territories before breeding, even though they may be highly sexually active (Wrangham 1993: 55). Girls similarly appear sexually mature before they actually become fertile, experiencing anovulatory cycles for 1-3 years after menarche (Bogin and Smith 1996: 710, Wood 1994).

In modelling conditions necessary for the evolution of delayed reproduction, Stearns (1992) argued that offspring of younger mothers should be at additional risk, or the younger mothers themselves should be at additional risk compared to older mothers, for delay in reproduction to evolve. Stearns (1992) cited evidence of increased mortality in infants of teenage mothers (see e.g. Srivastava and Saksena 1981, cited by Hrdy 1999: 557). But humans generally have lower infant mortality than chimpanzees or baboons. Altmann's study (1980) of wild baboon mothers showed that infant survival improved as mothers gained experience. A first-born, with 50 % mortality rate, was twice as likely to die as a third or fourth-born offspring. Macaques (Drickamer 1974) and langurs (Harley 1990) show similar patterns. Because of their relatively short interbirth intervals, it pays these monkeys to reproduce early and learn as they go. By contrast, Sugiyama (1994) found that among common chimpanzees at Bossou, infants of young mothers survived well compared with those of older mothers. Given demographic parameters of high infant mortality and long interbirth intervals, there is no selection pressure on chimpanzees to delay reproduction (Gage 1998: 217).

Factors that contribute to the relatively low mortality in infants of young human mothers are social structures of allocare, including her own experience as allocarer of younger siblings. Because of the higher rate of human reproduction and delay in maturation, an adolescent girl is likely to have many more opportunities to practice childcare than a chimpanzee female before she leaves her natal troop.

#### *2.3.4 Postreproductive lifespans*

The evolution of menopause has been a classic problem in evolutionary biology (Williams 1957). Theories of

senescence assume that selection cannot favour postreproductive life since any such mutation has no effect on fitness. Williams (1957) hypothesized that it became adaptive for evolving human females at a certain age to invest in children they had already borne, and grandchildren, instead of risking future reproduction. Empirical studies of the Hadza (Hawkes et al. 1989), Ifaluk (Turke 1988a) and Ye'kwana (Hames 1988) supported the idea that older women provided important investment of time and resources for their child-bearing daughters, with significant impact on their own inclusive fitness.

Hill and Hurtado (1991, 1996) used Ache demographic data to test whether benefits of help given to daughters (or sons) could outweigh benefits of continued child-bearing. They found that the genetic contribution grandmothers make by investing in close kin was not large enough to overcome loss of genetic contribution through reproduction. In developing a theoretical model, Rogers (1993) reached a similar conclusion. The grandmother effect would have to be unrealistically large to compensate for loss of reproduction. Turke's (1997) and Peccei's (1995) models are also framed in terms of a trade-off between investment in current versus possible future offspring.

Primed by observation of Hadza women's strategies, Hawkes et al. (1997, 1998) posed the problem in different terms. What had to be explained was not 'early cessation of fertility' but selection for long lifespan. Chimpanzees finish reproduction by 40 when they are in old age. Women end reproduction at roughly the same age. But the life expectancy of a 45-year-old woman among Ache, Ju/'hoansi or Hadza foragers is 20 or more years (Hill and Hurtado 1996, Table 6.1) when she is likely to be fit and active. As Blurton Jones et al. (1999: 147) note: 'The adaptation question then becomes: what could give rise to a selective advantage for delayed somatic senescence in an animal that is no longer reproducing?'. Help to descendants remains the probable answer.

Hadza women in their 60s and early 70s work long hours, with return rates equal to or greater than their reproductive-age female kin (Hawkes et al. 1989, 1995a, 1997). Hawkes et al. (1997) analysed variation in Hadza women's foraging patterns at different reproductive stages, and covariation between women's foraging and children's growth, allowing for seasonal change. They found that women spent least time foraging when their babies were youngest, while 'grandmothers' offset this initial reduction by nursing mothers, foraging most

when their ‘grandchild’ was youngest. The growth of weaned children of women with suckling infants correlated with their grandmother’s work hours, not their mother’s, this effect being strongest among the youngest weaned children, the most dependent (1997: 560). They concluded that senior female kin can and do increase the fitness of young descendants, particularly in the acquisition and processing of resources, tubers and nuts, which are difficult or impossible for young children to deal with.

The ‘grandmother’ hypothesis can illuminate several aspects of human life history (Blurton Jones et al. 1999: 151-2). The delay in maturity may be predicted more accurately if we take account of the gains from growing longer before reproduction that accrue during *both* child-bearing years *and* grandmothereing years. The ‘grandmother’ hypothesis also leads us to expect the short interbirth intervals and high fertility characteristic of human foragers. Fitness gains for an older woman come from raising the rate of reproduction of her daughter by relieving the mother of the burden of care for a weanling who is still dependent. Mothers with older helpers can therefore shorten IBIs and have more children. This leads us to expect that humans should be weaned at a relatively early stage of development, a prediction supported by Lee et al. (1991, but see discussion of Blurton Jones et al. 1999: 152). All told, the ‘grandmother’ hypothesis, in line with Charnov’s life history theory, accounts for the distinctively human features of menopause, late age at maturity, short interbirth intervals and high fertility (Blurton Jones et al. 1999: 152). It solves the paradox of how a hominin ancestor under pressure to produce increasingly encephalized offspring could wean early and small at the same time as slowing down growth rates. Instead of extending periods of lactation, as the Maternal Energy hypothesis would suggest for a highly encephalized primate, our ancestors were able to increase reproductive rate.

O’Connell et al. (1999) investigate the evolutionary conditions that would bring selective advantage to women who lived longer. In the Hadza study, Hawkes et al. (1997: 561) identify ‘a regular pattern of mother-child food sharing’ as the factor that gives senior female kin an opportunity to improve their fitness, especially where available resources are difficult for weanlings to handle on their own. During wet season, when fruit is readily available and accessible to children, Hadza women regularly target those resources, enabling children to do much of their own foraging (Hawkes et al. 1995a). But in dry season, women rely on foods that young children cannot obtain, spending hours digging up roots and tubers for high caloric returns (2,000 kcal/hour). O’Connell

et al. (1999: 466) note that this form of provisioning 'allows the Hadza to operate in habitats from which they would otherwise be excluded if, as among other primates, weanlings were responsible for their own subsistence'.

O'Connell et al. (1999: 467) propose an evolutionary scenario where significant change in environment reduces availability of resources younger juveniles could take by themselves. A form of mother-child provisioning could develop where returns were sufficient to support the collector and one other individual and where the resources were available on a daily basis with low variance in returns. Once such provisioning was established, older females could step in as helpers, improving survivorship for their grandoffspring and raising the birth rate for their daughters. O'Connell et al. (ibid.) argue that selection against senescence would proceed on two pathways:-

- i) Higher fitness for junior kin of more vigorous older females reduces relative frequency of deleterious alleles expressed around menopause;
- ii) Higher fitness for young adults with older helpers alters the trade-offs between allocation to current reproduction in early adulthood versus allocation to maintenance for later adaptive performance.

These selective pressures for longer lifespan would have further effect on age at maturity, with delayed maturity and lower adult mortality rates leading to larger body sizes (O'Connell et al. 1999: 468). Reproductive lifespans similar to the other apes should be conserved, since there is no selection for extended fertility, but birth rates would be increased. Importantly, since stress on weanlings in feeding competition is a major contributor to juvenile mortality (Janson and van Schaik 1993), such offspring provisioning would considerably reduce juvenile mortality. If resources occurred in dense patches, such that returns were limited by handling rather than abundance, larger groups could forage together and older females would be able to stay close to daughters and their offspring. Geographically, foraging ranges would no longer be restricted by juvenile capabilities (O'Connell et al. 1999: 468).

Turning to the fossil and archaeological records, O'Connell et al. (1999: 468) ask when in human evolution did

the life history changes predicted by the ‘grandmother’ hypothesis occur, and were those changes associated with environment change that effectively reduced ‘children’s’ resources? They point to the fossil evidence for larger brain size and body size in *H. erectus/ergaster* as indication of longer lifespan and later age at maturity. Despite maturing more slowly, *H. erectus* should be weaned earlier rather than later than either apes or australopithecines, according to the ‘grandmother’ model. Comparative estimates of age of weaning from study of chemical composition of permanent dentition and dental hypoplasia offer means of testing the model (O’Connell et al. 1999: 469). As the first hominin with modern human body proportions, *H. ergaster/erectus* appears well-designed for thermoregulation in relatively arid environments. The cooling and drying of the Rift Valley climate with increasing seasonality and expansion of open habitats is well-documented during the period of the emergence of *H. erectus* (deMenocal 1995, Behrensmeyer et al. 1997, Reed 1997). O’Connell et al. (1999: 470) note specific evidence for change in the critical period of 1.9-1.7 mya: sharp increase in abundance of C4 biomass, indicating aridity and seasonality, in Turkana and Olduvai (Cerling 1992); arboreal and frugivorous animals becoming much less common in East African sites after 1.8 mya (Reed 1997); and indicators of seasonal dietary stress in teeth of theropitids from Koobi Fora from 2.0 mya (Macho et al. 1996).

In the cool, dry seasons, plant foods, especially those accessible to children, became limited. Resources that could have been exploited by adults for provisioning juveniles had to be available throughout the dry season, on a day-to-day basis, providing returns that supported adult harvesters and at least one other person. Small game, shellfish, nuts, seeds and tubers or underground storage organs (USOs) all meet these criteria (O’Connell et al. 1999: 470). Some supplement of animal matter would have been very important for nutrition of children with growing brains (Milton 1999a). But, O’Connell and colleagues focus on the ecology and economy of carbohydrate-rich but nutrient-poor USOs. Generally inaccessible to children, these can be processed by adults with high returns (1999: 472, Table 1). Since they store food or water for periods of climatic stress, USOs are abundant in seasonally variable open steppe and savanna environments. As habitats became more open, they became more available. This is indicated by the increasing diversity of suids, which feed heavily on USOs, in the African record from 1.8 mya (White 1996, cited by O’Connell et al. 1999: 473). To support their argument that *H. erectus* foraging relied on tubers, O’Connell et al. (1999: 473) note the geographic range of this first hominin to move out of Africa. The expansion of range of *H. erectus* has usually been attributed to larger home

ranges of hunters/scavengers (e.g. Gamble and Steele 1999, Larick and Ciochon 1996). O'Connell and colleagues argue that USOs would be far more dependable, and hunting unlikely to be productive in many of the newly occupied habitats to which *H. erectus* moved. The northerly limit of *H. erectus*' range coincides with the limit of 'reliance on tubers as a staple among ethnographically known hunter-gatherers in continental habitats' (1999: 473, citing Thoms 1989). That *H. erectus* had the technological ability for manufacture of digging tools may be less controversial than claims for use of cooking fire at these early dates (see below). O'Connell et al. (1999: 474) also find support in apparent changes to *H. ergaster/erectus* digestive anatomy (citing Aiello and Wheeler 1995). They suggest two possible tests for the importance of tubers in *H. erectus* diets, one via toothwear analysis, the other via trace element analysis (1999: 474-5).

### *2.3.5 Problems for the 'grandmother' hypothesis*

The 'grandmother' model has elegance and explanatory power. Framed within general theory of mammalian life history, it has detailed empirical support in evolutionary ecology of contemporary foragers. Living in the vicinity of Olduvai, the Hadza are arguably the most suitable of any modern hunter-gatherers to act as models for Pleistocene hominin strategists. The hypothesis provides a provocative and stimulating challenge to orthodox, and outdated, thinking on *H. erectus* as a hunter-scavenger with incipient nuclear family organisation. As O'Connell et al. (1999: 464-5) argue, the notion of *H. erectus* as a big-game hunter with pair-bonding and 'paternal' provisioning is now indefensible. Hawkes and colleagues have challenged this view of the Hadza themselves (Hawkes 1990, 1993, Hawkes et al. 1991, n.d.), let alone *H. erectus*. They lament the 'narrow-eyed focus on zooarchaeological evidence' in the present dispute about hunting vs. scavenging (O'Connell et al. 1999: 465). This has the effect of begging 'the larger, ultimately more important ecological and evolutionary questions Pleistocene archaeology was once seen to address' (ibid.). The way the debate is now posed, by contrast with the original arguments of Isaac (1978), O'Connell and colleagues continue, '*no other interesting questions about hominid behavior are resolved by the answer*' (1999: 465, authors' stress).

Nevertheless, the 'grandmother' hypothesis has difficulties that need addressing. Blurton Jones et al. (1999: 152-9) review several criticisms themselves. Here, I look briefly at three issues. Firstly, cooking is an important part of Hadza ecology. Can the strategy emerge without cooking in the first place? Secondly, what are the



social and economic implications of children's wider dietary requirements? Thirdly, and most fundamentally, can we justify hominin social structures that enable mothers and daughters to stick together? A fourth area of concern is that Blurton Jones and colleagues specifically dissociate the 'grandmother' model from encephalization *per se* (1999: 157), a position that surely needs to be modified.

#### 2.3.5.1 *Is cooking necessary?*

Although O'Connell and colleagues focus on tubers, they observe that there are several other types of resources, difficult for young children to access, which could be exploited by adults to feed weanlings. Of these, shellfish, nuts, seeds or small game do not need cooking. Even considering tubers, some storage carbohydrates can be eaten raw. Simpler molecular forms of starch, sucrose and fructan are water-soluble and digestible by humans without cooking (O'Connell et al. 1999: 471, and refs.). Milton (1999a: 18) cites a study by Langworthy and Deuel (1920) on the digestibility of raw wheat, corn and potato starches. Subjects experienced no discomfort after ingesting large quantities of starch, nor was their digestion of other foods affected. In these experiments, the foods were finely ground, another form of processing which improves digestibility. However, cooking in general improves nutrient yield, especially for children. It is definitely required for more complex carbohydrates, and may be particularly important for denaturing toxins (Wrangham et al. 1999: 570 and refs.). Cooking therefore extends the range of edible species.

Like O'Connell and colleagues, Wrangham et al. (1999) see the cooking of plant foods as a crucial development in *Homo erectus* evolution. The model of Wrangham and colleagues, however, does not attempt to account for human life history variables, focusing on the evolution of male-female, rather than female-female, social bonds. They consider USOs as 'australopithecine fallback foods' (1999: 570) during the climatic shifts of the Late Pliocene, and contrast australopithecine and *H. erectus* utilisation of these resources as 'raw vs. cooked'. They find support for this view in the evolutionary trends for reduced dentition and gut size.

Evidence for the unambiguous controlled use of fire lies in the Late Middle Pleistocene (after 400,000 BP) (Clark and Harris 1985, James 1989, Straus 1989). Fire evidence is found sporadically in Lower Pleistocene African sites, notably at Koobi Fora (FxJj 20, dated 1.64 mya, Bellomo 1994), Chesowanja (1.42 mya, Gowlett

et al. 1981) and Swartkrans (Member 3, approx. 1 mya, Brain 1993). In each case, there are plausible natural causes for the fire with no compelling evidence of hominin use for cooking. The Koobi Fora ‘fireplaces’ may be the best substantiated (see Rowlett’s commentary on Wrangham et al. 1999: 584-5). Phytoliths found in the reddish patches at Koobi Fora show a heterogeneity in marked contrast to the homogeneity characteristic of ‘tree-stump’ burnings, suggesting a variety of sticks, woods and grasses gathered together (Rowlett 1990). The Swartkrans material includes hominin and other animal fossils, stone and bone tools, and some burned bone. However, it is in a ‘complex, secondary context. All of it reached the cave from the open-air landscape near the entrance to the cave by falling in, flying in, washing in, and so on, over vast amounts of time’ (Bunn 1999: 579). How the bones were burnt is unexplained. So long as this remains a singular example, few will be convinced on the basis of this evidence alone. Bunn acknowledges the problem of archaeological visibility for fire use in the Lower Pleistocene. O’Connell et al. (1999: 474) observe that the archaeological evidence of the fires typically prepared by the Hadza to cook *//ekwa* roots would be ephemeral, even where the site was used repeatedly. But, if *H. erectus* were making regular use of fire, animal products would presumably also be cooked on occasion. It seems surprising therefore that burned bone does not feature more frequently.

The notion that the reduced dentition of *H. ergaster/erectus* indicates cooking is challenged by Smith (1999: 585-6) who questions whether cooking at a simple technological level, with plenty of grit introduced into food, could reduce rather than add to abrasion. Anterior teeth in *H. erectus* are *not* in fact reduced, suggesting the need for slicing incision. But compared with *H. habilis*, *H. erectus* needed to do much less chewing, and had considerably less wear on molars and incisors. Smith argues that the food type likely to produce this form of dentition with resultant wear patterns is uncooked meat. This brings us to the question of overall dietary requirements.

#### 2.3.5.2 Children’s nutrition

As brain sizes increased, children needed high-quality foods that were concentrated in volume. Protein quality is particularly important for young growing animals (Lozy et al. 1980, cited by Milton 1999a: 19). Animal protein provides the full complement of amino acids needed by humans for protein synthesis. In addition, less weight and volume of meat is necessary to satisfy protein requirements than would be from plant foods (Milton

1999a: 18). Animal foods also provide the essential fatty acids, which make up 20 % of an adult human brain's dry bulk, as well as vital micronutrients – minerals and vitamins. High-calorie plant foods alone cannot supply the nutrients, proteins and lipids which children need for brain growth and development (Milton 1999a: 19). Moreover, some component of animal protein in the diet may have an important effect on the ability to detoxify cyanogenic plant foods (Milton 1999a: 18, citing Jones 1998). It is clear that supplements of meat, fish or shellfish were required by encephalized *Homo* offspring throughout the Pleistocene. Small volumes of such nutrient-dense foods would leave space in the gut for digestion of high-calorie plant foods such as USOs. This combination of animal matter with starchy plant foods formed the basic diet of encephalized *Homo*, according to Milton (1999a).

Hawkes, O'Connell and Blurton Jones were spurred to challenge the orthodox view of meat-eating as the catalyst in human evolution in part because of their observation that Hadza hunters, even with modern weaponry, are unable to provide more than the occasional windfall (Hawkes et al. 1991, O'Connell et al. 1988). Meat, whether scavenged or hunted, would not be a sufficiently dependable source to provide for children's daily needs. Nevertheless, we know from the archaeological assemblages that hominins of the Lower Pleistocene accessed animal carcasses wherever and however they could lay hands on them. Hawkes and her colleagues argue (in comment on Wrangham et al. 1999: 582) that the new plant foraging strategies allowed hominins to congregate in larger numbers. Such larger groups of larger-bodied *H. ergaster/erectus* would have become increasingly competitive as scavengers, accounting for the considerable evidence of carnivory. Hadza women today are perfectly capable of obtaining meat themselves, sometimes by aggressive scavenging, scaring large carnivores off kills (O'Connell et al. 1988: 361). But, in line with the evidence for chimpanzee hunting and meat-sharing (Boesch and Boesch 1989, Stanford 1996), we expect that early Pleistocene economies involved trade of male-obtained animal products for female sexual favour.

Chapter 3 will address male-female interaction and investment. Scenarios about the emergence of male-female pair-bonds based in food-sharing have long dominated narratives of human evolution (e.g. Washburn and Lancaster 1968, Lovejoy 1981, Lancaster and Lancaster 1983). Hawkes and colleagues pose their view of the primacy of female-female social exchange as a radical alternative. Yet, the onset of a 'grandmothering' strategy

would in fact promote increasing male sociality with females. A mother who is able to wean early because she has a vigorous older relative able to help in feeding the weanling will return to cycling sooner than a mother who does not. Once she has resumed cycling, she is in an advantageous position for attracting male help. Courtship by males eager to mate a fertile female is likely to include gifts of animal food, which the mother can use to supplement the diet of her latest weaned offspring. Whether such male mating effort persists much once the mother has been made pregnant again is uncertain. But a male is more likely to stay in consortship with a partner who has short interbirth intervals than one who, lacking an older relative's help, has longer IBIs. This is simply because he has less time to wait for his partner to be fertile again, and in that case, guarding his current mate may pay. Patterns in chimpanzee hunting at Gombe (Stanford et al. 1994) show a 'binge' tendency as males are motivated to hunt by the presence of larger numbers of oestrous females in certain seasons. A similar effect of increase in male hunting/scavenging activity should occur if early Pleistocene *Homo* females increased their fertility as a consequence of the 'grandmother' strategy, and were hence more likely to be cycling at any point in time.

In a novel departure from the usual story, Wrangham et al. (1999) see the evolution of male-female bonding in *H. erectus* as a result of female need for a male bodyguard to protect the female's supply of *cooked* plant foods from theft by dominant individuals (other males). To keep her bodyguard(s) sweet, female *H. erectus* increased her period of sexual receptivity. Because more males were getting more matings with increasingly receptive females, this reduced sexual competition, leading to reduced sexual size dimorphism. Wrangham and colleagues' account has virtues: it challenges received wisdom by focusing on males as economic liabilities and parasites on females, and by opening up a discussion of the complexity of social organisation required for cooking. As argued by Knight (1991: 262-6), the major problems in developing fire technology are not technological. They are social. Who stays by the fire to guard it? Can the social group be divided up so that one party remains and the rest move around the landscape? Given competition over both food and females, these are questions fraught with difficulty. Even supposing fire was used in the Lower Pleistocene, Wrangham et al.'s version is problematic. As noted above, sexual size dimorphism in *H. ergaster/erectus* reduced as a result of selection on females to get bigger, rather than relaxation of selection on male body size. It is not clear in this account why there would be less competition for *fertile* sex, which is what matters in evolution. Wrangham and

colleagues (1999: 571-2) dispute the importance of meat as a source of energy, neglecting to discuss other aspects of nutrition (see comment by Milton on Wrangham et al., 1999b: 583-4). A male bodyguard who settled down by the fire, keeping watch over cooked tubers, would have little opportunity for dedicated scavenging. He would run grave risk of being cuckolded, albeit sneakily, by scavenger males when his female partner went looking for the animal supplements required by her offspring. Dominant scavenger males need only turn up by his fireside with their offerings during periods when his partner was cycling. Once she had been made pregnant, he could be left to have all the extra sex he wanted in peace. Would this 'slippers by the fireside' strategy have done well against scavenging philanderers, given mother's and children's need for micronutrients? This scenario does not deal at all with evolution of human life history variables, nor does it resolve the issue of children's diet.

#### *2.3.5.3 Can mothers and daughters stay together?*

A traditional assumption on phylogenetic grounds that the ancestral human form of social organisation was characterised by female dispersal (Foley and Lee 1989, Wrangham 1987, Ghiglieri 1987, Rodseth et al. 1991) has been called into question (see e.g. Dunbar 1996: 148, Knight et al. 1995: 105, Hawkes 1996: 298-9, Hawkes et al. 1997: 561-2). The argument runs that because our closest relatives, chimpanzees and bonobos, are male philopatric species and modern hunter-gatherers have been regarded as generally patrilocal, therefore so were *all* intervening hominin ancestors. In fact, contemporary hunter-gatherer residence patterns show considerable variation. Hawkes et al. (1997: 572) note that just 56% of the hunting groups which do not use horses or depend on fishing in the *Ethnographic Atlas* (Murdock 1967, and see Ember 1978) show patrilocal. This compares with 71% of the whole sample including societies of all subsistence types. Hawkes and colleagues even argue that patterns of natal dispersal in *Pan* may vary much more than is widely held, citing data from Gombe and Bossou in their support (Hawkes et al. 1997: 572-3, Hawkes et al. 2000: 248). This suggests that models which address the social and ecological factors underlying such variability will be more useful than categoric assertions about species-typical dispersal patterns (cf. Mace and Holden 1999).

Primate behavioural ecology assumes as a default that female coalitions form the core of primate societies (Dunbar 1988: 138-139, 262). Any focus on major evolutionary change in social and sexual strategies forces us

to adopt something of a female bias. According to standard socioecological models, changing ecological variables drive changes in mammalian mating systems via changes in *female* strategies rather than male ones (Crook and Gartlan 1966, Clutton-Brock and Harvey 1977). Ecological change impacts most directly on female behaviour. While male primates tend to prioritize the search for fertile females over the search for food, mothers distribute themselves independently of males, in accordance with ecological variables and predation risks, prioritizing resources to feed their young (Wrangham 1980). Within constraints set by phylogenetic history, the resulting mating system depends on whether females forage in isolation or in groups, and on the nature of interfemale resource competition (van Hoof and van Schaik 1992).

Climate change leading to the stress of encephalization and consequent change in dietary and social strategies is likely to affect the costs and benefits of dispersal for female *Homo*. The main argument pitched against the idea that male philopatric hominins could have switched to become female philopatric is the cost of inbreeding depression (Foley and Lee 1989). If the ancestral state is for males to stay while females disperse, then females who began to change strategy in order to stay with female relatives would risk mating close relatives such as brother or father. However, a major feature of the changes implicated in the brain expansion of 2 mya is increase in social network size, inferred from the increase in brain size. Group sizes predicted from estimated neocortex volumes for *H. ergaster/erectus* are almost twice the mean group size for chimpanzees (Aiello and Dunbar 1993: 188, Dunbar 1992). If hominins had to bunch into larger groups to reduce predation risk in more open environments, this should dilute the risks of inbreeding by offering a wider pool of accessible mates. According to O'Connell et al. (1999: 468), as the climate changed and USOs became increasingly abundant, hominins and in particular females would have been able to gather in larger numbers, since returns were limited by handling requirements rather than food availability. The benefits to females who could stay near their mothers to obtain help with weanlings would outweigh any costs of the risk of inbreeding.

Just as female trade-offs and foraging strategies altered with environment change, so would male trade-offs in response to change of female strategy (Hawkes et al. 2000: 251-2). As females gathered and gained more extensive social networks, foraging across larger home ranges, males could no longer aim to patrol and guard females on territories chimp-style (Hawkes et al. 1997: 572, Foley and Lee 1989: 905). At the same time as the

benefits to female kin affiliation were increasing, the benefits of male territorial kin affiliation would be collapsing or changing. An alternative to the male coalitionary strategy of defending females on territories would be a strategy of bonding with and mate-guarding a specific fertile female. This could involve male mating effort with lengthy consortship but possible mate desertion once females were pregnant. Since the grandmother strategy produces more female fertility, payoffs to such roving males who used courtship gifts of animal food to bond with fertile females should rise. Some male cooperation in resource acquisition would be advantageous (Foley and Lee 1989: 905), but males who attempted coalitionary defence of territory could be hindered from effective scavenging and less likely to gain matings. Foley and Lee suppose that male kin alliance would be needed in 'hostile intergroup encounters' (1989: 905). But once chimpanzee-type boundaries had disintegrated and home-ranges were too extensive to defend, why not, as human foragers tend to do in situations of inter-band hostility, simply move on? In their observation of Hadza scavenging practices during 1985-6, O'Connell et al. (1988) found that scavenging returns were highly variable and intermittent; it was partly this that prompted them to investigate 'grandmothering' as an alternative, since returns would be far more reliable on a day-to-day basis. Simply as a matter of dependable income, changes to grouping patterns, foraging strategies and consequent trade-offs should support a new tendency for females to stick by mothers, or other female relatives. Who will a female rely on more on a daily basis – female kin or a possibly roving male? Since females share similar trade-offs while males must engage in mating competition, there can be little doubt about the answer. The problem of inbreeding risk can be overcome by sheer weight of numbers in the social groups.

Evidence supportive of a matrilocality model emerges from molecular genetics. Among small aboriginal human populations such as East African pygmy groups and Khoisan, the distribution of mtDNA comparative to nucleic DNA shows a pattern of variation consistent with female philopatry (Vigilant et al. 1989, Melnick and Hoelzer 1993). This pattern differs notably from the genetic structure consistent with female dispersal found in human groups with a long history of property-holding (Seielstad et al. 1998: 278-80; Stoneking 1998). Some commentators on the 'grandmother' model have asked whether the strategy could also work through benefits to offspring of sons (Gurven and Hill 1997: 566, Nishida 1997: 569). In the actual sample of nine senior women who were feeding younger women's children in the Hadza analysis (Hawkes et al. 1997: 554), five were

matriline relatives (mother's mother, mother's mother's mother, and mother's sister) while two were father's mother. From the grandmother's perspective the greatest inclusive fitness benefits accrue through daughter's offspring, simply because of the factor of paternity uncertainty as soon as a relationship is linked through a male. Again, as Hawkes et al. (1997: 573) put it: 'Mothers and daughters face similar trade-offs while sons must invest in mating competition'. This makes it inherently unlikely that the strategy could emerge via mother-son links, although once established as part of the species life-history pattern, it could then become flexible and adaptable to demographic contexts. White and Churchill (1997: 570) argue that food-sharing mothers could help the reproductive success of their sons by attracting incoming fertile females. But, as Hawkes and colleagues note, the fertile female could accept the food, meanwhile cuckolding the mother and son. The son's fitness will still depend on whether he wins out against other males. Nor will the mother gain any benefit if the female gets pregnant again more quickly to another unrelated male. But the most compelling reason why the grandmother strategy must emerge as a mother-daughter exchange is the factor of age to which the mother must live to have a beneficial effect. Males generally have a later age of first reproduction than females; among the Ache, the male fertility curve for early adult years lags behind the female curve by some five years (Hill and Hurtado 1996: 278). Grandmothers are less likely to survive long enough to help sons compared with daughters.

In a great variety of human societies, from foraging to post-industrial, women have stayed close to their female relatives for support in economic situations where men are unwilling or unable to offer dependable resources (cf. Mace and Holden 1999: 389, Hrdy 1999: 250). Given the unreliability of a scavenging economy, exactly such a situation characterised much of the Pleistocene. Rather than regard the requirement for matrilocality as a problem for the 'grandmother' model, we should accept that the evolution of human life history, including menopause, is in itself powerful evidence that matrilocality prevailed for much of *Homo* evolution. The standard 'patrilocal' model is silent on the subject of human life history. The real payoffs to patrilocality occur when men can accumulate resources as property, that is, within history.

Finally, in their own critique of their model, Blurton Jones et al. (1999: 157-8) ask whether it is 'right to divorce the evolution of human life history from the evolution of a large brain'? Their view of the direction of



causality of encephalization is that reduced mortality allows delayed maturity, increasing payoffs to learning and cultural transmission, therefore selecting for large brains good at cultural learning. Again, this ignores the question of cost of growing brains. It is hard to understand why Blurton Jones, O'Connell and Hawkes do not tie their environmental reduction of juvenile resources argument in with stress of encephalization (itself fundamentally triggered by environment change) as the motor cause of novel social behaviours. Precisely because *Homo* mothers experienced the worst costs of encephalization in the first year or two of infancy (Foley and Lee 1991) weaning of underdeveloped juveniles was a problem requiring a novel social solution. Without grandmothers, *Homo* females would have had to push out their IBIs, weaning later; with grandmothers, they could raise their birth rates. This view that it is the combination of pressure for encephalization with reduction of children's resources that counts also answers their question why other primates, especially chimps, do not develop grandmother strategies (Blurton Jones et al. 1999: 153).

All told, objections to the 'grandmother' model are by no means insuperable. The issue of when cooking becomes a factor is unresolved on current evidence. We might envisage a two-stage process, with intergenerational female cooperation implicated in the emergence of *H. ergaster*, whose diet remained raw, and a second Post-Acheulean stage with early development of cooking technology associated with the lineages that gave rise to further encephalization in *H. heidelbergensis*. But archaeological evidence in support of this argument is lacking.

More modelling is needed to assess the effects of the 'grandmother' strategy on male-female relations. It is expected that as female reproductive costs rise steeply with encephalization, the primary forms of social cooperation will be female-female (Key and Aiello 1999, Key 1998). *Homo* mothers would surely turn to their mums first before they turn to their mates. But the increase in female fertility should provoke concomitant increase of male productivity from hunting/scavenging. The combination of high-calorie starchy plant foods with animal foods is the diet predicted as ideal for *H. ergaster* in the African Lower Pleistocene (Milton 1999a), implying an incipient economic role for males.

## **2.4 Summary: the energetics of encephalization**

Probable selection pressures for encephalization in *Homo* include social factors of increasing group sizes, and the need for better sensori-motor control, both in respect of tool use, and of more efficient bipedality. Each of these contributing factors were responses to major climate change in the Late Pliocene. Alongside evidence of the first large increase in brain size and the cooling and drying of the Rift Valley climate occurs the onset of lithic technology. Around 2 mya., *H. ergaster* emerged as the first hominin with human-like body proportions and locomotive abilities, a far wider geographic range, and novel foraging and dietary strategies, involving both starchy plant and animal foods. Reduction in gut size, high-quality diets, larger body size and changes in life history, with new roles for senior females as feeders of dependent weanlings, can account for how females met the costs of this initial major increase of brain size. Males are likely to have contributed animal products to the diets of females, and hence females' offspring, on the basis of mating effort rather than as reliable parental investors.

For over a million years, from the Lower to early Middle Pleistocene, there appears to be stasis in relative brain size (Aiello 1996, Kappelman 1996, Ruff et al. 1997). With the emergence of *H. heidelbergensis*, accelerated encephalization rates in the late Middle Pleistocene brought further increased reproductive costs. These would be felt especially by mothers in early stages of lactation. Such steeply increasing costs of reproduction are likely to have driven major social and sexual behavioural changes (see Foley and Lee 1996: 63-4, Power and Aiello 1997, Key and Aiello 1999). Cooking technology at this stage would have enabled access to a wider range of high-energy resources. But cooking in itself should be viewed as a social institution requiring novel relationships between the sexes. In particular, those females who secured increased levels of investment provided by males would have enhanced their fitness. Chapter 3 discusses female strategies and mechanisms for achieving that end.

## CHAPTER 3

### FEMALE MECHANISMS FOR RAISING MALE INVESTMENT

#### 3.1 Paternal investment and reproductive conflict

Humans have a degree of paternal investment unprecedented among primates. The development of this feature has long held a central place in scenarios of human evolution (e.g. Washburn and Lancaster 1968, Lovejoy 1981, Alexander 1990, Fisher 1992). Lancaster and Lancaster (1983: 36) describe regular food-sharing between the sexes as ‘the true watershed for differentiating ape from human lifeways’, understanding the role of husband/father as ‘unique to the human species’. More recently evolutionary ecologists have challenged the view that male contribution to group food consumption among foragers is necessarily paternal investment (Hawkes 1991, 1993a, 1996, Kaplan and Hill 1985a,b). Hawkes (1996: 284) warns against falling into the trap of regarding the nuclear family as a ‘unit of common interest’. Males and females have potentially conflicting reproductive interests, and may differentially allocate mating and parenting effort.

In a review of data on food-sharing among Ju/'hoansi, Hadza and Ache foragers, Hawkes showed that ‘men often choose the very resources least likely to give consumption advantages to their own nuclear families’ (1993a: 350). A Hadza man, rather than target small game and other more reliable resources, spends a month of days hunting for each large animal he captures. Once he makes this kill, he loses all control over its distribution which, characteristically among such foraging groups, is band-wide (Wiessner 1996, Barnard and Woodburn 1988). What the hunter may gain is reputation and social standing – this is Hawkes’ ‘showoff hypothesis’. She suggests that men in these societies may be more inclined than women to trade off consumption benefits for social benefits, including alliance and mating advantages. Men generally have more to gain in terms of fitness from additional matings than women do. Among the Hadza and the Ache, having a better hunter for a father has little effect on child survival. Nevertheless, better hunters are likely to have more surviving offspring (Marlowe 1999, Hill and Hurtado 1996). This could come about because men with good

reputations as hunters win the best women foragers as mates (suggested for the Hadza by Hawkes et al. n.d.), or because better hunters succeed more in mating competition, gaining extra mates.

Examining data on male care in primates including humans, van Schaik and Paul (1996) question whether paternity is ever a factor motivating males to give care. Among non-human primates, the pattern of care 'is not adequately explained by parentage' (1996: 153). By offering care, males, including humans, may make themselves more attractive as mates. Hence, mating effort could offer a more general explanation for male care. In an abstract model, Hawkes et al. (1995b) showed that even among pair-living animals with extensive male care, a mutant male who spent most of his time searching for mates, offering no care, would spread genes throughout the population. This would undermine relatedness between males and infants they care for, as well as forcing males to spend more time mate-guarding, at the expense of giving care. The evolutionarily stable strategy (ESS) that arises is for males to give little care, even when they can mate-guard sufficiently to assure paternity. The assumptions of this model may make it unrealistic for humans. Female choice is not incorporated. Care-giving, searching for mates and guarding mates are assumed to be mutually incompatible activities, which is not necessarily the case in many foraging societies. The value of the model, for van Schaik and Paul, is that it forces us to take a fresh look. In order to demonstrate genuine parental effort by males, 'mating effort must be eliminated as a factor' (1996b: 154).

Marlowe (1999) tests the hypothesis that not all male care is mating effort by observation of married Hadza men with both biological and stepchildren in the families they provision. Although the Hadza themselves stress that men should and do care as much for stepchildren as for biological children, Marlowe found that actually they do not. More direct care (play, communication, nurturing) went to biological offspring, while men who had only biological children at home brought back more food than men who had at least one stepchild at home. Counted as per capita daily calories of all food types, this amounted to twice the quantity (1,901 kcal for men without stepchildren compared with 877 kcal for men with stepchildren). Significantly more meat was provided by men without stepchildren (349 kcal vs. 63 kcal). On this evidence, Hadza men do seem to be parenting. However, the issue of stepfathers' motivation may be confounded since men who are poor hunters, and pursue more 'cad-like' strategies are the ones most likely to become stepfathers. Their wives get fed up, end the

marriage and force them to move on. In that case, the better motivation of the men without stepchildren is indeed keeping them in favour with their wives. It becomes very difficult here to separate mating effort from parental effort.

If we step back with our models into the early Pleistocene, it is conservative to start from the assumption that males offer care or investment as mating effort, and then to investigate conditions under which male parental investment can arise. If female hominins derived a large amount of the energy from male provisioning as a result of mating effort then the importance of confidence of paternity as a motivation for male investment is diminished, with major implications for human social evolution. This would undermine traditional assumptions of a direct trade of male provisioning for paternity assurance within monogamous pair-bonds. In particular, can we model female strategies for raising male levels of investment without requiring paternity confidence and monogamy in the first place?

### **3.2 Sexual signals: concealed ovulation and continuous receptivity**

For females, sexual signals are primary mechanisms for eliciting behavioural change in males. Sexual characteristics of modern human females, particularly concealment of ovulation and so-called continuous receptivity, have long been implicated in evolutionary accounts of pair-bonding behaviour (Morris 1967, Alexander and Noonan 1979). These are not features unique to humans (Hrdy 1981: 158), although in other primates males may be able to track female cycles by olfactory cues despite visual concealment (e.g. Ziegler et al. 1993). In their phylogenetic analysis of the evolution of concealed ovulation and mating systems in anthropoid primates, Sillén-Tullberg and Møller (1993) show that visual signs of ovulation have been lost independently between 8-11 times, nearly always in non-monogamous contexts. They argue that, in the first place, the function of concealment in relatively promiscuous mating systems could be to counter infanticide risk by confusing paternity (cf. Hrdy 1981). However, once ovulation is concealed in a primate lineage, it becomes more likely that social monogamy will evolve. Males are forced into dedicated mate-guarding since they cannot tell when exactly a female is fertile. Hence, they *may* gain more confidence of paternity (cf. Alexander and Noonan 1979).

This serves a female strategy of increasing male investment, since chances of paternity become a function of time spent with the female. Attentive males are rewarded with more fitness than philanderers who aim to access the female only at her most fertile time. The human female appears 'well designed' to waste the time of philanderers by withholding accurate information about her true fertility state. Concealment of ovulation and loss of oestrus with continuous receptivity eliminate any reliable cue by which to judge whether a female has been impregnated. The longer a male has to spend with one female to ensure she has been fertilised, the less chance he has of fertilising another in the same breeding period (Dunbar 1988: 160).

In Sillén-Tullberg and Møller's phylogenetic reconstruction (1993: 16), the great ape common ancestor is likely to have had slight signs of ovulation, with the large sexual swellings seen in *Pan* being a derived state. Manning et al. (1996) argue that even in modern human females there are still subtle signals of ovulation, taking the form of change in fluctuating asymmetry around the cycle. Even if this is true, the effect of such subtle signals would still be to force males to be attentive. A man has to be with his partner every day to notice the differences (1996: 140-1). Grammer (1996) models a 'battle of the sexes' whereby men probe women's cycle state using pheromonal signals, while women have developed chemical weapons – copulines – which serve to equalize female attractiveness across the cycle. In his view, female sexual cryptis 'remains complete'. The best evidence supporting complete concealment from men comes from studies of variation in volume of human ejaculates. Baker and Bellis (1993a: 880) found that men varied the volume of their ejaculates in relation to their partner's absence, and to her weight, a possible indicator of fertility, but not in relation to her cycle. If Manning et al.'s symmetry signals work, it is hard to understand why men in steady relationships do not show higher volumes of ejaculate at time of their partner's ovulation. Women, however, may 'know' when they ovulate. Extra-pair copulations by unfaithful women cluster around the time of ovulation (Bellis and Baker 1990). Concealed ovulation allows for flexibility of female strategy. Women appear well designed for cuckoldry, able to maintain a pair-bond with a regular partner while timing the moment to get pregnant by a lover.

Ovulation concealment with continuous receptivity draws males into longer consortships during the female's fertile period. Once she is obviously pregnant, nothing guarantees the male's continued presence. If he has

mating opportunities elsewhere, he could desert. So these features are consonant with a strategy of male mating effort. It seems probable that ovulation had become concealed by the first major stage of encephalization in *Homo*. Originally, it may have functioned as protection against infanticide, as sociality increased in *Homo* with larger groups in more open environments. Infanticide risk could be a major selective factor in the evolution of pair-bonds (van Schaik and Dunbar 1990, Palombit 1999), preceding any form of provisioning effort or direct care by males. Once risk of infanticide had given rise to concealed ovulation and some longer-term protective pair-bonding an evolutionary trajectory leading to forms of social monogamy becomes more likely. The unique aspect of human mating is such 'social monogamy' – acknowledged pair-bonds where partners are not necessarily faithful – in multimale, multifemale groups (Deacon 1997). The factor pushing the emergence of male parenting will be female need for extra investment, and therefore choice of investing males. Female reproductive stress should become critical throughout the second major phase of encephalization commencing with *H. heidelbergensis* from 500,000 BP. What mechanisms are then available to females for altering male trade-offs between mating and parenting effort?

One parameter which critically affects the payoffs to males of paternal against mating effort strategies, because it affects the number of fertile females available at any one time, is the degree of reproductive synchrony among females. In this chapter, I model effects of synchrony, specifically birth seasonality, on hominin mating systems. How much does female reproductive synchrony alter fitness payoffs to ranked males of mating effort (philandering) strategies compared with parental effort (fidelity) strategies. By performing sensitivity analyses across a range of infant mortality and paternity confidence levels, I identify conditions likely to favour the emergence of parental care and increased pair-bond stability. The model is discussed in the context of recent human evolution and the ecology of modern foragers.

### 3.3 Theory of reproductive synchrony

Parental investment can be defined as anything done for an offspring that increases its chances of survival while decreasing the parents' ability to produce additional offspring (Trivers 1985: 207). In the case of a male, to the extent he increases his level of *parental effort* he must correspondingly decrease *mating effort* expended on females other than the mother of the offspring. By investing parentally, a male incurs an opportunity cost, foregoing possible extra reproductive success through extra-pair matings. Whether the reproductive benefits of paternal care outweigh the costs of lost additional matings for any male depends on the payoff between the value of the paternal care and the number of additional surviving offspring he could expect as a result of those additional matings. This, in turn, will be a function of the number of fertile females likely to become accessible to the male during the period when he is engaged in paternal effort and unable to expend mating effort.

One major determinant of the number of fertile females likely to become available to a male during any breeding period is the degree of reproductive synchrony among the females. Synchrony is defined as the timing of reproduction among females such that one male is unable to mate with more than one of the synchronised females (Knowlton 1979: 1023). As the number of synchronised females increases, the probability of a male gaining fertile extra-pair matings before his own partner is once more ready to reproduce decreases. The opportunity costs of paternal investment (in terms of extra-pair matings lost) will be reduced. Then, reproductive benefits accruing to paternal care (in terms of increased survivorship of offspring) may outweigh costs. In these circumstances, a male will maximise his fitness by offering paternal care.

Synchrony can be considered as a strategy by the sex which invests most in offspring to secure greater parental investment from their mates (Knowlton 1979). Following the theoretical models of Maynard Smith (1977), Ralls (1977) and Emlen and Oring (1977), Knowlton observes that 'the spread of female synchrony is likely to increase the ESS (evolutionarily stable strategy) for male parental investment because the payoffs to searching for new mates are reduced' (1979: 1029). Costs and benefits of synchrony to females may vary depending on the frequency of synchrony in the population. If a majority of the female population is synchronised, an individual female may be able to derive benefits of synchrony, such as reduced mate desertion, without herself being synchronised. Hence, an asynchronous 'freeloader' strategy can evolve. Knowlton's modeling of



frequency-dependent benefits of synchrony predicts the evolution of a 'balanced polymorphism between synchronous and asynchronous strategies at the point where they were equally successful' (1979: 1026).

Despite the centrality of synchrony as a determinant of animal and specifically primate mating systems (cf. Emlen and Oring 1977, Dunbar 1988: 140-7), little attention has been paid to this issue in models of human evolution. Turke (1984, 1988b) focused on ovulatory synchrony as a key factor in the emergence of male parental care. Turke discussed only the effect of ovulatory (ovarian cycle) synchrony combined with evolving loss of estrus, without considering effects of seasonal reproduction. Yet, some degree of seasonality would be essential for female hominins to maximise their capacity for ovarian cycle synchrony. If most of the females who are cycling during a given year commence cycling around the same month, more females overlap their periods of fertile cycling and can synchronise ovulation than if females cycle at random periods throughout the year. More males are then required to mate with these synchronised females, since each male must mate-guard attentively for the period his female is cycling (assuming concealed ovulation with continuous receptivity). Once the seasonal cohort of females has been impregnated, no other females may be cycling until the next period of fecund cycling the following year. Hence, males have nothing to gain by searching for a new partner immediately and may remain longer with their impregnated partners before more cycling females become accessible.

In this chapter, I concentrate on seasonality as a determinant of synchrony, without necessarily assuming ovarian cycle synchrony. Certainly, where females do synchronise ovulation tightly, there are no benefits to a male in moving from one female to another during the same ovarian cycle and hence for the whole period that both females are cycling together. But females may obtain the same effect by concealment of ovulation. In modeling the optimal day for male desertion of one cycling partner for another, Dunbar (1988: 159-161) demonstrates that where a male receives no good information about the imminence or occurrence of ovulation, his chances of making the right decision are reduced. In other words, says Dunbar, 'the longer the period during which ovulation might occur, the less worth the male's while it will be to desert one female in favour of another.' (1988: 160)

### *3.3.1. Seasonality in primate mating systems*

Among animal species, seasonal reproductive synchrony is generally correlated with environmental factors. Marked seasonal variation of day-length, temperature or rainfall is likely to result in seasonal patterns of food availability, driving the evolution of species-specific adaptations linking timing of reproduction to resource availability (Sadleir 1969, Bronson 1988).

In a review of primate species, Lancaster and Lee (1965) found seasonality in most populations observed, with a tendency to greater seasonal variation in reproduction as distance from the equator increases. Among primates, the degree of seasonality in reproduction is a good predictor of whether troops are multimale or unimale in composition (Ridley 1986). Although Ridley's hypothesis has been challenged in particular cases (Pereira 1998), it outlines a basic constraint in primate grouping patterns. Significant seasonality increases the probability that females synchronise or overlap their fertile periods. This decreases the likelihood that any single male can guard and impregnate a whole troop of females. Once the number of co-cycling females rises above a critical threshold (see Dunbar 1988: 140-43), a would-be harem-holder may be unable to prevent other males from entering the group and mating with his females. In a study of 23 populations of langurs (*Presbytis entellus*), Srivastava and Dunbar (1996) show that the proportion of one-male groups is a function of the male's ability to defend groups of females, determined by the number of females and their degree of reproductive synchrony. An additional factor is home-range size, which affects any male's willingness to search for other groups. This in turn is affected by environmental parameters such as rainfall volume and seasonality.

Analysis of nine primate species living in temperate zones by Cichy and Ford (reported by Burne 1995) showed that male care for infants, especially infant-carrying, was common. Among tropical species such behaviour is relatively rare. Primates living in temperate zones showed greater frequency of infant care even in species where females had mated more than one male. Food shortages in winter result in increased reproductive seasonality. This in turn leads to a more even operational sex ratio (defined as the average ratio of fertilizable females to sexually active males at any given moment, Emlen and Oring 1977). In seasonal multimale systems, on a probability basis, males are more likely to be fathers of the infants of the females they have mated, since fewer males on average will have competed for access to any one cycling female. In multimale systems where births are randomly distributed through the year (e.g. common chimpanzees), more

males may be able to compete for access to any cycling female, and the average probability of any one male being father of her infant is reduced. Even where a dominant male secures good probability of paternity, he may be inclined to pursue further mating opportunities rather than offer infant care. Marked birth seasonality implies that a male primate is either more likely to be father of the infant of a female he has mated or less likely to have mating opportunities outside the period of female fertile cycling. One or both of these factors combined would motivate the male to greater infant care. Males may also be more inclined to offer care such as carrying when the benefits to infants and mothers are greatest, for instance during harsher seasons (Anderson 1992). It may be difficult to distinguish between parental and mating effort, since a male may care for an infant in order to improve his chances of mating the mother next time she is fertile (cf. Smuts and Gubernick 1992).

Wallis (1995) has detailed seasonal influences on chimpanzee reproductive physiology at Gombe, where chimpanzees are not seasonal breeders. Social contact between females stimulates resumption of postpartum cycles in both wild (Wallis 1992) and captive (Wallis 1985) chimpanzees, as well as stimulating first full anogenital swelling in adolescent females (Wallis 1994). Analysis of long-term Gombe data indicates that significantly larger party sizes are found in late dry season, when there is also an increase in the presence of oestrous females (Wallis and Matama 1993, Wallis 1995). Females travelling in large feeding parties may expose themselves to already cycling females and receive whatever olfactory or tactile chemical cues are available (Wallis 1995). There are also seasonal effects on chimpanzee females in other than fertile conditions, notably greater frequency of full or partial swellings during pregnancy and lactation, besides the normally infertile stages of first postpartum oestrus and first full oestrus swellings of young females. Cyclic, pregnant and acyclic females *all* exhibited anogenital swellings more frequently during late dry season.

These social factors appear to have an influence on food procurement patterns, particularly of meat. Stanford et al. (1994: 223-4) report a peak frequency of hunting for red colobus (largely by male chimpanzees) during the late dry season at Gombe. Hunting showed a pronounced 'binge' tendency, with binges triggered by such factors as larger party size and presence of swollen females (including non-fertile females with swellings).

### *3.3.2 Costs of synchrony to females*

Reproductive synchrony, then, is a key mechanism by which females can – and female primates do – alter costs and benefits to males of philandering and mate desertion. While reproductive synchrony in a hominin population should theoretically bring benefits to females through reduction of mate desertion and possible increases in levels of male investment, synchrony will also be costly for individual females. Costs include reduction in a female's chances of gaining access to a preferred male partner (or, in the extreme, delaying access to any male partner); and time 'lost' to reproduction for synchronising females whose infants die. In the event of infant death, a female has a choice of reproducing again as quickly as possible – which implies that she will not maintain synchrony – or staying in synchrony and waiting until the appropriate time to reproduce again (Foley and Fitzgerald 1996).

If synchrony is to guarantee the one-to-one sex ratios envisaged by Turke (1984), it must be extreme reproductive synchrony, with local females synchronizing all reproductive events: ovulation, conception, gestation, birth, lactational amenorrhea and return to fecund cycling. However, such extreme synchrony could not have existed in conditions of hominin evolution, given optimal interbirth intervals (IBI) of 4 to 5 years. Foley and Fitzgerald (1996) highlight the costs of infant mortality for synchronisers. In modeling an evolutionary competition between female 'synchronisers' and 'cheaters', they show that synchrony at the level of 70% (7 out of a band of 10 females) would only be evolutionarily stable in conditions of low infant mortality (halving that observable among contemporary hunter-gatherer groups). This, they argue, is not likely to correspond to the demographic conditions prevailing in recent human evolution. It is also unclear by what mechanism a female hominin who had resumed cycling after loss of an infant could delay reproduction, unless by refusing sexual access. The capacity for continuous receptivity characteristic of modern human females is generally supposed to have evolved as a mechanism which reinforces pair-bonds (Alexander and Noonan 1979), and promotes male investment. Delaying reproduction by refusing sex for long periods would negate any benefits of extra mating effort gained from continuous receptivity.

Power et al. (1997) model an alternative strategy where synchrony is seasonally based, which is more realistic for conditions of human evolution than a strategy of extreme synchrony. A female who synchronised would

only give birth during a three-month time window of any year. If she lost an infant, she might have to wait up to 11 months before the appropriate time to conceive again. A non-synchroniser or cheat would reproduce as soon as possible. The costs incurred by seasonal synchronisers are negligible at low child mortality rates, and minimal at higher child mortality rates (above 30%). A seasonal synchroniser will have as many expected surviving offspring as a non-synchroniser if she gains a reduction of 2-3 fewer offspring dying per hundred. This reduction can come about either through social factors of lower rates of mate desertion with improved male investment, or through environmental factors of seasonal variation in food availability and energy budgets, or both.

Because of the costliness of a complete reproductive cycle for any female mammal, numerous physiological and behavioural mechanisms link reproduction and energy metabolism (Wade and Schneider 1992). Reproductive attempts may be deferred through suppression of ovulation when food is scarce, or when other processes such as thermoregulation make extraordinary energetic demands. The best predictor of patterns of human birth seasonality is energy balance determined by resource availability and energy expenditure in acquiring resources (Bailey et al. 1992, Ellison 1994: 265-9, Bronson 1995: 147-51 and see below). Females who did not align reproductive effort in accordance with seasonal energetic demands (non-synchronisers in this model) are likely to incur higher child mortality. Evidence from the Gambia suggests that such increased mortality may have effect into early adult life. People born during the annual 'hungry season' are up to 10 times more likely to die prematurely in young adulthood, possibly as result of 'a permanent effect of malnutrition on the development of the immune system during fetal growth.' (Moore et al. 1997)

Seasonal synchrony has low costs in terms of 'waiting' time. The energy balance mechanisms resulting in seasonal reproduction avoid any need to disrupt continuous sexual availability. Hence benefits of mating effort gained from continuous receptivity are retained. Seasonal synchrony cannot guarantee the same level of male parental effort as extreme reproductive synchrony. Once a female has been impregnated, she is liable to be deserted by a male partner as soon as other cycling females become available in the next period of female fecund cycling, when she may be in early stages of lactation. However, seasonality, combined with the effect of concealed ovulation, should ensure at least as many sexually active males in breeding groups as there are

fecundable females in any year period. The mean number of fecundable females in any year can be roughly calculated as the number of reproductively active females in a local group (N) divided by the number of years in the optimal IBI, plus an additional factor of extra fertile cycles arising from infant mortality. In the conditions of hominin evolution, assuming IBI of 4-5 years, with first year infant mortality at 25%, this would range between a quarter and a third of reproductively active females in a social group (30% synchrony). Increases in infant mortality would raise this level of synchrony, while a longer IBI would reduce it.

### *3.3.3 Effects of partible paternity and infant mortality on male strategies*

This suggests that the male to female ratio secured by seasonal synchrony if females mated only one male each would be no more than 30 per cent. In that case, every three females would have the provisioning energies of one male, on average, between them all, the rest of the males being excluded from the breeding system. No male can be expected to provide parental care unless he has some probability of being father of the infant. Nor will any male provide mating effort unless he has a reasonable prospect of fertile sexual opportunities as a result. Provisioning energies of the excluded males will be lost to the females, while excluded males may also pose a threat of infanticide. To increase levels of male provisioning energy available, one possible strategy for females is consistently to mate with more than one male (cf. Benshoof and Thornhill 1979). This strategy spreads the chances of paternity among a larger number of males (functioning to reduce infanticide risk, cf. Hrdy 1981), and should engage more males in mating effort.

Such a strategy of mating more than one male, possibly surreptitiously, by hominin females would involve more males in the breeding system, making more male muscle-power available for infant care, defence or provisioning, while undermining the monopoly of fertile consortships by dominant males. From the viewpoint of a female, whether the energy she extracts from males comes as a result of mating effort or paternal strategies does not matter. Nor is she concerned whether any particular male who invests in her is father of her offspring. From a male viewpoint, if investment is provided on a mating effort basis, that is to improve future chances of fertile sex, the male need not be concerned whether he is father of any particular infant. Confidence of paternity clearly affects male inclination to invest parentally, but paternity probability is not a good predictor of level of care. In Maynard Smith's general model of the evolution of parental care (1977) confidence of paternity does

not affect whether paternal care is an ESS. Apart from the effect on offspring survivorship, what matters for male mating/parenting trade-offs is the male's chances of future fertile mating opportunities. By conferring greater or lesser probability of paternity on in-pair mates, females affect mating opportunities of extra-pair mates. They can manipulate this factor to reward males who are more inclined to invest as against males who tend to philander. By altering probability of paternity, females can alter costs and benefits of male philandering strategies.

#### *3.3.3.1 Partible paternity*

Few attempts have been made to quantify the levels of cuckoldry in modern human populations. Blood group tests on two sample populations in England revealed paternity confidence of less than 80% for husbands/partners (Baker and Bellis 1995: 200). In a review of the sparse available data, Baker and Bellis arrive at a cross-cultural median of 9% 'paternal discrepancy', i.e. 91% confidence that the partner is father of any child, with a range from 70% to 98.6% (1995: 199-200). Studies by Baker and Bellis (1993b, 1995) on orgasm and sperm retention in modern human females suggest that orgasm could be a mechanism by which women favour the paternity chances of extra-pair mates relative to husbands. This is reinforced by a tendency for an increased frequency of extra-pair copulations during the period of ovulation (Baker and Bellis 1995, Bellis and Baker 1990). These effects indicate that surreptitious extra-pair mating may have been an important strategy for evolving hominin females (cf. Benshoof and Thornhill 1979).

Some contemporary foraging populations may be characterised by paternity confidence at the lower end of the range determined by Baker and Bellis. Hill and Kaplan (1988: 298) state that Ache women reported a mean of 2.1 possible fathers for each child – possibly a defence strategy against high risks of infanticide (Hill and Hurtado 1996). By contrast, genetic studies on the Ju/'hoansi by Harpending (1971) revealed very high paternity confidence, confirming that the named father of a child was in fact the biological father in almost all cases. However, it should be noted that this did not result purely from marital fidelity. When extra-marital pregnancies occurred, the father was accurately identified and a new marriage arranged during early stages of pregnancy (Howell 1979: 232). This situation arose most frequently as a result of break-up of first marriages. Presumably the women involved were gleaning mating effort from both first husband and lover (who became

second husband) for a period before the new marriage took place. Worthman (1978, cited in Hrdy 1981: 139) tracked the cycles of Ju/'hoan women through hormonal analysis. These women reported an increase in sexual activity with both husbands and lovers around midcycle. Anecdotal evidence suggests that Ju/'hoan women expected to receive mating effort in the form of presents from lovers (Shostak 1983) in addition to investment from husbands.

Apart from surreptitious strategies, evidence from a range of societies in the Old and New World shows that multiple fatherhood or 'partible paternity' is a socially accepted and probably ancient institution (Hagmann 1999, Milius 1999). Partible paternity refers to a collection of ideologies surrounding conception which assume that more than one sex act is required to make a child, large quantities of sperm being needed to form a viable foetus. This implies that more than one man can contribute sperm to the foetus; therefore the resulting child has more than one father. Any lover a woman takes from the time she first conceives may be named as a contributing father, and is expected to take an interest in supporting the child. Practices of secondary or contributing fatherhood are documented in a number of South American groups (Ache: Hill and Hurtado 1996: 274-5; Barí: Beckerman et al. 1998 in press; Canela: Crocker and Crocker 1994: 83-7; Curripaco: Valentine, in press). 'Paternity is essentially probabilistic to the Ache' write Hill and Hurtado (1996: 250). Of forest Ache, 63 % of children had one or more secondary fathers reported (Hill and Hurtado 1996: 444), men who had had sex with the mother in the year preceding birth. Given the real danger of infanticide or child homicide among the Ache when a parent is no longer present (1996: 434-9), a secondary father provides important protection in the 'common event' of the death of a primary father. Hill and Hurtado found best survivorship among children with one primary and one secondary father (1996: 444). Any more candidates involved tended to dilute paternity confidence too much for the men to invest. A similar finding is reported for the Barí (Beckerman et al. 1998, in press) where up to 25 % of children have secondary fathers. Again, those with one primary and one secondary father have lowest mortality rates up to 15 years, followed by those with only a primary father. Children with a number of secondary fathers come off worst, this being an indicator of social distress where a mother has no husband. The Barí Partible Paternity Project (BPPP) has provided the most extensive analysis of the strategy. With less risk of infanticide among the Barí, it seems that extra nutrition of a mother during pregnancy is the main cause of improved offspring survivorship. Clearly, secondary fatherhood enhances the



fitness of women and children in these foraging and horticultural societies with marginal nutrition. It may also serve reproductive interests of men in situations of severe adult male mortality. The Barí have suffered intense persecution by oil companies and landgrabbers in recent decades. The matrilineal Canela formerly endured such high mortality from disease and warfare. Their extraordinarily liberal regime of extra-marital sex was traditionally integral to social and economic life (Crocker and Crocker 1994). Perhaps four contributing fathers might sit down with the social father to share in a meat-pie eating rite at the end of post-partum seclusion, which all fathers observed as a couvade. Crocker downplays the specific economic role of contributing fathers, but sees the institution rooted in the wider extra-marital sex life, which was important in motivating male hunting and labour.

Partible paternity clearly establishes that men invest in women and children where they know that they share a chance of paternity with at least another man. Women are not only well designed for sneaky cuckoldry, but they can and do practice extra-pair mating resulting in pregnancy openly and with social acknowledgement. While Barí and Ache data suggest one extra lover is optimum for child survival, the Canela provide an example where several extra mates are not only viable but desirable. On the basis of this evidence, we can expect that female hominins would have at least one extra-pair mate 'contributing' to any pregnancy.

#### *3.3.3.2 Effect of father desertion*

Besides reproductive synchrony and probability of paternity which can be manipulated by females themselves, a further factor affecting costs and benefits of male philandering strategies is the degree of infant mortality incurred by a female if her mate deserts her, or expends mating effort elsewhere. One argument for the evolution of male parental strategies is simply that if infant mortality increases steeply, it will pay the male to offer care where this can improve infant survival (cf. Harpending and Draper 1986). In a comparative study of Ache and Hiwi foragers, Hurtado and Hill (1992) found that a strong effect of paternal presence on offspring survivorship alone was not a good predictor of pair-bond stability. They suggest that investigating the interaction of number of mating opportunities with paternal effect on offspring survivorship would provide a more accurate model for predicting pair-bond stability. Following up Hurtado and Hill's work, Blurton Jones et al. (2000) compared divorce rates among Ache, Hiwi, Ju/'hoansi and Hadza. The best predictor of divorce

rates was Fertility Units per Male (FU/m), an index of mating opportunities similar to operational sex ratio. The effect of father's desertion on offspring survival did not predict divorce rate, nor did a ratio of this Father Effect and FU/m. 'The view that higher costs of desertion lead to more enduring pair bonds received no support from this comparative analysis', Blurton Jones et al. conclude (2000: 80).

In horticultural populations, polygyny has a deleterious effect on infant survival, yet it raises male reproductive success (Daly and Wilson 1983: 126-7). Among the Dogon, Strassmann (1997a, 2000) found that polygyny was the strongest predictor of child mortality. Each extra wife raises the odds of death for a child by a factor of 4.6. The mechanisms adversely affecting child survival are unclear. But polygynous Dogon men gain reproductive benefits from extra impregnations despite heavy increases in infant mortality incurred by their wives. An earlier study on the Temne (Dorjahn 1958) also showed that women in polygynous households incurred higher infant mortality – 41% of children born to households with 2 or more wives died, as against 25% in monogamous households.

Here, I try to assess a critical threshold of infant mortality which might lead to changes in male strategies by modeling trade-offs for males of extra mating opportunities against increased likelihood of infant death.

#### *3.3.4 The model*

A model was designed to investigate the interactive effects of seasonal cycling by females with varying levels of paternity confidence and infant mortality on male strategies. At the start of each game, each male was assigned a rank and a strategy as either a philanderer (P), who offered only mating effort before searching for other mating opportunities, or a faithful mate (F), who offered dedicated care through pregnancy and the first year of a child's life before searching for other mating opportunities. Infant mortality for a female was increased if the male most likely to be father of her infant was a philanderer. The aim is to see how the different distribution of female cycles (seasonal or random) affects the reproductive success of males pursuing either 'P' or 'F' strategies.

The model takes one interbirth interval (4 years or 5 years) for a group of N females of reproductive age who

are mated by a group of  $N$  males, ranked 1 to  $N$ . Each female has one resident 'partner', assigned at the beginning of the breeding period, and one extra-pair mate (unless all males are occupied), who is the highest-ranked male free at the time that she starts cycling. Rank is assigned arbitrarily; the only effect of rank is that females choose highest-ranked males first. All females are assumed to be interested in an extra-pair mate, with their choice of mate reflecting a trade-off between access to resources and access to good genes.

Each female has randomly assigned to her a month during the IBI when she begins cycling. In a seasonal scenario, her start of cycling is aligned with the year start (see Figure 3.1). The female gives birth a year after her cycle start, and offspring



**Figure 3.1** Patterns of random and seasonal cycling for a group of  $n$  females through an interbirth interval of 4 years. F = females; numbers across top = months. In seasonal pattern, start of female cycling is aligned with year start.

survivorship is tested against differential mortality rates according to the strategy pursued by her resident male. If she loses an infant, she resumes cycling. Each resident male stays with his female for at least eight months covering the critical period when she is cycling. It is assumed that to be acceptable as a resident with any female, a male must begin to be attentive for at least two months before her start of cycling. The resident male should mate-guard attentively while his female is cycling, and remains attentive into early months of pregnancy, until he is certain that she has been impregnated. An extra-pair mate is attentive for 6 months, starting from the female's first month of cycling, before he may search for another cycling female.

If the resident male is a philanderer (P) – pursuing a strategy of mating effort – he may move to any available cycling female at any time outside the period when his own female is cycling. If he is 'faithful' (F), he remains through the first year of the child's life – that is, an additional 18 months on top of the mating effort strategy, representing a moderate level of dedicated care by modern human standards. The opportunity costs of a fidelity strategy are the extra matings missed during that 18 months; the benefits from playing faithful come through improved offspring survivorship.

At the start of each game, number of females (N), interbirth interval (IBI), paternity confidence levels, infant mortality rates and strategy for each male are set. Every game was run 400 times with female cycles distributed randomly, and 400 times with females cycling by season. The pattern of female cycles (random or seasonal) combined with male rank and male strategy determines each male's opportunities for extra-pair matings. Probability of paternity and infant mortality then affect the benefits each male gets from those matings.

Every game was played across a range of paternity probability 'splits' between resident and extra-pair males. These varied from 60-90% for resident males v. 40-10% for extra-pair males. Strategy A (60% paternity confidence for resident) represented lowest confidence levels for resident males, with strategy B at 70% and strategy D at 80%. For strategies C (70/80%) and E (80/90%), the paternity probability parameters were differentiated according to rank of the female's resident male with higher probability for males in the top half of the ranking. Strategies A and B may be more representative of Pleistocene conditions prior to the evolution of stable paternal strategies, C, D and E more representative of the range in modern populations (cf. Baker and Bellis 1995).

Infant mortality directly reflected the strategy played by the mother's resident male. For each game, infant mortality for mates of 'F' resident males varied between low, intermediate and high baselines. Mates of 'P' resident males incurred increments of extra infant mortality, concentrated in the first year (see Table 3.1). Survivorship was tested over the first four years of the child's life with the low rate equivalent to !Kung (Ju/'hoan) mortality (Howell 1979: 93), the high rate equivalent to chimpanzee mortality (Nishida et al. 1990). Intermediate mortality was a hypothetical rate calculated as the mean between high and low; overall it compares with mortality for the Hadza (Blurton-Jones et al. 1992). Arguably, intermediate to high rates are more applicable to Pleistocene conditions.

For every game, the mean surviving offspring from 400 random runs and 400 seasonal runs was calculated for each male. Percentage fitness for each male relative to the other males was determined by dividing his mean surviving offspring by mean total surviving offspring from the breeding period (IBI).

### *3.3.5 Results*

Varying the group size parameter,  $N$ , representing the number of fertile females, did not have a large effect on the resultant distribution of fitness. We are interested here in the discrepancy in fitness distribution where females cycle seasonally or at random. Results are presented for a population of  $N = 12$  fertile females. Age/sex profiles of foraging populations (see e.g. Howell 1979: 45, Blurton-Jones et al. 1992: 173) suggest that females of reproductive age make up around 20% of general population. Hence the population in the model numbers 60, and could comprise two neighbouring bands of around 30 individuals each.

Figure 3.2, Table 3.2 show the percentage fitness by rank for each male in random and







**Figure 3.2** Mean fitness in Game 1. All males philander; IBI = 4 years; paternity confidence = A 60%.



seasonal conditions in Game 1 where paternity probability is set at 60% (strategy A) for resident males, all males play 'P' (philanderers), and all females incur the same infant mortality (intermediate). IBI is 4 years. Seasonal cycling reduces differentials in reproductive success at all levels of paternity confidence. For Game 1, in terms of surviving offspring, the reduced differential between the most and least successful males in seasonal conditions averages around 0.5 surviving offspring less difference.

High-ranked males lose a significant share of fitness where females cycle seasonally. Table 3.3 shows the distribution of aggregate fitness per quartile of ranked males (quartile 1 = males 1-3) in Game 1. As female cycles shift from random to seasonal, quartile 1 males lose an average of 16 per cent of their share of fitness. Most of this loss is incurred by male 1 (M1), as illustrated by Figure 3.2. In seasonal conditions, males below the top quartile gain extra matings, marginally improving their relative fitness. This is consistent with expectations of the effect of seasonal synchrony when more females overlap their periods of fertile cycling. As a higher-rank male is occupied with one of the cycling females, a rival of lower rank can gain access to another cycling female. Seasonal synchrony spreads chances of extra matings, and hence relative fitness, down the male ranks. These additional matings are distributed fairly evenly among middle to lower-ranked males, with low-ranked males gaining most in percentage terms.

#### *3.3.5.1 Effect of interbirth interval*

For any given population of females ( $N$ ), the number of females expected to be fertile in any one year is  $N/IBI$  (plus extra fertile cycling of females whose infants have died). This rough formula for the number of cycling females available in any year period corresponds to the number of males able to monopolise extra matings where females cycle at random, and hence indicates the number of high-ranked males whose share of fitness is reduced by seasonality. Increasing IBI reduces the mean number of females fertile in any year, and dilutes the effects of seasonality. This can be seen by comparing Games 1 and 2 on Table 3.2, where IBI is increased from 4 to 5 years. The top two



males (M1, M2) increase their share of fitness, for both random and seasonal cycling. The longer IBI tends to distribute extra matings among fewer high-ranked males. Consequently, a larger proportion of males have few extra mating opportunities.

#### *3.3.5.2 Varying infant mortality according to male strategy*

It can be expected that lower-ranked males, in the bottom half of the population, will enhance their reproductive success by being relatively more attentive, faithful and offering better levels of investment compared with high-rank males. A strategy of relative fidelity has low opportunity costs for low-rank males. Faithful (F) males remain attentive to their mates for 18 months longer than philanderer (P) males, losing any possible mating opportunities in that period – which represents the opportunity cost of parental care. But low-rank males have few such chances anyway, and lose little. Their opportunity costs are easily offset by improved offspring survivorship. This can be seen by comparing Game 1, where all males play as philanderers, with Game 3 (Table 3.4), where quartile 3 and 4 males (ranks 7-12) play ‘faithful’. Mates of ‘F’ males had low baseline mortality while mates of ‘P’ males had intermediate rates (reducing from 30% to 17% in first two years of child’s life). Even with low paternity confidence for resident males (A60%), quartile 3 maintains relative fitness between Game 1 and Game 3, while quartile 4 improves fitness marginally especially in seasonal conditions (see Table 3.4). The more that paternity probability rises above 60%, as set here, the more ‘F’ strategy males should improve their fitness, since the benefits of extra-pair mating to high-rank philanderers are reduced (see reductions in aggregate fitness for quartile 1-2 males at higher paternity confidence, Table 3.3).

By contrast, fidelity has high opportunity costs for high-rank males in terms of possible extra-pair matings lost while the male is engaged in parental care. In Game 4 (Figure 3.3), males rank 1, 3 and 5 played as philanderers. Their resident mates had high infant mortality, while the mates of faithful males (ranks 2, 4, 6...) had low infant mortality (reducing from 41% to 17% in first two years of child’s life). Despite the wide differential in infant mortality, philandering males gain greater fitness than faithful







**Figure 3.3.** Effect of fidelity on high-rank males (quartiles 1-2). In Game 4, IBI = 4 years; paternity confidence = 60%. Males 1, 3, 5 play as philanderers, and their mates have high infant mortality; all other males are faithful, and their mates have low infant mortality.

males ranked above them (e.g. M3 better than M2, M5 better than M4). For top quartile males, these gains are more significant where females are cycling randomly. We can compare the reversal of reproductive success of males rank 2 and 3 in Game 4 where M2 drops more steeply behind M3 in random conditions (Figure 3.3). By contrast, in quartile 2, the reversal between M4 and M5 was more marked in seasonal conditions. In fact, M4 even drops behind M6 where female cycle seasonally, owing to extra mating opportunities lost.

In Game 4, probability of paternity was low for residents (A60%), which favours 'P' strategy males. Philanderers have a 40% chance of cuckolding 'faithful' males in any extra-pair mating; they benefit from the low mortality secured by the investment of the faithful males in putative offspring. Philanderers risk losing offspring by their own resident females, but this is offset by the benefits of extra-pair matings. If females cycle at random, these gains are greater. A top-rank philandering male loses at least one extra-pair mate on average if females cycle seasonally. Seasonality cuts back the benefits for philandering males.

#### *3.3.5.3 Varying paternity parameters with infant mortality: when does fidelity pay high-rank males?*

We have seen that fidelity has low costs for males in the bottom half of the population. The more such a male can reduce infant mortality for his mate, the more he improves his fitness through a fidelity (F) strategy. But how high does infant mortality have to rise for mates of philanderers, and how high must paternity probability rise for resident males for 'P' strategy to lose to 'F' strategy among high-rank males (top quartile)? How much effect does seasonality have on these levels? Sensitivity analysis was performed in a series of games where high-rank males played different strategies. Mates of 'faithful' males had a baseline infant mortality held constant in each series of games, the baseline being varied between low, intermediate and high rates (see Table 3.1). For mates of 'P' males, infant mortality was steadily incremented above these baselines. Paternity probability ranged from A60% for a resident male up to E80/90% (higher probability for resident male in top half of rankings). All males below the top quartile played 'F' strategy. The expected number of offspring for a philanderer male rank 1 (M1P) and a faithful male rank 1 (M1F) were calculated when M2 played 'F' and M3 played 'P'.

Figures 3.4, 3.5 and 3.6 show the results where baseline infant mortality for mates of faithful males was high,

intermediate and low respectively. In each case, the lines S1 and R1 show the margins of increase in infant mortality (for the mate of a philanderer) where a faithful male rank 1 has equal (or better) reproductive success compared with a rank 1 philanderer, in seasonal and random conditions. The bold horizontal line marks the point where the increase added to the baseline reaches 100% mortality of infants in first four years.

Where baseline mortality is high (Figure 3.4), at low paternity confidence (A60%), even in seasonal conditions, M1F cannot equalise M1P. It pays the top-rank philanderer to trade off extra-pair matings and abandon his resident female completely. Otherwise, in seasonal compared with random conditions a much smaller increase of infant mortality for a philanderer's mate is required to equalise the success of 'P' and 'F' strategies. S1 always lies below R1. The required increase reduces as paternity probability improves for resident males.

In seasonal conditions for all baseline infant mortality rates, a consistent margin of some 15 (range 10-25) fewer infants dying per hundred compared with random conditions suffices to equalise the success of 'P' and 'F' strategies for M1 (margin between R1 and S1 on Figures 3.4, 3.5, 3.6). Once 'F' and 'P' strategies score equal mean reproductive success, the faithful strategy should become more evolutionarily stable. This is because of the greater variance in reproductive success of the philandering strategy. Although only mean reproductive success has been used here to compare the strategies, philanderers consistently have higher standard deviation. 'P' strategy is high risk, high gain, compared with the more sure and steady 'F' strategy. Once 'P' males have no better gains than 'F' males, the 'F' strategy should prevail. For rank 2 or rank 3 males, who do not gain as many benefits from philandering as M1, the



**Figure 3.4** Increase in infant mortality (IM) for mates of philanderers required to equalise reproductive success of faithful male rank 1 with philanderer male rank 1 in random (line R1) and seasonal (line S1) conditions. High baseline mortality (50% in years 1-4) for mates of faithful males.

**Figure 3.5** Increase in infant mortality (IM) for mates of philanderers required to equalise reproductive success of faithful male rank 1 with philanderer male rank 1 in random (line R1) and seasonal (line S1) conditions. Intermediate baseline mortality (36% in years 1-4) for mates of faithful males.

**Figure 3.6** Increase in infant mortality (IM) for mates of philanderers required to equalise reproductive success of faithful male rank 1 with philanderer male rank 1 in random (line R1) and seasonal (line S1) conditions. Low baseline mortality (23% in years 1-4) for mates of faithful males.

increase in infant mortality needed to equalise 'P' and 'F' strategies (i.e.  $M2F \geq M2P$ ) is less. But again seasonality reduces the margin of increase needed. It should be stressed that for males in quartile 2 of the rankings (ranks 4-6 for  $N=12$ ), seasonality will have a reverse effect of promoting philandering, because it brings them extra mating opportunities. However, for these middle-ranked males, differences in reproductive success between fidelity and philandering strategies are less marked compared with those for high-rank males. Their gains from philandering are not so significant, and would be sensitive to relatively small increases of infant mortality.

Table 3.5 shows the absolute level of infant mortality (totalling baseline mortality plus increase in mortality for philanderer's mate, over first two years of child's life) where fidelity overtakes a philandering strategy for a top-rank male. As a general observation, it can be said that the levels of infant mortality (suffered by the philanderer's mate) needed to pull back the 'P' strategy are extremely high. For all baseline mortality regimes, in random conditions, infant mortality verging on total or abnormally high mortality (upwards of 55%) is required, even where paternity confidence for resident males improves (E80/90%). Rises in infant mortality and increased paternity confidence alone are not likely to be sufficient to force high-rank males to stop philandering in random cycling conditions. Female mates of these high-rank philanderers are likely to adopt alternative counter-strategies before mortality rates for their infants rise so high. *But it is females who will be forced to switch strategies (e.g. by selecting their mates differently); the philanderer males have no motive for changing strategies.* Looking at seasonal conditions, the differences in mortality between mates of 'P' and mates of 'F' males are more realistic, though still large. For low baseline mortality, philanderers profit maximally from cuckoldry at lower paternity confidence levels (A60%, B70%). Mortality rates of resident mates of 'P' males must treble (e.g. low seasonal B70%, rising to 55% from 17% baseline). Even where paternity confidence for resident males improves (E80/90%), infant mortality must double (rising to 35% from baseline 17%) for a philanderer's mate before a top-rank philanderer should offer more than mating effort. At intermediate to high baselines, in seasonal conditions where paternity confidence improves (C70/80%, D80%, E80/90%)





the increases required above baseline mortality appear within the bounds of possibility (e.g. intermediate seasonal E80/90%, increase from 30% to 45%; high seasonal E80/90%, 41% to 50%). In these circumstances, top-rank males will be motivated to offer dedicated care in the first year of a child's life. *Therefore these males may alter their strategies before any change in female strategy occurs.*

### 3.3.6 Discussion

The model demonstrates that seasonality could be a contributing factor in the emergence of long-term investment by high-rank males, assuming that offspring survivorship could be significantly improved by longer periods of dedicated care by males (taking a form of regular provisioning with energy rich foods or enhanced protection against predators /infanticide?). Conditions such as severe deterioration in climate and resource stress – allied with reproductive stress on females resulting from selection for encephalized offspring – could lead to large-scale increases of infant mortality for mates of philanderers relative to mates of more faithful males. In these circumstances, seasonality could force high-rank males to shift towards longer-term care strategies.

Middle-rank males may become relatively less faithful with seasonality, and it can be argued that their mates would not benefit from the social consequences of seasonal reproduction. Seasonality is therefore likely to become operative in a hominin mating system only where environmental factors and constraints on female energy budgets are overriding. However, suppose that female partners of middle-rank males tried to avoid seasonal reproductive synchrony by weaning at a different time of year. Suppose for argument's sake that this did not affect offspring survivorship. High-rank females, who have a strong interest in seasonal reproduction, are then able to 'seduce' the middle-rank males at the time they are cycling, which will not be simultaneous with the middle-rank females. High-rank females can 'spitefully' undermine the better investment received by middle-rank females. This is a strong motive for any middle-rank female to overlap her period of fecund cycling with a high-rank female.

Synchrony and asynchrony by females, philandering and fidelity by males are conditional frequency-dependent strategies. Costs and benefits ultimately depend on what other members of the population are doing. In the

model, male strategies were assigned at the start of the breeding period, which did not permit males to alter strategies conditionally as might be expected in real life. In general terms, however, fidelity strategies must evolve and stabilise among lower rank males first, since they have least to lose in terms of philandering opportunities. A situation where quartile 1 males are relatively faithful, while quartile 2 males start to philander is never likely to exist in real life. Quartile 1 males would immediately alter their strategies, reverting to philandering, since these high-rank males always gain most relative fitness from philandering. In seasonal conditions, middle-ranking males (quartile 2) arguably profit from a modest amount of philandering. But, if that undermined the stability of fidelity strategies among quartile 1 males, it might pay middle-rank males to maintain fidelity.

The model suggests that seasonality can critically affect mating effort/parental effort trade-offs for higher-ranked males. The degree of seasonality in the model is unrealistic, with all fertile cycles falling into one half of the year. However, a situation where a large majority of fertile cycles falls into one six-month period would reduce the chances of a philanderer impregnating more than one female each year, and significantly reduce his extra mating opportunities, promoting a switch to care strategies. Where increased male care significantly improves offspring survivorship, it pays males below the top quartile in the ranks to pursue care strategies in both random and seasonal conditions. It will only pay top quartile males to do so in highly seasonal conditions. Are such effects likely to have operated in human evolution or be observable in contemporary populations?

### *3.3.7 Human birth seasonality: the energetic challenge model*

Significant levels of birth seasonality have been documented among diverse human populations (see Lam and Miron 1991, Bronson 1995 for review). Much recent work has focused on a model of energetic challenge to ovarian function as a predictor of patterns of birth seasonality (Ellison 1994: 265-9, Bronson 1995: 147-51). Sensitivity of ovulation to energetic challenge is well documented in humans (Ellison 1990). The validity of the energy balance model has been demonstrated in empirical studies of tropical societies living at subsistence level (Bailey et al. 1992, Ellison et al. 1993, Leslie and Fry 1989). In each case, a marked correlation is shown between seasonal variation in conception rate, rainfall and food supply. Bailey et al. (1992) have demonstrated the effect of decline in nutritional status in reducing ovarian function and fecundity among the Lese subsistence farmers of Zaire. In Turkana women, ovarian function shows seasonal variation (Leslie et al. 1996) resulting in marked birth seasonality (Leslie and Fry 1989); fertility patterns appear to track environmental quality (Leslie et al. 1999), while pregnancy outcomes, birth weight and length are also influenced by season of birth (Pike 2000). The energetic challenge model is potentially applicable to studies of foraging societies such as the Hiwi (Hurtado and Hill 1990), Ache (Hill and Hurtado 1996: 315-6) and Ju/'hoansi (Wilmsen 1978, Bentley 1985) where food supply, energetic expenditure in foraging and conception rates appear correlated. In a study of seasonal reproduction in Bangladesh, Becker et al. (1986) found that the period of the rice harvest and the following months (November-April) was the time when nursing women were most likely to start menstruating again, when cycling women were most likely to conceive, when births were most likely to be live and infants most likely to survive. The low food period (August-September) showed a corresponding decline in fertility and high risk of stillbirth.

Bush-living Ju/'hoansi (Wilmsen 1978) show a single marked peak of conceptions, with some 75 per cent of fertile cycles falling into one half of the year, conditions which should promote care strategies rather than philandering. By contrast, the seasonality profile for Labrador Eskimos (Ehrenkranz 1983) reveals two widely separated peaks of conceptions, a large one in June and a smaller one in winter (December/January) with a deep trough in autumn. These seasonal changes in fertility correlate tightly with monthly net caloric returns from foraging recorded by Smith (1991: 266-7) for the Inujjamiut of Hudson Bay. In such circumstances,

there are good chances for philanderers of impregnating one woman in summer and another in winter. Because of the different social conditions characteristic of traditional Inuit culture in summer and winter, the levels of paternity confidence are likely to be considerably higher for children conceived in summer than for those conceived in winter. Different investment patterns in summer- and winter-conceived children can be expected. A similar situation arises as a result of seasonal sub-trooping patterns in South African chacma baboons. Offspring conceived in winter in unimale subtroops receive more carrying by probable fathers than offspring conceived in summer when troops are multimale (Anderson 1992).

Would the mechanisms which result in seasonality in contemporary populations have operated in the conditions of hominin evolution? At a gross level, Foley (1993: 18) notes that hominin origins from the Pliocene are 'closely linked to the development of increasingly seasonal conditions in tropical Africa', particularly marked wet/dry season variation. Data on soil chemistry, pollen and faunal remains indicate increased aridity and seasonality in tropical Africa from 2.5-1.7 mya (Behrensmeyer et al. 1997, Cerling et al. 1988, Reed 1997, Spencer 1997, Vrba et al. 1996). These are confirmed by specific indicators of marked seasonality in Rift Valley sites after 2 mya (Cerling 1992, Macho et al. 1996). Speth (1987, 1989, Speth and Spielman 1983) argues that early hominins would have experienced difficulty in obtaining fats and carbohydrates during dry-season periods of resource stress. The metabolism of proteins requires either fats or carbohydrates (Speth 1987), while animal fats are crucial for pregnant/lactating females in sustaining rapid brain growth in infants (Chamberlain 1996). Seasonal scarcity of specific nutrients would have led to some seasonality in reproduction.

In the past million years *Homo erectus* and in the past half-million years archaic grade *Homo sapiens* or *H. heidelbergensis* have moved into more northerly latitudes with variation in day-length and temperature, and oscillation between glacial and interglacial cycles. The exponential increase in brain size associated with archaic *Homo sapiens* (Leigh 1992, Aiello 1996) represents a severe energetic challenge for archaic mothers sustaining brain growth in their infants (Foley and Lee 1991). The energetic challenge model suggests that this period of rapid encephalization in human evolution could have featured increasingly seasonal patterns in hominin conception and birth rates, with fine-tuning of ovarian function to metabolic cues. The Penultimate

Glacial cycle spanned 190,000-130,000BP, maximising between 160,000-140,000BP (Jouzel et al. 1993). This roughly coincides with the period of transition from late archaic humans to early modern humans, when cranial capacity attained modern levels (Stringer 1992). On the grounds of climate and of energetic challenge, we can infer seasonality of birth during this time in both Africa and Eurasia.

A further possibility is that Eurasian archaic populations showed markedly more seasonal reproductive profiles than the tropical ancestors of modern humans. This could have led to significant divergences in male reproductive strategies between archaics and moderns. Neanderthals were a cold-weather adapted species. It is worth noting the differences in seasonal use of sites between Levantine Neanderthal and anatomically modern human populations (Lieberman and Shea 1994). While the effect of different strategies of seasonal mobility on Neanderthal and anatomically modern human female reproductive patterns remains unclear, some difference is probable.

We may infer that increased reproductive stress experienced by archaic *Homo sapiens* females during periods of rapid cortical expansion would have led to increases in infant mortality unless compensated by other factors.

These could include:-

- a) aligning reproductive effort with resource availability (via seasonality);
- b) extracting increased energy from male investment.

Reproductive synchrony in the form of seasonality can effectively reduce male philandering opportunities, hence increasing investment in offspring.

The energetic challenge model of ovarian function predicts that where females come under increasing stress owing to the energetic costs of reproduction, their pattern of reproduction is likely to show more correlation with seasonal patterns of net energy intake. This in turn promotes better investment by males who are most inclined to philander. So seasonality has a 'thermostat' effect, acting to raise overall levels of investment when most needed. If even high-rank males are forced into strategies of greater investment, the tendency to invest can be expected to spread in the population, since these males sire a larger proportion of offspring. It is not necessary to posit a genetically determined disposition to invest for this tendency to pass down the generations.

Cues from life history patterns – for instance, the amount of paternal care a male himself received – may be important determinants of his own subsequent strategies (Chisholm 1993).

One important point to underline is that the overall effect of increasing seasonality of reproduction in the human lineage is to reduce reproductive variance and hence sexual competition among males. Whatever the effect on investment, it leads to a more equal distribution of fitness. Pawlowski et al.'s (1998) finding that the correlation of male rank and mating success is undermined in polygamous primates as neocortex size increases could be applicable to human ancestors of the Late Middle Pleistocene (see discussion in Chapter 4, section 4.3.2, on Erdal and Whiten's 'counter-dominance' model). Seasonality acts as a mechanism promoting pair-bonds, enabling increase of neocortex size, which allows for more complex alliance and coalitionary strategies.

### **3.4 Alternative female strategies for increasing male investment via mating effort**

But what if the specific circumstances of high birth seasonality combined with large increases in infant mortality never arise? How then do resident mates of philanderer males – presumably themselves high-ranking females – cope with reproductive stresses of encephalization? It can be argued on the basis of these results that because infant mortality increases must be huge (Table 3.5) before a high-rank male should abandon philandering strategies, mates of these philanderers may have adopted different counter-strategies sooner than expecting to garner paternal care.

In their comparative study of hunter-gatherer divorce rates, Blurton Jones et al. (2000) found that father effect, very low in some populations, was not a good predictor of pair-bond stability. The most faithful Hiwi had the lowest 'father effect', while Ache men, whose presence really affected a child's survival chances, had greatest propensity to desert. Risk to child survival which has been modelled here as increased mortality of infants of philanders' mates may not have an effect; mating opportunities alone predict pair-bond stability, i.e. pair-bonds were stable where there were fewer fertile mating chances. These are a function of sex ratios, female fertility rates, and degree of reproductive synchrony.

This suggests that, rather than wait for increased child mortality to cause males to change behaviour, which

may never happen, females should use mating opportunities as the means for generating male productivity. Blurton Jones and colleagues argue that hunter-gatherer men may actually not be very effective as paternal provisioners, although this receives a qualified challenge from Marlowe (1999). Paternity in any case is no guarantee of male productivity. Even if, thanks to a more seasonal reproductive profile, Neanderthals became more stable in their pair-bonds, and hence confident of paternity, it is possible that the lack of female fertility at some seasons led to a lack of male interest in economic exchange (cf. Binford in Fischman 1992). More female fertility certainly has an effect on motivating hunting by male chimpanzees at Gombe (Stanford et al. 1994). In cultures such as the Canela, women and girls use sexuality to stimulate men's economic performance. If females can promote male mating effort, channelling the increased productivity to needy mothers and offspring, they can raise male investment. But it would not necessarily be directed as parental investment.

To do this, females would need coalitionary strategies (cf. Power and Watts 1996, Power and Aiello 1997, Key and Aiello 1999). Resident mates of philanderers lose out when philanderers desert them for cycling females once they have been impregnated. Suppose however that females join in coalitions with the females who cycle after they have got pregnant. The attractions of cycling members of the coalition could be exploited to generate extra mating effort from philanderer males (i.e. hunting in exchange for fertile sex), and some benefits of that mating effort could be channelled to acyclic (i.e. pregnant and lactating) members of the coalition. Subsequently, roles in the coalition would be reversed, as formerly cyclic females became acyclic, and were recipients of benefits derived from mating effort generated by cyclic females. 'Moral' strategies, where acyclic females obstruct sexual access to cyclic females, or 'symbolic' strategies, where acyclic females symbolically mimic fertility signals (i.e. menstruation), then arise. These could be effective in forcing philanderers to produce more in exchange for chances of fertile sex.

While we cannot describe the strategies of female chimpanzees at Gombe using terms like 'moral' or 'symbolic', nevertheless their behaviour shows incipient forms that could have led to such developments among evolving hominins. Gombe females manipulate coalitionary alliances in forming larger party sizes, promoting the degree of oestrous synchrony (Wallis 1995). Acyclic females use deceptive sexual signals, appearing to mimic the attractions of fertile females with their non-fertile swellings. These seasonal effects



drive greater male hunting effort during the leanest time – late dry season.

The criterion for determining male rank is not specified by this model. If male rank (and female choice) was determined by hunting success, then females could gain increased investment even after impregnation through mobilising persistent mating effort *as long as* the benefits of that mating effort were distributed throughout coalitions to acyclic females. Standard hunter-gatherer institutions like brideservice (whereby son-in-law labours for bride's mother, see Collier and Rosaldo 1981: 278-9) may exemplify such female coalitionary strategies. Hunting is mobilised by chances of fertile sex with the wife, but the hunter surrenders his produce to her mother.

As discussed in chapter 2, 'grandmother' strategies (Hawkes et al. 1997) promote the daughter's ability to gain mating effort by curtailing lactational amenorrhea. Generally, shortening the optimal IBI should raise the total *mating effort* by males. As regards paternal effort, however, it cuts both ways. A shorter IBI leads to more female synchrony, and spreads opportunities of extra matings to more males, potentially undermining 'faithful' strategies. But, if a female's prospective IBI is shorter, it may be more worth her resident male's while waiting for her to return to fertile cycling instead of searching for another cycling female. Male strategy will depend on rank and opportunity.

In arguing that men may be motivated in their foraging practices by mating opportunities, Hawkes notes that 'it is easier to show that they are not choosing foraging targets that would give higher family earnings than to show mating payoffs' (1996: 294). Among the Ache, better hunters are more frequently reported as sexual partners by women (Kaplan and Hill 1985a). However, Harpending's study of the Ju/'hoansi revealed no evidence of better sexual access for good hunters (1971, and see comment on Hawkes 1993a: 354). Among Hadza men, Marlowe (1999) found that hunting reputation was generally well earned. Good hunters do not tend to have more wives in a lifetime. But that says nothing about affairs. When Hadza men were asked if they could increase their chances of having an affair 'on safari' by offering meat 'several men said yes. And I have observed them trying' (Marlowe 1999: 403). But it is difficult to exchange meat for sex directly, because meat cannot be hidden and has to be shared widely. Of course, Marlowe continues:

‘the inability to make direct exchanges is precisely why a man must show off by sharing with everyone. Once meat is shared out, however, he loses his leverage. If a woman repays him with sex, she is providing a public good others can free-ride on. Because the showoff provides more meat, other men may have to show greater tolerance of his affairs with their wives. Or perhaps single women might pay him back. But which woman and why her? It might be more plausible that, if women are choosing to have affairs with the best hunters, it is because they are gene shopping and hunting success is a good genes indicator. I assume men try to show off, but it is not yet clear if it pays, because it is not clear whether in return for their meat, men gain additional extramarital opportunities or better treatment of their children.’ (1999: 403)

By promoting showoff strategies, women may be acting cooperatively to raise men’s economic game. Their implied threat is, if you men don’t hunt well, we will go after good hunters who do. Ironically, it could be a male counter-strategy to the female threat of EPCs that leads to pair-bonds. Hawkes and colleagues argue that a ‘semblance’ of pair-bonding can arise as a ‘conventional’ form of mate-guarding by men (Hawkes et al. n.d.; Blurton Jones et al. 2000) which reduces male-male competition (see further discussion in Chapter 4). Such an ‘agreement’ among males not to go after each other’s wives (if we can believe it) would let them off the hook economically, since women lose the leverage of the threat of EPCs. This view completely turns the venerable ‘man the hunter/paternal provisioner’ idea on its head. It suggests that men will be more motivated and more productive if they are going after extra-marital liaisons, and women can keep them on their toes. There is ample evidence from ethnography of South American groups like the Canela and the Sharanahua to support this. Among the Sharanahua, women act in coalitions, painting each other, to promote ‘special hunts’ (Siskind 1973: 96-8). In these, more productive than a normal day’s hunting, men are chosen by lovers to hunt for them. The women’s attitude is revealing; when one husband returned empty handed after a long day in the forest, the women of his household started to paint up, saying: ‘We want to paint, there’s no meat, let’s eat penises!’ (Siskind 1973: 105).

Differences in foraging patterns between Ju/’hoan and Hadza men may reflect different payoffs to paternal investment and mating effort strategies (Hawkes 1996: 296). While the Hadza regularly pursue big game which is shared throughout the camp, the Ju/’hoansi would tend to mix big-game hunting with trapping of small animals, the smaller, more reliable packages contributing directly to family provisioning. Paternity confidence

among the Ju/'hoansi (Harpending 1971) is likely to be considerably higher than among the Hadza. More marked birth seasonality among the Ju/'hoansi (Wilmsen 1978) could be one factor contributing to higher payoffs for paternal strategies. In South America, comparative studies of seasonality in foraging for the Ache (Hill et al. 1984) and the Hiwi (Hurtado and Hill 1990) suggest greater variation of diet and activity patterns among the Hiwi, and hence more marked reproductive seasonality (Hurtado and Hill 1992: 35-6). While extra-marital affairs are commonplace among the Ache, they are very rare among the Hiwi (Hurtado and Hill 1992: 40).

These are anecdotal instances neglecting other factors likely to affect male mating opportunities (i.e. demographic variables including fertility rates and sex ratios). However, the model suggests that in foraging societies lacking resource accumulation, we should still see effects of seasonality on the degree of dedicated paternal care and levels of paternity confidence. Where births are less seasonally distributed, the model predicts more male mating effort strategies and reduced paternity confidence. However, *more male mating effort could mean more male productivity.*

### **3.5 Summary: female mechanisms for raising male investment**

Current debates on investment by males in human and non-human primates question whether male care ever represents parental effort, or can be more generally explained as mating effort. One key strategy by which females can raise levels of male investment, by altering the trade-offs between mating and parental effort, is reproductive synchrony. A model was designed to test the effects on payoffs for ‘philandering’ and ‘faithful’ male strategies where female hominins reproduced seasonally and where they reproduced at random. Seasonal cycling by females would have a significant effect of reducing differentials in male fitness among Pleistocene hominins. Where increased male investment was effective in reducing infant mortality, for instance, in conditions of climatic deterioration combined with acute reproductive stress for females arising from costs of encephalization, seasonality should promote increased male care after impregnation, especially among high-rank males who are inclined to provide no more than mating effort. Once a male’s partner is impregnated, no other cycling females then become available until the following season. Where females cycle at random, even where infant mortality becomes severe, it will not pay high-rank males to invest longer periods of dedicated care in female partners. With a seasonal pattern, payoffs to philandering are reduced, and in circumstances of high infant mortality and increased paternity confidence, increased investment may begin to pay high-rank males. Seasonality does affect birth and conception patterns in a range of food-limited societies today. The energetic challenge mechanisms which result in birth seasonality would have been operative in the conditions of the Middle Pleistocene. So, seasonality could have impacted on the reproductive strategies of archaic humans, perhaps especially in Eurasia.

This model assumes that the factor of infant mortality will affect male strategies. However, evidence from hunter-gatherer demography suggests that mating opportunities predict pair-bond stability; risk to child survival does not. The best strategy for females endeavouring to raise levels of male investment may therefore be to promote increased mating effort, forcing ‘philanderers’ to ‘show off’. This requires female coalitionary action. Chapter 4 describes the ‘sham menstruation’ model of female ‘proto-symbolic’ strategies for increasing male investment, and outlines its predictions.

## CHAPTER 4

### DECEPTIVE SEXUAL SIGNALLING: THE 'SHAM MENSTRUATION' STRATEGY

#### 4.1 Introduction

At the end of Chapter 1 (sections 1.7-8), I argued that a signal or sexual selection process of ritualization involving *coalitions* of signallers would yield a framework for collective engagement with illusion or deception, in other words symbolism. In a simple thought experiment, female coalitionary display produced a repertoire of shared intangible constructs as an emergent property of the specific forms of signalling female hominins would be driven to use. The motive for female coalitionary action is the economic need to mobilise male mating effort. The signals would be directed by females with defensive support of male kin to outsider males who were non-kin. The first symbolic strategy, arising as non-cycling females mimic and appropriate the signals of cycling females, is also the first 'moral' strategy, since non-cycling females exert collective pressure to obstruct sexual access to cycling females. All the dimensions of economics, kinship and morality emerge at once in the first symbolic ritual performance. Rights to food, rights in sex partners, and allocation to social group of kinship and gender are all signalled digitally and categorically.

This is a Darwinian signal evolution model, resulting from individual fitness-maximising strategies, yet it produces something that social anthropologists would recognise as 'total social fact' (Mauss 1954). In *Culture and Practical Reason*, Sahlins writes of culture as a set of conceptual meanings, rooted in the kinship structure and mapped onto all planes of social action – economic, political, ritual and ideological – as a consistent system of relationships (1976: 102). For Durkheim, religion 'is a system of ideas with which individuals represent to themselves the society of which they are members' (1947: 225). Writing within Durkheim's tradition, Lévi-Strauss asserted: 'Things cannot have begun to signify gradually' (1987: 59). Language, symbolism, society, all arise at once. But how can a Darwinian model make sense of such an idea?

In this chapter, I present the ‘sham menstruation’ model, outlining its main predictions. I discuss how the model relates to other Darwinian models of social and behavioural change from the Middle Pleistocene. First, I note the advances made on Knight’s original ‘sex-strike’ formulation (Knight 1987, 1991). Then, ‘sham menstruation’ is assessed in relation to Dunbar’s ‘vocal grooming and gossip’ hypothesis (1996) and Erdal and Whiten’s ‘counter-dominance’ hypothesis (1994, 1996), both derived from Machiavellian intelligence theory; to Key’s reciprocity modelling of the emergence of social and sexual cooperation (Key 1998, Key and Aiello 1999); and to three more models which use Zahavi’s Handicap Principle: Miller’s ‘culture as courtship’ (1999, 2000), Kohn and Mithen’s ‘handaxe’ theory, and Hawkes’ ‘showoff’ and mate-guarding hypotheses (1991, Hawkes et al. n.d.).

#### **4.2 The ‘sham menstruation’ model and key predictions**

Concealment of ovulation in the hominin lineage can never guarantee more than mating effort, since once a female is pregnant/lactating the fact that she is *not* ovulating is not concealed. The most prominent remaining signal in the modern human female cycle is menstruation. In a natural fertility population, with most females of reproductive age pregnant or lactating (Short 1976), menstruation occurs relatively rarely and is a good indicator of *imminent* fertility (Strassmann 1996a). Menstruation did not evolve as a signal, as suggested by Worthman et al. (1992); it is a by-product of endometrial function (Strassmann 1996b). But it is a trait that can be exapted as a signal in the definition of Zahavi and Zahavi (1997: 58): its value to the signaller is that it conveys information to signal receivers, in this case information to males about female fertility state. Pleistocene males who were attentive to recently menstruating females in an effort to improve their mating prospects should enhance their fitness. No male could afford to ignore it. Individual hominin females would respond to such male interest by advertising menstruation to males in the vicinity to promote mating effort. Once females draw attention by exaggeration, menstruation becomes a signal (cf. Zahavi and Zahavi 1997: 67). Menstrual blood as a reliable index of fertility has a material value translatable into energy in the form of male provisioning.

For any pregnant/lactating female, a menstrual female is a potential threat capable of diverting male energy and investment away from non-menstruants. One response to this problem, as females experienced increasing

reproductive stress, would be to adopt a reciprocal altruistic coalitionary strategy of manipulating menstrual signals. Each female coalition needs to prevent any male from sequestering the imminently fertile female; they should surround her and restrict sexual access. Given the economic value of the signal, rather than hide the menstruant's condition, we would predict the opposite. Whenever a coalition member menstruates, the whole coalition joins in advertising this valuable signal as widely as possible to recruit available male energy to the coalition. The strategy succeeds as long as any mating effort generated by the menstruant's signal flows into the whole coalition, benefiting both non-menstruants and menstruants. Non-menstruant coalition members would confuse matters by borrowing the menstruant's signal or mimicking it with other blood or blood substitutes. This strategy would effectively prevent males from discriminating in favour of cycling females and undermine attempts by would-be dominant males to monopolise imminently fertile females via brokering of energy-rich resources.

Such cosmetic manipulation of menstrual signals is termed 'sham menstruation'. Within any coalition, the strategy is well designed for a reciprocal altruistic alliance, since any female must prove her commitment to the alliance when she is cycling before she can derive any benefits when she is not cycling. All fertile females alternate between being cyclic and non-cyclic. Between female coalitions, a competitive dynamic is expected as they strive to attract available male muscle power. This should drive an evolutionary 'arms race' of increasingly elaborate sham menstrual advertising, resulting in ritualistic amplification of displays. These could involve use of red pigment to amplify and broadcast the menstrual signal, with multimedia effects of movement, song and dance.

The 'sham menstruation' strategy involves deceptive signals in that some females who are not imminently fertile pretend to be. Unlike primate tactical deception which is always individualistic and egocentric (Whiten and Byrne 1988), the deception in this case is sociocentric, being maintained by a collective. As such, it represents a vital step towards sustaining an *imaginary construct* and sharing that construct with others – that is, establishing symbolism. The value of the deception here is not really that it dupes males into imagining an acyclic female is cyclic. Ritual action conveys a social message: 'Don't try to pick and choose between us because we are sticking together'. If such a display is convincing, it should deter prospective male philanderers

from targetting and attempting to isolate menstrual females.

So long as such deceptive displays are staged only because a local female is menstruating, these signals, however amplified, are still embedded in perceptible reality: basically, they form loud advertisements of the presence of an imminently fertile female. But it is easy to see how a female coalition would be pushed into signalling of imagined constructs which are impossibilities, corresponding to no perceptible reality – collective deceptions. Males who are attracted by cosmetic displays advertising imminently fertile females will be reluctant to leave the vicinity; they will instead be inclined to mate-guard. Some males may even be non-cooperative and attempt abduction of menstrual females. These circumstances would force the female coalition (with male kin support) to step up resistance by loudly signalling ‘No access’ to outgroup males. Knight et al. (1995: 84) argue that the way female coalitions would construct such a ‘No’ signal is by reversing the normal parameter settings of the species mate recognition system (cf. Paterson 1978, 1982). Where female animals in courtship normally display ‘right species/right sex/right time’, systematic reversal by a defiant female coalition would yield ‘wrong species’ – we are animals, not humans; ‘wrong sex’ – we are males, not females; and ‘wrong time’ – we are not fertile right now, but *soon* we will be. This is the predicted performance constructing the potency of the ritual domain and the inviolability, or ‘taboo’ state, of menstrual or body-painted females. Transmission of such signals counter to perceptible reality will involve energetically expensive, repetitive, iconographic pantomime – high-cost ritual signals sustaining fictitious ‘gods’.

Power and Watts (1996) argue for a two-tier process of the evolution of ritual, fundamentally determined by degree of reproductive stress on females. During earlier stages of the brain expansion of archaic *Homo sapiens* or *H. heidelbergensis*, they posit *context-dependent* sham menstruation displays, triggered by the incidence of menstruation in local populations. Female coalitions used these as opportunity arose to attract and retain male support, securing long-term bonds with mates and resisting philanderers’ attempts to target menstrual females. This strategy implies less planning depth in obtaining materials for cosmetic usage, with correspondingly greater reliance on biodegradable matter, and only occasional traces of utilised ochre. As late archaic to early anatomically modern females endured acute reproductive stress – roughly the period 160,000-130,000BP, coincident with the Penultimate Glacial maximum (Jouzel et al. 1993) – they posit the emergence of a habitual



strategy of cosmetic ritual underpinning the sexual division of labour. Greater regularity, planning and organisation of performances would lead us to expect abundant and regular use of ochre. The onset of this earliest ritual tradition would institutionalise an economic division of labour and forms of social cooperation both between the sexes and between kin groups. Therefore, it should permit relaxation of selection pressures for robusticity, especially in females, and reduce stress levels experienced by juveniles, possibly permitting earlier weaning. It should promote investment in campsites with females and offspring able to stay 'home' while male hunters depart on logistic hunts. This later stage of the strategy corresponds closely to the original 'sex-strike' hypothesis (Knight 1991).

As soon as males give in and go hunting to gain access to female coalition members, they are actively investing in that female coalition. Besides sexual selection forces of female-female competition between body-painted coalitions, factors of male choice for cosmetically decorated females should also motor an explosive spread of ritual traditions. These processes of sexual selection could be implicated in speciation of anatomically modern humans with cultural, artificial secondary sexual signals marking divergence between modern and archaic forms (cf. Andersson 1994: 46-7, 223, 226).

Why should males be interested in choosing females who use cultural deceptive sexual signals, interfering with the genetic species mate recognition system? Although dishonest at one level, at another, ritual cosmetic display can be understood in 'handicap principle' terms as a costly signal which is honest about the quality of the signaller (Zahavi and Zahavi 1997). Suppose a young female reaches puberty. At the time of her first menstruation, a cosmetic ritual should be staged, involving immediate coalition members in costly preparations, gathering and processing pigment, followed by energetic performance. Not only does such ritual advertise a female of maximum reproductive value, it also demonstrates in ways that are 'hard to fake' and 'easy to judge' the extent of the female's kinship support network, and its ability to organise coalitionary alliances.

Early modern human females are expected to be discriminating in their choice of mate. From the evidence of hunter-gatherer mating systems, the primary female criterion of choice is institutionalised in the form of brideservice. As a general rule, males do not gain access to mates unless they prove successful as hunters,

either individually or as part of a team. To the extent that males must invest increasing levels of energy in gaining access to mates, they should be increasingly discriminating. But beyond a general requirement of high reproductive value, what were the criteria of male choice for long-term partner? The sham menstruation model suggests that female cosmetic display became an important selective criterion for choosy males.

In arguing that patterns evolve in the animal world as costly signals of individual quality, Zahavi (1978, Zahavi and Zahavi 1997: 53) suggests that the feature which will be elaborated through pattern or design will be critical for the reproductive success of the individual. For instance, length is a critical determinant of fitness in the anemone fish; its striped pattern draws attention precisely to this feature. In line with this argument, the species-specific adaptation which human cosmetic ritual advertises is the ability to form and deploy coalitionary alliances. The pubertal female whose kin coalition stages body-paint display is signalling to discriminating males: 'invest in me, because I have extensive kinship support, and my children will have it'.

The major predictions of the 'sham menstruation/sex strike' hypothesis can be summarised as follows:-

*a) Predictions testable in the archaeological record*

1. The earliest ritual tradition will be evidenced by a cosmetics industry focused on red pigment;
2. This first evidence of ritual traditions should correlate with the onset of hunting behaviours consonant with a symbolically structured sexual division of labour;
3. It should also correlate with evidence for investment in structured hearths and homebases.

*b) Predictions testable in the palaeontological record*

4. 'Sham menstruation' is a female response to reproductive stress of encephalization. Therefore evidence for the strategy will be apparent by the time cranial capacities maximise;
5. Habitual use of 'sham menstrual' ritual underpinning the sexual division of labour will lead to reduction of robusticity in females and of stress in juveniles;
6. Habitual use of cosmetics marks speciation of anatomically modern humans. Therefore cosmetics will be associated with modern morphology in Africa.

*c) Prediction testable in the archaeological and ethnographic records*

7. The first 'gods' or the original 'collective representations' will be signified by 'wrong species/wrong sex' metamorphosis in conjunction with red or 'menstrual' cosmetics.

*d) Predictions testable in the ethnographic record of magico-religious symbolism*

8. Traditions of female inviolability, specifically menstrual taboos, should be widespread (see Knight 1991 and below);
9. These should be associated with prohibitions on sex before hunting etc., operating within an ideological framework of lunar/menstrual periodicity (see Knight 1991 and below);
10. Structures of ritual and mythological narratives should conform to a 'time-resistant' ritual syntax (Knight 1987, Knight et al. 1995: 91). Ritual potency or access to the 'other world' is enhanced by bloodflow, celibacy or non-marital sex, 'wrong species/sex' signals etc.

'Sham menstruation' also offers the following premises:-

*e) Premises for a behavioural ecology of cosmetics usage in natural fertility populations*

1. Men will be interested in locating and tracking menstruating women, and women will respond by advertising menstruation;
2. Costly ornamentation by females should correlate with levels of male investment and contribution to sexual division of labour;
3. Cosmetics function as sexually selected signals of coalitionary alliances.

#### *4.2.1 Development of 'sham menstruation' from the 'sex-strike' theory*

The 'sham menstruation' hypothesis can be viewed as the Darwinian version of the 'sex-strike' theory of human cultural origins advanced by Knight (1991). Working as a symbolic anthropologist influenced by structuralism, Knight focused on syntax of myths and fairytales (1987), hunting practices, totemism and rules of distribution (1991: 88-121) and menstrual observances (1991: 374-416). He posited an ideal model for the emergence of a symbolic sexual division of labour operating on a lunar template (see summary in Knight et al. 1995: 82-3). At the dark phase of the moon, women as collectives would go 'on strike', refusing to cook for or consort with marital partners, this being flagged by synchronous menstruation. Men would prepare and execute the hunt during waxing moon as the evening sky got brighter. Taboos placed on the bleeding flesh of women extended symbolically to the bloody flesh of wounded game animals. Only once hunters had brought back the kill around full moon and cooking fire had removed all blood from raw meat could taboos be relaxed and flesh, whether female or animal, be consumed.

Knight (1991) located the original sex-strike early in the Upper Palaeolithic, triggered by resource stress caused by climate change as modern humans moved into Europe. Female reproductive stress in response to encephalization is the motor factor in the 'sham menstruation' model. Hence, proto-symbolic female strategies – the preliminary stage of opportunistic sham menstruation – should occur among both Eurasian ancestors of Neanderthals and African ancestors of modern humans. Sham menstruation's second stage as a regular ritual tradition places the onset of symbolic culture prior to the migration of modern humans from Africa. Hence, early modern humans carry symbolic culture, language, art and religion to Asia, Australia and Europe.

As a cultural anthropologist aware of extensive traditions of menstrual taboos, Knight read menstruation in terms of a 'No fertility' signal, assuming males would be least interested in menstrual females (1991: 209-10). But behaviourally, menstruation is a reliable indicator of impending fertility. Hence males should be inclined to bond with menstruating females, not to leave them. This gives females a problem in sending males away hunting: it will require very loud and costly signals to overcome male resistance. Knight based his model in the prior evolution of ovulatory synchrony (Turke 1984) for recruiting males to pair-bonds and increased investment. As discussed in Chapter 3, section 3.3.2, the proportion of a hominin females population able to

synchronise in any one year would be limited, and can only be optimised by significant seasonality. The 'sham menstruation' model does not require behavioural ovulatory/menstrual synchrony, since cultural signals override to produce artificial synchrony. However, female cooperation within coalitions may lead to optimal conditions for a degree of behavioural synchrony (Graham 1991, Weller and Weller 1993, 1997, Stern and McClintock 1998, also see Strassmann 1997b). Whatever the actual behaviour, both 'sex-strike' and 'sham menstruation' predict the emergence of an *ideology* of female synchrony, generally expressed by reference to the lunar cycle (see Knight et al. 1995: 92 for review).

Overall, sham menstruation clarifies the mechanisms giving rise to female ritual coalitions. This proto-ritual activity sustains shared imaginary constructs which become the core of a fully consummated sex-strike strategy. To the extent females perform 'wrong species/wrong sex' to signal 'No access', sex-strike is implicit from the earliest beginnings of sham menstruation. Acyclic females necessarily restrict access to the target menstrual females. How they themselves behave sexually with males, kin or non-kin, may vary. Sex-strike aims to secure temporary separation from husbands; one of the easiest ways for women to do this may be to engage in ritual sex with classificatory kinsmen (cf. Durkheim 1947: 216). What matters for establishing a stable repertoire of intangible constructs is the regularity and repetition of ritual performance. Once the 'gods' are summoned through repeated ritual, the boundaries of classificatory kin groupings stabilise. We then have that 'conceptual set of meanings' rooted in kinship, mapping onto economics and ideology, that Sahlins calls culture. Women and men become categorically 'wives' and 'husbands', 'sisters' and 'brothers'. These categories are no longer, like the kin-based alliances of chimpanzees, fickle and transient in nature, subject to Machiavellian negotiation. The 'gods' guarantee belonging, identity, solidarity, obligations that persist through time (cf. Bloch 1973, Rappaport 1999).

Of the predictions listed above, those testable in ethnography of magico-religious systems (8-10) derive from sex-strike theory. Knight and colleagues have developed a body of work, testing the 'ritual syntax' in a wide range of cultural contexts. These include Aboriginal Australian ritual and mythology (Knight 1983, 1987, 1991), Amerindian myth (Knight 1997), Khoisan ideology of initiation, hunting and fertility (Power 1993, Power and Watts 1997, 1999), and European folklore (Cardigos 1996). The predictions are well substantiated;

but most importantly, they are potentially falsifiable by one single magico-religious tradition that stipulates marital sex as the prime signal of ritual power. No other Darwinian model of symbolism, with the possible exception of Boyer (2000), offers such a fine-grained description of what the first ‘gods’ looked like: the original and highly conservative signature of ritual potency.

Most other predictions in the list are also falsifiable. If red ochre is not the earliest archaeological evidence for ritual, that does not support ‘sham menstruation’. On the other hand, if red pigments are found in Acheulean contexts before the worst stress of encephalization, that also negates sham menstruation. The archaeological predictions (1-3) of the theory have been thoroughly investigated by Watts (1998, 1999); I review his results in Chapter 5, along with some consideration of predictions 4-6. Although cosmetics should certainly associate with moderns, Neanderthals, as the species with the largest absolute cranial capacities, should likewise develop cosmetic traditions. I discuss possible reasons for differences in strategies between the two species.

The rest of this thesis will be concerned with developing tests for the remaining predictions and premises. In chapter 6, I use a cross-cultural survey of initiation rites in diverse sub-Saharan African cultures to test for the presence of the archaic signature of ritual power described in predictions 7 and 10. Chapter 7 addresses methods for behavioural ecological analysis of cosmetics as costly signals (premises 1-3). Initiation rites for *both* sexes are the focus. As soon as a cosmetic ritual tradition becomes a function of kinship, males should adopt precisely the same signalling mechanisms as females to express their identity as kin and participants in ritual, the only difference being that ‘wrong sex’ comes out as males playing female, while females play male. Cosmetics will not be the province of females alone, although there may be a more fundamental female motivation, rooted in the female problem of reproduction being limited by resources and investment. If cosmetics become signals of alliance and ritual power, Machiavellian male exploitation is expected to arise. Chapter 7 explores factors underlying variability between the sexes in cosmetics usage.

#### **4.3 Machiavellian intelligence models: ‘gossip’ and ‘counter-dominance’**

Sham menstruation is motored by the accelerated encephalization of the Middle Pleistocene commencing in *H. heidelbergensis*, with brain volumes upwards of 1,100cc rapidly approaching modern levels. Dating of early specimens has been pushed back. The skull from Bodo, Ethiopia, is now placed c.600 kya (Rightmire 1996); recent application of computed tomography techniques yield an estimated endocranial capacity of 1,250cc, well within the modern range (Conroy et al. 2000). The Swanscombe skull, with estimated cranial capacity close to the modern average at 1,300cc, is newly dated at c.400 kya (Stringer and Hublin 1999). There is no clear answer as to why this encephalization happened. But we presume that it reflects selection for abilities of social negotiation or Machiavellian intelligence in a situation of increasing social complexity, co-evolving with language use (Aiello and Dunbar 1993). One measure of Machiavellian intelligence in primates is capacity for tactical deception (Byrne and Whiten 1990, Byrne 1996). This presents us with a paradox: human encephalization can be viewed as the culmination of ability in tactical deception. At the same time we evolve language, a system of communication which, because it consists in cheap, conventional, volitional signals, is extremely vulnerable to deception (Knight 1998). Whatever caused selection for larger brains also increases reproductive stress for females. How then does the model of female coalitionary action relate to Machiavellian intelligence models for the emergence of language and human social structure?

##### *4.3.1 Dunbar’s ‘vocal grooming, gossip and evolution of language’*

The idea that ‘gossip’ or vocal exchange of social information was a vital mechanism for bonding early human groups appears plausible and concretely testable (Dunbar 1996, 1998b, Dunbar et al. 1995). Encephalization is presumed to reflect the increasing size and complexity of these social groups (Aiello and Dunbar 1993). Vocal grooming in the first place and ultimately gossip offered alternative mechanisms for servicing such extensive social networks, because they saved valuable time compared with the traditional primate means of manual grooming.

This ‘time-saving’ argument leads to a serious problem for the gossip hypothesis of language origins, however. As our ancestors maximised brain size in response to the pressure for larger groups, they maximised their

Machiavellian intelligence (Byrne and Whiten 1988a, Whiten and Byrne 1997). Humans appear to be selected for a capacity involving both social cooperation and alliance formation, but also manipulation and exploitation of their relationships. We cannot consider gossip as a mechanism of social bonding without factoring in this Machiavellian aspect of manipulating information for selfish purposes (Kemmerer 1997; Gluckman 1963a: 310 citing Colson 1953). In the case of primate grooming, time becomes a currency (Byrne 1995: 200-202). Time spent grooming an ally reliably quantifies an individual's commitment to that ally. Correspondingly, if vocal grooming and gossip mechanisms led to a reduction in time spent grooming per individual groomed, this implies a reduction in the level of commitment signalled to each individual (not necessarily equally distributed). Hence, while *H. heidelbergensis* had larger numbers of allies than any previous hominin, those more numerous alliances would have been less intrinsically reliable.

This anomaly led Power (1998) to argue that for gossip to function as a means of social bonding, it necessarily co-evolved with another independent mechanism for establishing commitment to alliances. Raising the costs, in terms of time and energy, of forming coalitions safeguards against exploitation by 'freeriders' – those who accept benefits of social cooperation without paying the costs (Enquist and Leimar 1993, Dunbar 1999). How could costs of coalition-forming be raised, and whose coalitions specifically?

In Dunbar's model for the emergence of gossip, the process is driven by the need for living in larger groups, which compromised social time budgets. Among primates, the ability to monitor relationships and alliances appears to be limited by relative neocortex size (Dunbar 1992). Pressure for larger groups leads to a greater requirement for coalitionary alliances to act as buffers against the increasing stress of group-living. Under the Machiavellian Intelligence or Social Brain hypothesis, this in turn leads to selection for larger-brained individuals. The costs of encephalization would drive changes in behaviour to alleviate the increasing reproductive stress on females (Power and Aiello 1997, Key and Aiello 1999). Time and energy budgets of female hominins would have been most severely compromised as they were selected to produce more encephalized offspring. This implies that it was females who initially developed more efficient means of servicing alliances, to reduce social time budgets as a direct result of the costs of encephalization (cf. Dunbar 1996: 148-51, Dunbar 1998b: 99).



Larger group sizes also result in increased opportunities for freeriders. Factors such as size, mobility and dispersal of population affect the rate at which cheats will encounter naive individuals whom they may exploit (Enquist and Leimar 1993). Prisoner's Dilemma simulations suggest that gossip (exchange of information about others' behaviour) can function as an effective counter-measure against social cheats (Enquist and Leimar 1993, Dunbar 1999). But these models generally assume without question the uniform reliability of such gossip. In real life, that reliability will be affected by many factors including kin relatedness, rank, age and sexual strategies.

The high energetic costs of encephalization for females imply that a key area where cheating – and exchange of information about cheats – will critically affect reproductive success is in contexts of mating. Early desertion by a mate and subsequent loss of investment could compromise offspring survival, or simply lengthen female interbirth intervals.

The problems for females specifically can be summarised as follows: a) because of pressure on time budgets, females need 'gossip' as an efficient mechanism for servicing alliances; b) with larger group sizes, females suffer more risk of freeriding by philandering males who have more opportunities for mate desertion; c) females must negotiate with other female coalition partners, especially cycling females who are potential rivals for male investment.

The sham menstruation strategy solves all these female problems at once (Power 1998). Participation in sham menstrual ritual is well-designed as a costly demonstration of *long-term* commitment to extensive alliances. On the first and each subsequent occasion that a young woman menstruates, she is put on the spot. Is she going to cooperate with members of the coalition in using her menstrual signal to attract the benefits of male provisioning to the whole coalition, or is she going to cheat, and use the signal for her benefit alone, potentially inciting mate desertion? If she shares her signal (and the consequent benefits) each time she menstruates until she gets pregnant, she has proved her reliability and commitment to the coalition in hard to fake, material terms. Up to the time she gets pregnant she is 'on probation' and must repeatedly demonstrate her commitment through material sacrifice of her valuable signal whenever she menstruates; once she gets pregnant, and subsequently when she is lactating, her interests clearly lie with the rest of the non-menstruants in the coalition.

Having proved her commitment to the alliance, she can demand by way of reciprocity her share of the benefits derived from the signals of other menstrating members of the coalition. When she begins menstruating again after weaning, and engages in menstrual ritual, she reaffirms her commitment to the alliance. The beauty of menstrual ritual as proof of commitment is that it is absolutely necessary for the ‘probationer’ to pay her ‘dues’ first before she derives subsequent benefits when she is pregnant/lactating.

Knight et al. (1995, Knight 1998) propose that ritual and speech necessarily co-evolve, ritual acting as the ‘hard to fake’ guarantee of trustworthiness among members of the speech community. It is argued here that sham menstruation, as a precursor or preadaptation to ritual – and specifically puberty ritual – functions as a ‘gold standard’ to guarantee the veracity of ‘gossip’ within extensive female alliances. Gossip can work on a basis of trust since the signal of commitment has value in the long-term – lasting through the length of at least one interbirth interval. In Chapter 8, I examine case studies of female initiation, chiefly in Bantu groups. These rituals have functioned historically to bound ‘gossiping’ communities. I demonstrate that they involve all the signalling mechanisms expected of ‘sham menstruation’ including cosmetics use and secret or deceptive entities that identify the community of initiates.

#### 4.3.2 Erdal and Whiten's 'counter-dominance' model of hunter-gatherer egalitarianism

Building on work by Knauff (1991) and Boehm (1993), Erdal and Whiten (1994, 1996) ask how the egalitarianism strongly characteristic of hunter-gatherers could have evolved given the ancestral anthropoid primate pattern of dominance hierarchies. The 5-6 mya common ancestor of *Pan* and *Homo* is assumed to have a social life characterised by dominance, as well as significant Machiavellian intelligence for coalition formation and manipulation. Although humans have developed strongly hierarchical and stratified societies within history, a rough egalitarianism is almost universally documented among hunter-gatherers (see Erdal and Whiten 1996 for refs.). Since foraging is the subsistence mode that offers the best model of economic and social life in the Middle to Late Pleistocene, this suggests that modern humans and their immediate ancestors evolved with a predisposition to equality in social relations – a radical discontinuity between ape and human social life. Erdal and Whiten (1996) refer mainly to food-sharing practices and the absence of recognised authority or leadership roles, regularly reinforced by techniques of 'counter-dominance', usually ridicule levelled at anyone who gets above himself. The psychology of the behaviour is complex. People may be selfishly motivated, looking out for number one, by making sure no one gets more than they do; but they seek to cut the costs of conflict by 'playing fair', not taking more than anyone else. Erdal and Whiten (1994) describe this as 'vigilant sharing'.

Machiavellian intelligence theory has illuminated the ways that competition among monkeys and apes can be mediated by brain as well as brawn through manipulation of alliances. Among chimpanzees a whole array of sophisticated political activities are observed (de Waal 1982, 1989, 1996) ranging from reward of allies with grooming and meat-sharing, to interference in formation of competing alliances, from revenge and punishment to reconciliation. Erdal and Whiten (1994), like Dunbar, associate the rapid expansion of the brain with increasing Machiavellian intelligence. They argue that an evolutionary escalation would be set up

'between the capacities of group members to manipulate the dominants and the ability of dominant individuals to counter such skills. Indeed, such a spiral might have played a causal role in the encephalisation which took place. Given such an evolutionary escalation, eventually the maintenance of direct dominance would have become prohibitively costly in time and/or energy. Under these circumstances there would have been a fitness advantage to the strategy of "vigilant

sharing” or “playing fair” – of resisting dominance by others but not attempting to achieve dominance oneself.’ (1994: 178)

Knaft (1991) originally proposed a U-shaped curve to represent the trajectory through time from ape hierarchy to human egalitarianism. Although we do not know the appropriate timescale of Knaft’s hierarchy curve, it can be redrawn schematically as a virtual mirror of the curve of encephalization (Figure 4.1). As brains maximise in size, societies become most egalitarian. If encephalization reflects Machiavellian intelligence escalation producing counter-dominance, it also mobilises female strategies for alleviating reproductive stress. Erdal and Whiten focus largely on economic equality in food-sharing, assuming that reduction of risk in accessing unpredictable resources is the main adaptive cause (1996: 147). But from an evolutionary perspective, the most



**Figure 4.1** A trajectory of change in ‘dominance’ relations in human evolution reflecting change in brain size (chart adapted from Aiello and Dean 1990, Erdal and Whiten 1996, after Knauft 1991).

important type of levelling is equality in reproductive fitness. Without concomitant reduction of reproductive variance, counter-dominance could not be a stable strategy. In his comment on Erdal and Whiten's model, Knauff justifiably accuses them of being gender-blind, asking 'what role do females play in dominance or counterdominance, and what is the relationship between counterdominance and female mate selection?' (1994: 182). Pawlowski et al. (1998: 361, Fig.1) show that increasing Machiavellian intelligence in monkeys and apes does indeed result in reproductive counter-dominance.

Hawkes' argument for the evolution of pair-bonding as a conventional agreement among males for relaxed mate-guarding (see below) represents a form of reproductive counter-dominance. Basically, men agree: 'I won't go after your wife, if you won't go after mine'. But, as argued at the end of Chapter 3, section 3.4, this may not be the most economically productive arrangement for females. Sham menstruation, with ritual coalitions mobilising the economic effort of males, is an alternative counter-dominance strategy which reduces reproductive variance. In the first place, sham menstruation counters the would-be dominance of philanderer males who target menstrual females. When acyclic females start driving up the costs to philanderers of accessing cycling females, it then pays the dominants to settle for a 'fair share' of the paternity pie. The best arena of competition for hunters then becomes 'showing off' by going after large game. But, as documented by Lee (1988) among the Ju/'hoansi, such showing off must be done with great modesty. Turnbull recounts a case among Mbuti net-hunters where one family's long run of good luck was ascribed to *anjo* sorcery; by collective agreement, their medicine horns were destroyed in an effort to spread the luck around the band (1984: 90-1).

Sahlins (1960) also contrasted typical primate dominance with human relations mediated by symbolic kinship. 'Dominance is at its nadir among primitive hunters and gatherers,' he writes,

'Culture is the oldest "equaliser". Among animals capable of symbolic communication, the weak can always collectively connive to overthrow the strong,' (1960: 83)

Victor Turner adopted Iowan Lewis's phrase 'the powers of the weak' in his thesis on sacredness (1974: 85). Aspects of the sacred are liminality, the state of being betwixt and between, marked by juxtaposition of phenomena counter to perceptible reality (Turner 1967: 105), and *communitas*, the assertion of equality

through stripping away all difference of rank – the equivalent of counter-dominance. A true Durkheimian, Turner rooted symbolism in ritual action, and gave ritual primacy as generator of linguistic concepts. If the weak can temporarily take power from the strong, it is because symbols summon the force of their ritual coalition in action. The causality of Sahlins' formulation should be reversed: *because* among Machiavellian humans the weak can connive to overthrow the strong, we are animals capable of symbolic communication. Without counter-dominance, language just would not work. The strong would have no need of it; they have other means of persuasion. Although vulnerable to being hijacked by the politically powerful, sacred traditions the world over invoke manifestations of counter-dominance as the collective moral sanction, the alliance of the weak against unrestrained physical dominance.

In his study of political oratory among the Merina, Bloch (1975) demonstrates how dominance impedes linguistic or syntactical creativity, forcing speakers into repetitious forms whose only meaningful content is to express political relations between speaker and listener. Bourdieu (1991: 430) has attacked Chomsky's abstract model of a 'homogenous speech community' which eliminates social interaction as an aspect of language. Without a model for counter-dominance ameliorating basic economic, social and sexual inequalities, no speech community can be viable. In Erdal and Whiten's view, such counter-dominance arises as part of the evolutionary process of selection for Machiavellian intelligence and encephalization. While they address economic and political competition, no Darwinian model can be adequate without incorporating factors of sexual competition. Female proto-symbolic strategies of coalitionary action introduce that component and must be seen as integral to both of these Machiavellian intelligence models of 'gossip' and 'counter-dominance'.



#### 4.4 Reciprocity modelling: exchange, social and sexual cooperation

Because they share similarity of interests and trade-offs, it is relatively easy to establish reciprocal cooperation between females. Exchange of services can be readily monitored since these involve the same activities (Boyd 1992, cited by Key and Aiello 1999: 21). The asymmetry of the services exchanged between males and females makes it more difficult to establish reciprocity between the sexes. Key and Aiello (1999, Key 1998) use Prisoner's Dilemma models to investigate the evolution of cooperation as the energetic costs of reproduction rise. Female-female cooperation is the easiest to establish, thanks to the ease of monitoring. By contrast, 'Cooperation between males and females is much more difficult to establish and is likely to be much less common than intra-female cooperation since the currencies of exchange are usually very different.' (Key and Aiello 1999: 21)

However, in certain conditions, according to Key's simulations, males will cooperate with females even where females do not reciprocate. Such unconditional cooperation implies that a male may offer food or other services to a female and her offspring without guarantee of paternity or even of sexual access. But this strategy depends on two factors. Firstly, female energetic costs of reproduction must be much higher than male energetic costs. Secondly, females must develop strategies whereby males who fail to cooperate unconditionally are severely punished by long-term refusal to cooperate. Key and Aiello (1999: 25) argue that such factors became operative during the late Middle Pleistocene period, between 500-100,000 B.P., of encephalization in late archaic to early modern *Homo sapiens*.

One of the major factors determining difference in energetic cost of reproduction between the sexes is body size dimorphism. In sexually dimorphic species where males must maintain a large body mass to be sexually competitive, their energetic costs may be as high as, if not higher than, females' (Key 1998, Key and Aiello 1999: 18). If we consider relative costs between the sexes through the trajectory of hominin evolution, the first big shift towards higher costs for females comes as their body size increases relative to males with *H. ergaster*: This should dispose *H. ergaster/erectus* males to be cooperative with females. A further significant increase of energetic costs for females over males occurs during the late stage of encephalization when there is no real change in relative body sizes. Crucially, this model shows that a form of male investment emerges without any

requirement of paternity certainty. Males will be inclined to invest in females so long as they have access to at least two females (Key and Aiello 1999: 21). This gives rise to a scenario of ‘partible paternity’ similar to that modelled in Chapter 3, section 3.3.3-4, with neither sex being monogamous.

Key and Aiello (1999) do not discuss the mechanisms needed to satisfy the second condition of the model (but see Power and Aiello 1997), by which females would institute ‘punishment’ of non-cooperative males. They assume that the requisite female-female cooperation would be in place. Female ritual coalitionary strategies, as described here, are precisely what is required, cutting back the benefits for philandering or freeriding males who target cycling females. Sham menstruation is watertight as a reciprocally altruistic cooperative strategy between females, whether or not they are relatives, and fulfils the requirement of the model’s second condition.

Because males are prepared to cooperate even when females do not reciprocate, this form of cooperation is best not described as ‘reciprocity’ between the sexes. The extreme inequity of reproductive costs may cause a flip into a ‘handicap’ or ‘prestige’ system. Females choose males who display quality through ability to bear costs of cooperative behaviours. This would lie at the root of ‘showoff’ strategies. Although Erdal and Whiten see risk-reduction through reciprocity as the main adaptive cause of ‘vigilant sharing’, empirical behavioural ecology of food-sharing practices among foragers does not support risk-reduction reciprocity (Bliege Bird and Bird 1997, cf. Woodburn 1982a, Petersen 1993). ‘Tolerated theft’ and/or ‘prestige’ models better explain observed patterns of food distribution (see Hawkes’ comment on Bliege Bird and Bird 1997: 72-3). Reciprocity may be the appropriate description of cooperation between females, and Prisoner’s Dilemma the appropriate model: The specific mechanism of sham menstruation certainly works as reciprocal altruism among females. But the game being played *between* the sexes is not Prisoner’s Dilemma, and the outcome is not reciprocity. Instead, we could try a model of costly signalling as display of quality – Handicap. Sham menstruation works as costly signalling by female coalitions of quality to male prospective mates/investors.

#### **4.5 Handicap models: sexual and signal selection**

Sham menstruation is a Zahavi handicap model, with females using cosmetic ritual as costly signals to demonstrate the quality of their coalitionary alliances. Males as kin to females are part of that display; as non-

kin or prospective mates, they demonstrate quality through hunting large game. This is clearly congruent with Hawkes' 'showoff' hypothesis (1991). Lately, Hawkes has argued that shifts in Late Middle Pleistocene hunting practices could have been driven by a Zahavi dynamic and should be understood as costly display (1999, Hawkes et al. n.d.). Before returning to the details of Hawkes' argument, I review two other relevant models of sexual selection for cultural display.

#### *4.5.1 Miller: sexual selection for culture*

An evolutionary psychologist and game theoretical modeller, Miller (1999, 2000) argues that culture, language and art evolved as an array of sexually selected behaviours. The expansion of the brain was motored by selection for these costly displays of creative ability, which were wasteful in the sense that they had little to do with survival strategies. Jokes, Turner Prize entries, personal web pages, all are fitness indicators akin to the peacock's tail. The standard direction in sexual selection is female choice of males (Andersson 1994), since males compete more intensely for relatively rare fertile females (Bateman 1948), this being determined by relative levels of parental investment between the sexes (Trivers 1972). But, as high parental investors, humans appear to have mutual mate choice (Miller 2000: 94-8): Males are just as choosy as females when it comes to longer-term partners. This implies that males have chosen females for cultural display as much as females have chosen males, explaining why the sexes are equal in general intelligence, rather than dimorphic. In places, however, Miller reverts to standard sexual selection formulations, quantifying sex difference in cultural displays like jazz albums or paintings by assessing age/sex profiles of artists (1999: 81-7.).

Miller's theory has considerable potential but presents problems of testability. Too easily, it could be invoked to explain anything. This 'catch all' criticism has also been levelled at Zahavi theory generally (see Miller 1998: 346): Suddenly we have an account for the evolution of any non-adaptive, wasteful behaviour. One of the key tenets of Handicap theory is that signals should be costly for the signaller to produce, but easy for the receiver to judge; this leads to standardization and ritualization of signals (Zahavi and Zahavi 1997: 65). If culture is a product of signal evolution, we have a problem in explaining its extraordinary diversity of forms. From the perspective of mate choice, how do you choose between a juggler or a thumb piano player, the person who climbs Everest or windsurfs the Atlantic, the body paint design with orange squares or blue circles: which

display shows most quality? Miller does not discuss the contexts for cultural production in societies which live in conditions more closely resembling those of evolution than we do. Overwhelmingly, 'art' is located in religious and ritual contexts, where indeed faithful reproduction of form is a powerful concern. Hence, standardization of signals occurs. Whether and how these signals affect mate choice is more problematic. Frequently, cultural signals are being produced by an older generation, aimed at terrorising or intimidating a younger generation of initiates (cf. Bloch 1974), which does not fit Miller's expected age profile of cultural production. If this individualistic mate-choice model could be reconciled with a Machiavellian intelligence model of ritual coalitions advertising alliance, it would gain in explanatory power. But is this allowable? If we as a species have been selected for super Machiavellian intelligence, then it certainly makes sense to advertise those qualities to our possible mates. In that case, standardized initiation rituals which cement alliances of kin groups or age-sets, even if conducted in secrecy and seclusion, could function as sexually selected cultural displays to prospective mates.

In general, Miller's hypothesis is good at discussing protean novelty, bad at describing conventionalization. Unless a Zahavi ritualization process is invoked, which in the human case must involve ritual coalitions, it is unclear how individualistic sexually selected display can produce the arbitrary and collective rules characteristic of all human cultures. A case in point is how Miller's idea relates to the evolution of language. Courtship display of verbal abilities offers a powerful way of exercising playful linguistic inventiveness without issues of truth and trustworthiness mattering. The value of 'gossip' lies partly in whether or not it is accurate; believing some hearsay about another individual that turned out not to be true could have a serious effect on fitness. But jokes, poems and nonsense rhymes do not need to be true; they are designed as fictions which are shared to demonstrate the inventiveness of their creator. The trouble for Miller is that language is used for so much else besides courtship where true or not true has significant consequences for fitness. Courtship can preadapt for language, selecting protean ability, and it can exapt syntactical language once that has emerged. But alone it will not generate language as an arbitrary, conventionally agreed code.

Words are cheap; in courtship, they count for 'sweet nothings'. Late Middle Pleistocene females needed energy not poetry. Miller's model should address which female would best enhance her fitness: the one who went for

the strong, silent type who regularly hunted eland, or the one who picked good jokers. Increased male investment in the Late Middle Pleistocene could not have been stable on a basis of cuckoldry of good hunters by storytellers. In terms of parental investment and sexual selection (Trivers 1972), if the later stages of encephalization had anything to do with increased investment by males, this goes along with increasing male choosiness of mates. Females necessarily continued to invest heavily in offspring, and as access to fertile females would limit male reproductive success we expect standard sexual selection factors of male-male competition and female choice to operate. However, we can infer that what really changed in the period leading to the emergence of modern humans was the level of investment by males in female partners – hence, the level of male discrimination in choosing which females to invest in – along with increased female-female competition for access to investing males. Therefore, atypical factors of male choice and female-female competition became increasingly prominent as determinants of variance in female reproductive success (Gowaty 1997, and see Harcourt 1996: 122, Andersson 1994: 161, 177).

As and when human mating systems tended towards ‘social monogamy’, selection on males became less intense relative to selection in more polygynous systems. Correspondingly, selection on females became more intense, as females competed for access to ‘best quality’ males. The constraints of encephalization imply that it was females who were primarily selected for wasteful cultural display by males, with males acquiring those abilities as members of ritual kinship alliances. As mates, male ‘wasteful’ display involved big-game hunting.

In circumstances where both sexes participate in extensive parental care and either sex stands to lose badly from defection by the other party, Møller suggests that sexual evolutionary conflict will generate elaborate signal evolution and adapted psychologies, a ‘breeding ground for extreme abilities of mind-reading’ (1997: 44-5). Miller advances the similar notion of a ‘Scheherazade strategy’ (2000: 383-6, 444), involving novel ways of keeping one’s partner interested by storytelling and good conversation. Among apes, gibbons have social monogamy with EPC levels not dissimilar from humans (Palombit 1994, Reichard 1995), although in much smaller social networks. Gibbon long-calls or ‘duets’ may be most readily compared to sexually selected elaborate signalling like birdsong. These performances are frequently initiated and driven by the female (Reichard and Sommer 1997). She is ‘showing off’, proving her quality to any extra-pair males in earshot, and

testing the quality of her current mate. He is forced into a briefer response call, presumably telling outsider males to keep away from his attractive partner. Relative to other apes, female gibbons extract large amounts of time and attention from their male partners. Here, investment by males produces female sexually selected display and elaborate signalling response. However, this dynamic of atomised pair-bonding is not likely to be characteristic of human social evolution. Among foragers, the amount of time married partners actually spend with each other can be far less than time spent with same-sex allies.

#### *4.5.2 Kohn and Mithen: the handaxe theory*

By contrast with Miller's very general application, science writer Kohn and archaeologist Mithen apply Zahavi's principle to a specific artefact, the mysterious and symmetrical Acheulean handaxe, locating their argument precisely in the archaeological and palaeontological records (1999). Handaxes can perform a number of functions, such as butchery, cutting, chopping, and providing a source of flakes, but Kohn and Mithen focus on their possible role in a social or sexual signalling system. If handaxes acted as 'fitness' indicators, this could answer questions about their pervasiveness in the record, the extraordinary numbers found in some sites, and their symmetry (1999: 518). If a male could demonstrate to a female his ability to make a beautifully symmetrical handaxe, he would prove in 'hard to fake' terms his knowledge of where to find resources, and his cognitive and technical skills and coordination. Kohn and Mithen also argue this could demonstrate social skills and awareness, but do not clarify how (1999: 522).

Symmetry is a classic indicator demonstrating good genes and healthy development. In an artefact, it plays into the sensory bias of the opposite sex, and also makes the quality of handaxes 'easy to judge'. One of the problems for archaeologists is that handaxes have an imposed symmetry of form beyond any functional requirement (1999: 520). If plain flakes and choppers can be used to do the same job, then excessive symmetry appears wasteful. Another mystery is the huge abundance of handaxes found in many sites, often apparently in pristine condition (1999: 522), suggesting many were made and immediately discarded. The handaxe 'handicap' theory readily explains this, if males were repeatedly manufacturing the artefacts under female observation. This is necessary to guard against thieves and cheats who could steal top quality handaxes manufactured by others. The model does not preclude females making handaxes, but suggests that while

females would make more practical tools, males would endeavour to produce more symmetrical display items. These include some spectacular examples of giant handaxes.

Kohn and Mithen relate the timespan of the handaxe culture (from 1.4 mya to c.250 kya) to encephalization and female reproductive stress (1999: 521, 523). They concur with O'Connell, Hawkes and Blurton Jones (1999) that female foraging strategies among *H. ergaster/erectus* were largely independent of males, with intergenerational female cooperation. Males were not selected for regular provisioning, but for qualities that were reliably indicated by handaxe manufacture. The rapid encephalization of the Late Middle Pleistocene changed that. As females came under stress, they shifted their selection criteria, seeking instead mates who would do more productive hunting. This 'caused the Acheulian to break down' (Kohn and Mithen 1999: 523). Males began making tools that met functional requirements. Hence, the development of new industry like Levallois (1999: 524).

The handaxe theory fits well with sham menstruation. At the lower grade of encephalization, females select males for cultural displays; as brain sizes rise, female protoritual coalitions mobilise male hunters, and choosier males begin to select females for cultural display. Since handaxes are essentially a 'social technology', there is no reason why male handaxe makers should not be involved in some form of ritualized coalitionary display behaviour, preceding the ritual coalitions of females. The difference will be that male ritual of this kind does not provoke any collective fictional constructs, forcing engagement with counter-reality. Displays will be cultural but not symbolic.

#### *4.5.3 Hawkes: showing off or mate-guarding?*

Hawkes (1999) has argued that evidence of rhino and horse kills at Boxgrove c. 500 kya (Pitts and Roberts 1997) and wooden hunting spears from Schöningen c.400 kya (Thieme 1997) are early signs of a shift towards large game hunting, indicating male ‘showoff’ strategies. Evidence for routine big game hunting is found from the Late Middle Pleistocene in Middle Palaeolithic and Middle Stone Age contexts (Gaudzinski 1996, Marean and Kim 1998, Marean and Assefa 1999). This fits with Kohn and Mithen’s model of change in the arena of male competition from handaxes to hunting. Because this change is driven by encephalization and female choice, some female coalitionary strategy is needed to turn handaxe makers into hunters. Again, an early stage of sham menstruation can function to resist efforts of top handaxe makers to access cycling females, and get them to think about going hunting.

Significantly, while handaxe makers can expect to repeat their performance regularly, implying certain males could have higher fitness, hunting is inherently much more unpredictable in outcome. Although there are differences of hunting ability, the luck factor in ‘showoff’ hunting will have the effect of reducing reproductive variance among males – a form of reproductive counter-dominance (Hawkes et al. n.d.). Hawkes considers ‘showoff’ as wasteful and costly for males. Since prey size is negatively correlated with encounter rate, it involves long days of searching for potentially small reward. The rare kills are shared widely in the social group, bringing social rather than economic benefits to the hunter. Yet this wasteful behaviour for males can be highly productive for females and offspring. A similar dynamic has been observed by Zahavi and Zahavi (1997: 125-150) among babblers where high-rank birds compete for prestige by altruistically feeding juniors and subordinate individuals. Birds are not likely to be feeding their own offspring; in this case, social competition between individuals produces food for the offspring of the entire group.

Among the Hadza, Hawkes and colleagues found that nutritional welfare of young children was affected by foraging of mother and/or ‘grandmother’, not by the provisioning of fathers (Hawkes et al. 1997, Hawkes et al. n.d., but see Marlowe 1999). This is not surprising since hunters lose all control of distribution of meat after large kills. Up to 90% of the meat women and children eat comes ‘without regard to husband/father’s success’. An earlier report by Hawkes (1993b) had found that children of better hunters put on more weight, but this can



be accounted for if good hunters are marrying more industrious foraging wives through assortative mating. Blurton Jones et al. (2000: 80-83) argue that, if paternal provisioning is not the motive, another more general explanation for the evolution of pair-bonds is required. Formal modelling by Hawkes, Rogers and Charnov (1995) suggested that in conditions where no single or small number of males could dominate mating opportunities, mate-guarding by each male became the optimal strategy. However, among foraging groups like the Ache, Ju/'hoansi and Hadza, husbands and wives actually spend long hours of daylight apart, perhaps most among the Hadza (Blurton Jones et al. 2000: 72-3, citing Woodburn 1968a,b). Physical mate-guarding does not happen. Hawkes et al. (n.d.) argue that socially acknowledged pair-bonds act as a form of conventional mate-guarding which solves the problem of male competition and allows males to get on with the job of 'showoff' hunting.

This idea begs a lot of questions. How can such a convention be trustworthy? 'Showoff' implies that women are discreetly rewarding best hunters with more EPCs. What level of cheating is admissible before the convention breaks down? Of course, pair-bonds do break down as a result of cheating. So perhaps this is a realistic model if policed through social mechanisms of vigilance such as 'gossip'. But it is hard to see it would be workable unless it were in female interests. Hawkes and colleagues argue that because female foraging hours are vital to offspring welfare, removing the interference of male contest is a huge benefit allowing a woman to get on with supporting her children (Blurton Jones et al. 2000: 81-2). Therefore women should support and indeed institute the convention.

Hawkes is arguing that 'showoff' strategies produce reproductive counter-dominance, with the consequence that mate-guarding becomes the best male policy. 'Conventional' pair-bonds, with emergent nuclear family structures, will then be in best interests of men and women. But it must be female coalitionary strategies – sham menstruation – in the first place which tip male competition into the arena of 'showoff' hunting, and therefore drive these changes. In practice, sham menstruation can work either to support conventional pair-bonds – by resisting advances of philanderers or would-be dominants – or deliberately to defy pair-bonds, mobilising men who are lazy hunters. A classic case in point is that of the Sharanahua, where coalitions of women paint each other, using genipa juice, which is mythically related to the Moon and menstrual blood, in order to send men

who are lovers, not husbands, on special hunts (Siskind 1973: 34 for picture of paint, 1973: 47-8 for myth of Moon and menstrual blood, 1973: 96-105 for special hunt).

This suggests that it is sometimes in female economic interest to uphold pair-bond conventions, sometimes not. Overall, women will do best with a flexible sexual strategy; and men may respond with a flexible foraging strategy, changing at different stages of life history. Hunting strategies among the Meriam of Torres Strait (Bliege Bird and Bird 1997: 66) included both risky encounter hunting during the turtle feeding/mating season of showoff type, which was widely shared, and more reliable return rates during nesting season, when consumption was targetted to nuclear families. Unmarried men were more likely to pursue the first, while married men with children did more of the second. Among the Ache, secondary fathers are typically younger unmarried men (Hill and Hurtado 1996: 274-5, 288, Fig 9.5). Clearly, women are operating strategies of keeping young lovers who are anxious to show off, besides stable pair-bonds.

Some evidence that male alliances, involving 'respect' between men of pair-bonds, act against female economic interests comes from Hadza religious practice. The key Hadza symbolic construct is *epeme*, at once the name of the dance feast held each dark moon (Woodburn 1982b) – the time when women are supposed to menstruate (Woodburn pers. comm. 1993, Bleek 1930: 700) – the name of God, and of certain special portions of fatty meat from large kills. The story told to the uninitiated is that these valuable portions of meat are given to God in *epeme* feasts. The secret of Hadza male initiation is that, in fact, it is hunters who consume this meat. Any woman who approached the men's place at an *epeme* feast would risk rape and murder. This is legitimised in a mythological narrative of the overthrow of 'women's rule': once *epeme* meat belonged to women, who were led by Mambedaka, a woman who hunted zebra and wore a zebra's penis; she was violently humiliated by the men; henceforth, men have eaten *epeme* (Woodburn 1964: 298-9, Power and Watts 1997: 550-2). It is impossible to know how much men's respect for 'conventional' mate-guarding is affected by such initiatory alliances, which are effective conspiracies against women. But it is also hard to believe that men would trust each other at all without such alliances, guaranteed in ritual. Where adultery among the Ache is concerned, Hill and Hurtado (1996: 230) observed that men would likely beat up their wives, but would avoid confrontation with lovers in order to preserve alliances.

Gowaty (1997) proposes that the evolution of mating systems is driven by ‘sexual dialectics’ – processes of male manipulation and control of female reproductive capacities co-evolve in an ‘arms race’ with female resistance to control. Where male manipulation-control operates via ‘brokering’ or trading of resources for access, female resistance strategies should lead to intersexual competition for control of resources (Gowaty 1997). These factors would become increasingly important in the evolution of hominin mating systems as pressures of encephalization rendered high-quality food vital for female reproduction. Here, I argue that symbolic culture emerged as a strategy of female resistance to male control through ‘brokering’ of high-energy resources. To an extent, conventional pair-bonding supported by male ritual alliances may be an effective male counter-strategy, undermining female control of valued resources. That is the lesson of the Hadza *epeme* myth.

#### **4.6 Summary: deceptive sexual signalling: the ‘sham menstruation’ strategy**

Symbolism arose as a response to increasing levels of reproductive stress experienced by females during the rapid phase of encephalization in the Late Middle Pleistocene. Once reliable fertility signals had been phased out, menstrual bleeding was left as the only cue offering males positive information on which females were imminently fertile. Because menstruation was valuable for extracting mating effort from males, non-cycling females ‘cheated’ by joining in with menstruating relatives, painting up with blood or blood substitutes to signal ‘imminent fertility’. Cosmetic manipulation of menstrual signals by female coalitions is termed ‘sham menstruation’. Females collected, processed and applied red pigment a) to amplify menstrual signals of coalition members in order to motivate male mating effort (hunting); b) to demonstrate the quality of their coalitionary alliances through costly signalling. An implication of the model is that, simultaneous with advertising fertility using cosmetics, late archaic/early modern females constructed taboos indicating refusal of sexual access except on condition of successful hunting. These involved signalling ‘we are the wrong sex and the wrong species’ in costly ritual performance to deter advances of non-cooperative males. Such ritual metamorphosis into gender-ambivalent therianthropes, highlighted by amplified bloodflow, constituted humanity’s first ‘gods’.

Proto-symbolic strategies of ‘sham menstruation’ are not only compatible with, but integral to all the major Darwinian models of social and sexual change leading to the evolution of modern humans: ‘gossip’, ‘counter-

dominance', intrasexual social cooperation, culture as sexual display, and 'showoff and pair-bonding'. Chapter 5 considers how 'sham menstruation' measures up to archaeological and fossil evidence.

## CHAPTER 5

### REVIEW OF ARCHAEOLOGICAL AND PALAEONTOLOGICAL EVIDENCE

#### 5.1 The record of 'pigment' use

In his work on the origins of symbolic culture in the archaeological record of the southern African Middle Stone Age, Watts (1998) adopted Chase and Dibble's (1987, 1992) criteria for identifying symbolism. Repetition of form with no apparent function, and evidence for intention to produce pattern would allow us to infer symbolic behaviour. If the materials or classes of artefact supposed to be symbolic are present in later archaeological contexts which are generally agreed to be symbolic this supports the inference of early symbolic representation. Ochre provides the earliest class of material from which a ritual tradition could be inferred, meeting the criterion of repeated pattern stipulated by Chase (1991). Framing his investigation within the predictions of the 'sham menstruation' hypothesis, Watts (1998) examined the geographic and temporal record of ochre use. Does ochre constitute evidence for an early ritual tradition? And does it represent a cosmetics industry? The following summarises his findings (Watts 1998, and see summary Watts 1999) with some recent updates.

##### *5.1.1 Where and when were mineral 'pigments' used?*

Ochre is a general term for any ferruginous rock producing a red or yellowish streak (Wreschner 1983). Besides iron oxides and hydroxides, manganese in oxidised form can produce black streaks. These metallic oxides account for all archaeological claims of pigments prior to the Eurasian Upper Palaeolithic (UP) and African Later Stone Age (LSA).

Watts lists some dozen possible and definite cases of pigment use prior to the Upper Pleistocene worldwide

(Watts 1998: 197-202, and see App.5a, 1999: 122). Nearly all involve small assemblages, mostly single pieces, of ochre and haematite, a pure iron oxide producing red streak. Doubts have been raised in a number of cases as to whether these are really artefacts. Watts considered pigment use probable at ten sites, none likely to pre-date c.300 kya; six of these are African, four showing definite evidence of utilisation. The latter comprised a striated and abraded piece of ochre at Bečov 1A, Czech Republic, dating c.222,000 BP; an abraded piece from Achenheim, Alsace, dating c.250,000 BP; a piece with parallel striation from Hungsi, southern India, dating between 200-300,000 BP; and a large piece of ground haematite with striations from Nooitgedacht 2, northern Cape, in a Fauresmith assemblage (preceding the Middle Stone Age). To these cases can be added material from Kapthurin, Kenya (McBrearty 1999a), and four pieces recovered at Twin Rivers, Zambia, in 1996 (Barham 1998). The Twin Rivers pieces are variously faceted, flaked and grooved. Mass spectrometric dating of the top of A Block, from which three pieces of haematite were recovered, yielded a minimum age of 300,000 BP (Barham 1998: 704). Uranium/Thorium dating for the top of F Block, where a faceted piece of limonite was found, gave  $230,000 \pm 35,000 - 28,000$  BP. The site may therefore illuminate the Acheulean-Middle Stone Age (MSA) transition.

Following these sporadic occurrences, the record in Eurasia and Africa appears contrasting. After c.220,000 BP, there is a gap of some 120,000 years before any further finds in Eurasia (Wreschner 1985: 389, Watts 1998: 200-1, cited by Watts 1999: 122). In Africa, apart from Twin Rivers, two cave sites, nearby Mumbwa in Zambia, and Pomongwe in Zimbabwe, 'may provide evidence for continuous usage in the terminal Middle Pleistocene, linking earlier Fauresmith and earliest MSA occurrences to the more extensive record from the early Upper Pleistocene.' (Watts 1999: 122).

Watts performed a temporal analysis of pigment use in MSA sites south of the Limpopo, adopting Volman's technotypological scheme (1999: 123, Table 7.1, 129-132, Table 7.2, Fig. 7.5). Pigments were found in 43 out of 53 shelter sites, and seven of 21 open sites (Watts 1999: 130). From the MSA2a (possibly reaching back into O.I. stage 6), there is evidence for regular use of ochres at southern African sites Apollo 11 and Klasies River Mouth; compared to the 'meagre' record for the end of the Early Stone Age and MSA1 there is clearly increased frequency, although this may be confounded by archaeological visibility. With the development of

the MSA2b, between 120-100,000 BP, ochre becomes virtually ubiquitous, and remains so for all stages thereafter. In analysis of relative frequency of pigment, counting pigment pieces as a percentage of total lithic and pigment assemblage, Watts found a tenfold increase in mean values between the MSA2a and MSA2b (1999: 131 Table 7.2, 132 Fig 7.5). Values double between the MSA2b and Howieson's Poort, with a further 50% increase from Howieson's Poort to MSA3. From the MSA2b, relative frequencies are comparable to those found in LSA shelter sites in the Matapos Hills, Zimbabwe, dating from the last 13,000 years (Walker 1994). Therefore, the most pronounced change in ochre use through time lies between MSA2a and 2b, with a fairly stable frequency thereafter. The scale of ochre use in southern Africa from this stage onwards is unparalleled elsewhere until the Eurasian UP, some 50,000 years later.

In a review of Upper Pleistocene European pigment finds prior to the UP, Watts (1998: 202-4, and see App.5b) noted few occurrences before c.75,000 BP, and hardly any before c.100,000 BP. Most of the material is associated with Mousterian industries from the Wurm Glacial. In the French Mousterian, manganese is abundant in two sites (Couraud 1991) from 55-40,000 BP (Mellars 1996: 187-8). According to Mellars (1996: 369-70), ochre is found in over a dozen Middle Palaeolithic (MP) sites in south-western France, and manganese in many more, but this constitutes a minority of over 50 such Périgord sites. Outside the Dordogne, reports of ochre and manganese are rare. Couraud (1991) showed a massive jump in 'pigment' use at Arcy-sur-Cure associated with the Châtelperronian, when red ochre starts to predominate over manganese and yellow ochre, a feature seen in a number of other Châtelperronian sites compared with Mousterian sites (Harrold 1989: 696). From the early Aurignacian, some sites become super-abundant in red ochre (cf. White 1995: 624). Watts (1998: 204) comments that the scale of quantitative difference in pigment use across the MP/UP boundary (including the Châtelperronian) suggests qualitative behavioural change.

Overall, Watts concludes that no claim for pigments associated with *H. erectus* can be substantiated, while *H. heidelbergensis* is associated with a spotty record of red ochre use in Eurasia and Africa between 300-200,000 BP, possibly earlier in Africa. After 200,000 BP, the Eurasian record shows significant discontinuity, whereas in Africa there appears to be continuity of pigment use to the end of the Middle Pleistocene. The early Upper Pleistocene sees an efflorescence of ochre use in southern Africa which persists thereafter, and is not matched

until the European UP. We lack adequate data for a quantitative evaluation of the record in East Africa (or other parts of Africa).

#### *5.1.2 Selective criteria for material used*

All the substantiated claims for pigment use in the Middle Pleistocene involve red ochre and haematite. A single example of yellow is the limonite cobble from F block at Twin Rivers (Barham 1998), which is relatively soft with a characteristic brownish-yellow streak. According to Barham, 'The facet runs along the only portion of the artifact which grades into hematite, resulting in the production of both yellow and red streaks (Munsell 10R 4/8) from a single piece' (1998: 705). Of the harder haematite pieces from A Block, the two showing most apparent modification have a dark red and strong red colour (1998: 706), the latter being grooved.

Watts examined 4,056 pieces of potential pigment from 17 MSA sites (1999: 122) with total mass over 25 kg. (1999: 126). Half of this comprised glittery specularite (a form of haematite with high mica content), largely from Olieboompoort; 20 % fell into a default 'ochre' category; 10.8 % was shale; 6.5 % sandstones; and 5.9 % haematite (ibid.). Assessing rate of modification by category, Watts found that 34 % of haematite pieces showed modification; after allowing for biasing effects, 25 % of shale and 15 % of default ochre were modified (ibid.). Without the bias of the 'massive caching' of specularite at Olieboompoort, modification rate of this material would have been 'at least as high as for haematite' (ibid.). A subcategory of 'haematized shale' also showed very high rates of modification. These different rates, Watts writes 'indicate a hierarchy of esteem comparable to ethnohistorical data from the same region' (1999: 127).

On analysing streak values, Watts found 3.6 % of the sample had yellow, orangey-brown or yellowy-brown streaks; 10.7 % were brown; under 1 % black, grey or white; 2.4 % 'various' or lacking any streak (mistakenly curated as pigments); reds amounted to 81.4% of the sample (1999: 127). This pattern is hard to explain without human selection on the basis of streak. Watts notes the relative insignificance of yellowish streak, and virtual absence of black despite being available over large parts of the study region (ibid.). 'Light' and 'strong' reds made up similar proportions of the total sample of valid pigment; but when it came to modification, 'MSA



people were clearly selecting the most saturated shades of red' (ibid.). This category of 'strong reds' included poppy, blood red and dark red. Of 383 'definitely ground' specimens, 52 % were strong reds, 30.3 % light reds, and 5 % reddey-brown. Forty-eight of these ground pieces were classified as 'crayons' (see Figs 7.2-7.4 in Watts 1999), 'intensively utilised pieces where ground facets tended to converge to a point' (1999: 127). Among these, colour selection was even more pronounced, 60.4 % showing 'strong red' streaks. The honed points and small facets of some of these pieces suggests they were applied directly to rock or organic surfaces such as hide, indicating production of defined areas of colour, design or pattern (ibid.).

Overall, the selection bias for redness shows that 'ochre was primarily used for visual signalling' (Watts 1999: 128). When a 'brilliant' sample was identified, including rich, bright, metallic or lustrous streaks, this showed a modification rate of over 40 %, suggesting that MSA people sought both 'redness' and 'brilliance'. This is supported, says Watts, 'by the early mining of glittery specularite from Lion Cavern and the caching of specularite at Olieboompoort' (1999: 129).

### *5.1.3 Possible non-cosmetic uses*

Archaeologists concerned with the MSA refer to ochre as a general phenomenon, and almost always interpret it as body paint (Watts 1999: 121 and refs.). But they offer no explanation for the use of cosmetics. Those who are cautious or conservative about the onset of symbolic behaviour advance utilitarian hypotheses for ochre use, principally the idea that it was applied as a hide preservative, or that it offered environmental protection from cold or insects. Watts (1998: 219-226, and see App.5c) has provided an extensive discussion in rebuttal of these arguments (see Knight et al. 1995: 88-9, Power and Watts 1996: 317-8 for summary). The main point in opposition to either hide preservation or protection from the elements is that they imply no selection for colour. Widely available yellows or blacks should be just as useful. While laboratory experiments indicated that metal ions inhibit the breakdown of collagen, field experiments with ochre failed to show that it had a preservative effect (Audouin and Plisson 1982, cited by Watts 1999: 121). According to Watts, ethnographic reports of ochre use in hide-working largely involve 'decorative application in the finishing stages' (1999: 121). The first evidence of ochre use in hide-dressing comes relatively late in the archaeological record, and may be connected with the production of 'prestige goods' (Watts 1999: 121, and refs.). Although Watts does not rule out utilitarian hypotheses entirely, he concludes that ritual and symbolic uses for ochre are primary, arguing that 'the onus is on those still wishing to defend utilitarian hypotheses to do so on a much more rigorous basis than hitherto' (Watts 1999: 133).

### *5.3.4 Evidence in ethnohistoric accounts*

Genetic evidence suggests that certain African hunter-gatherer populations descend from some of the most ancient human lineages (Vigilant et al. 1991, Soodyall and Jenkins 1992, Cavalli-Sforza et al. 1994, Gibbons 1997, Underhill et al. 1997, Hammer et al. 1998). Southern African archaeologists have long argued for continuities in material culture, linking contemporary Khoisan populations with LSA peoples. Such cultural continuities over millennia imply that ethnohistoric accounts of pigment procurement and processing, and their symbolic significance have relevance.

Watts reviewed the history of pigment exploitation in his study region, focusing on Khoisan usage (Watts

1998: 250-63, and see App.5g, Cat.5g, summary in Watts 1999: 133-7). Among the Khoisan, the most highly valued pigments were bright red or brilliant (e.g. How 1970: 34, Beaumont 1973, Bleek and Lloyd 1911: 377-9, Lewis-Williams and Bieseke 1978). Where obtainable, these were haematite and specularite, but where earth pigments were scarce, 'red dye woods (particularly *Pterocarpus angolensis*) were held in similar esteem' (Watts 1999: 133, and refs.). These materials, meeting the same selective criteria as identified for the MSA, were most likely to be transferred over long distances, and people travelled long distances to obtain them. Cross-culturally in southern Africa, Watts notes, 'women seem to have played a major role in the quarrying of earth pigments' (ibid.). He cites an account from the 1820s of 2,000 Xhosa women quarrying red clay at Bathurst, and evidence from the early 1900s of Bantu women travelling distances of 200 km. to haematite works in the Transvaal (Beaumont 1973). If the procurement of pigments was predominantly a female task, Watts continues, 'this was more emphatically the case when it came to their processing' (Watts 1999: 134, and refs.). If ochre was primarily used for visual signalling, it is clear that this was costly in terms of time and energy used in procurement and processing *for women*.

In Ju/'hoan stories, women's pounding of ochre is a metaphor for impending ritual (Bieseke 1993: 196); cross-culturally, ritual injunctions could govern procurement and processing of pigment (e.g. Bleek and Lloyd 1911: 379, How 1970: 35). Overwhelmingly, Khoisan peoples used red pigments in ritual contexts (Knight et al. 1995, Watts 1998). The single context where red pigment is invariably present is menarcheal ritual (Knight et al. 1995: 93-5, Watts 1998: 260, see Cat.5h for comprehensive review). A girl's emergence from seclusion was the occasion for social and collective use of pigment, as the girl passed ochre or haematite around the women of the band, and specially anointed the young hunters, as a protection from lightning (Hewitt 1986: 281, Lewis-Williams 1981: 51). Ritualization of ochre use at menstruation among Khoisan pastoralist groups was, if anything, even more elaborate. For Khoisan generally, redness and brilliance signalled supernatural potency, overlapping with a range of cosmological concepts revolving around rain, fertility, hunting luck, horned antelope, the moon, death and the trickster (Solomon 1992, 1994, Power 1993, Power and Watts 1999). It appears that menarcheal ritual provides a template for other rituals of transition, including first-kills, marriage and death. It may provide the metaphor for 'movement to the other world' involved in trance death and rain-making (Power 1993, Power and Watts 1999). No other ritual context, writes Watts 'is as concerned with

human responsibility for ensuring the reproduction of the cosmos' (1999: 134). Watts concludes: 'Khoisan menarcheal rituals probably provide us with the *single* most useful source of ethnographic information about the role of red pigments in the MSA (without implying that MSA usage was restricted to such relatively rare events)' (1998: 262).

#### *5.1.5 Correlation with onset of 'modern' behaviours*

If the MSA ochre record represents the onset of a regular ritual tradition, how does this fit with other aspects of behaviour in the Upper Pleistocene? In particular, are there other changes associated with the MSA2a/b boundary when ochre in southern African becomes generalised? This is part of a major current debate in archaeology as to whether modern human behaviour arose around the same time as modern human morphology, or post-dated modern anatomical form by some 50,000 years. Klein (1995, 2000) is the main proponent of the latter view, arguing that radical behavioural change occurred c.50-40 kya as a result of mutations in the brain. Another camp, including Brooks (1996, Brooks et al. 1995), Yellen (Yellen et al. 1995), Deacon (1995), and Henshilwood and Sealy (1997), see evidence for modern behavioural traits in Africa as far back as 100,000 BP. McBrearty lists signs of modern behaviour in the African Middle Stone Age including 'blades, bone tools, specialized hunting, use of pigment, and long-distance trade or transport of raw materials at dates between 70 ka and >250 ka' (1999b: 1). According to her colleague Brooks:

'More and more evidence from Africa suggests that the "revolution" began there about when modern humans did, or not long thereafter. By 80 Ka technologies included blades..., hafted projectiles..., and bone tools... Economies involved fishing and seasonally-specific ambush hunting of dangerous animals..., as well as long distance procurement of raw materials...In Africa, social networks are suggested by regional differences in projectile style...and by movement of raw materials..' (1996: 148)

Brooks also notes evidence for incipient symbolism in decorated items such as incised ostrich eggshell, besides pigment processing.

In his latest defence of his position, Klein states that credible claims for 'modern human behaviour before 50

ky ago must involve relatively large numbers of highly patterned objects from deeply stratified and sealed contexts' (2000: 28). By this criterion, he acknowledges, 'the most plausible evidence ...comes from the Katanda sites in Democratic Republic of Congo and from Blombos Cave in South Africa' (ibid.). At Katanda, ESR and TL dates 'bracket mammal and fish bones, stone artifacts that could be either MSA or LSA, eight whole or partial barbed bone points, and four additional formal bone artifacts between 150 ky and 90 ky ago' (ibid., citing Brooks et al. 1995, Yellen et al. 1995). At Blombos, a bone tool industry and quantities of red ochre were found in association with bifacial foliate MSA Stillbay points, and mammal and fish bones. Two bone points were 'intentionally shaped by grinding and polishing to symmetrical bone points very similar to LSA examples' (Henshilwood and Sealy 1997: 892). Another piece of bone is incised, and there are some 20 less standardized bone tools resembling awls or borers. Carbon and nitrogen analysis clearly separates MSA bone from LSA bone at the site (1997: 894). Several of the bone tools preserve traces of red ochre, which occurs in large chunks at the site. Engraved pieces of ochre have also been found (D'Errico 2000: 24, Henshilwood et al. in press). These artifacts accumulated some 70 kya according to TL dates. Impressed by the formal bone artifacts, Klein nevertheless notes the absence of comparable artifacts from large assemblages at Klasies and Die Kelders, and calls for additional substantiation of the dating for both Katanda and Blombos (2000: 28-9).

Although Klein aligns the MP/UP boundary to the MSA/LSA, the Eurasian model of radical change from Middle to Upper Palaeolithic, taken to reflect population replacement, does not fit in Africa where there is population continuity. Over large parts of sub-Saharan Africa, the transition does not occur until 25-20 kya (Watts 1999: 114, and refs.). In contrasting aspects of Ancient and Modern behaviour, Stringer and Gamble focus on the lack of 'campsites' prior to c.60 kya, where these are defined in terms of 'structured hearths (rather than just concentrations of ash), post holes for tents, pits for storage, or trenches from house construction' (1993: 155). Watts (1998: 164-6) summarises the ethnoarchaeology on campsites of low-latitude foragers, suggesting that these are inappropriate criteria for Africa. Importantly, African hunter-gatherer hearths are generally simple and may not be distinguishable from hearths found in Late Middle Pleistocene contexts. Ash spreads are just as likely to be found. Low-latitude foragers rarely invest in storage facilities. In terms of hearth structure and spatial patterning, comments Watts 'no qualitative difference can be demonstrated between

Upper Pleistocene MSA shelter occupations...and early LSA counterparts' (1999: 117, and refs.). Regarding rubbish disposal, Deacon observes that 'people were living by the same rules of use of space and cleanliness in the Middle and Later Stone Ages' (1995: 128).

From MSA2b, there is some evidence for activity differentiation between shelters (Evans 1993, cited by Watts 1999: 117). An important indicator of change from MSA2a/2b is the wide distribution of grindstones, which occur rarely in early MSA contexts (including at Twin Rivers (Clark 1971)). Being so cumbersome, grindstones were likely to be cached. Their more widespread presence indicates 'increased labour investment in sites as 'campsites'' (Watts 1999: 118). Although potentially important in food-processing, grindstones were evidently used for processing pigment, and their more expanded distribution coincides with the dramatic increase in relative frequency of ochre (ibid.). Another significant change Watts associates with MSA2b is expansion of habitat range into arid hinterland, evidenced by ostrich-eggshell water containers found in Namibian MSA shelters (ibid., citing Vogelsang 1993). While lithic raw material procurement was almost exclusively local up to and including MSA2a, some exotic materials are found in MSA2b assemblages. Distances of 70-130 km for transport of non-lithics – high-quality pigments and marine shells – are 'fairly well attested in the MSA2b and Howieson's Poort' (Watts 1999: 119).

In terms of hunting capabilities, MSA people could deal with such dangerous animals as warthogs and giant buffalo (Brooks 1996: 148). Such differences as exist between the MSA and LSA can be explained as less intensive exploitation in the MSA when there were lower population densities and no bows and arrows. The contrast in buffalo exploitation between MSA and LSA which is claimed by Klein (1989) relies on samples from the Holocene LSA, a period characterised by economic intensification. Had early LSA samples been used, Watts comments, 'no MSA/LSA contrast would have been observed' (1999: 117). Marean and Assefa consider that many changes between MSA and LSA practice 'such as broader diet breadth, increased use of more labor-intensive resources, and production of specialized tools to extract low-ranked foods, can be explained as reactions to natural population growth' (1999: 35). Differences seen between the MSA and LSA in South Africa 'are no different in scale or magnitude than other changes we see through the Upper Pleistocene and Holocene, both in South Africa and elsewhere' (ibid.). Marean and Assefa find behavioural

ecological and demographic models for change more compelling than Klein's 'appeal to a neural advance that, so far, is untestable' (ibid.).

In his overview, Watts sees little to differentiate the MSA2a/2b in terms of subsistence strategies and organisation of space. But there is little change in these up to and including the early LSA. He summarises these significant developments between the MSA2a and 2b: 'the first appearance of bladelet technology, the generalisation of grindstones, the differential use of shelters, the indications of increased logistical organisation and the procurement distances of potential 'prestige goods'' (1999: 120).

Overall, as regards the first three predictions of 'sham menstruation', the evidence that MSA ochre/haematite formed the basis of a cosmetics industry implicated in the earliest ritual traditions appears compelling. From MSA2b, valued pigment features in extensive exchange networks as a possible 'prestige' item. From MSA2a, when ochre use becomes regular in two Southern Africa sites, and visible in others, the record of hunting strategies and campsite organization cannot be distinguished from that of the early LSA. From MSA2b, when ochre use appears habitual, some increase of planning depth and logistical organisation is indicated.

Watts (and see Power and Watts 1996) associates the early sporadic record of pigment, in both Eurasia and Africa, with an early stage of 'context-dependent' sham menstruation, not fully symbolic. But it is arguable that, at the earliest stages of the strategy, no more would be required than cutting to produce extra blood. The presence of *any ochre whatsoever* speaks of some planning depth in respect of cosmetic ritual. Discussing the procurement patterns at Twin Rivers, Barham argues that 'the collection of iron oxides was a deliberate activity early in the MSA at Twin Rivers' (1998: 708). He continues:

'The extent to which these finds are representative of the period or of the region cannot yet be determined given the paucity of comparably aged sites not just in Central Africa but in the continent as a whole' (ibid.)

It is likely that low visibility in the Penultimate Glacial prevents us from seeing the picture in Central Africa. Besides Twin Rivers, sequences at Pomongwe suggest that ochre use stretches back into the early MSA. But

Watts argues that this cannot be taken as representative of the early MSA as a whole. Systematic use of iron oxides in Africa is associated with ‘the development of regional technological specializations by the beginning of the Upper Pleistocene’ (Barham 1998: 709, citing Clark 1992). Barham links the emergence of the MSA to ‘a package of interrelated behaviours’ including development of syntactical language, more complex technology involving hafting, and social networks linking culturally similar groups. In this context, he argues, in Durkheimian fashion:-

‘Symbol use and ritual would have played an integral role in the generation and maintenance of group identities.’ (1998: 709)

According to Chase’s (1991) criteria for recognition of symbol use, repetitive action must be embedded in a system of shared meaning. Repetitive behaviour becomes symbolic if it intentionally communicates a group’s identity. Demonstrating this with sparse Middle Pleistocene data ‘poses a formidable methodological challenge’ comments Barham (1998: 709). But,

‘If repetitive pigment use developed before 200,000 years ago, as is very tentatively suggested by the Twin Rivers data, then this package of behaviours underpins the later appearance of regional specializations and, more significant, the emergence of behaviourally modern humans.’ (ibid.)

If female proto-symbolic strategies, with full capacity for symbolism indicated by procurement of ochre, were up and running over 200 kya in both Eurasia and Africa, then a key question becomes, what happened subsequently in Eurasia?

## **5.2 Review of palaeontological evidence**

This section considers Predictions 4-6 in the light of the hominin fossil record, and approaches the important problem of difference between Neanderthals and Moderns.

### *5.2.1 Correlation of ochre use with encephalization*



Sham menstruation arises as a female response to reproductive stress. Evidence for the strategy should begin to appear, *at latest*, by the time cranial capacities maximise. The hypothesis would not be supported if evidence appeared before significant increases in brain size, nor if it appeared after brains had already attained peak levels. Because the opportunistic, context-dependent initial stage of the strategy does not necessarily involve pigment, but more *ad hoc* measures, an early phase of sham menstruation should precede any appearance of ochre. Therefore we should see time lag between first increase in brain size and finds of utilised pigment.

In a study of body mass and encephalization, Ruff et al. (1997) calculate mean cranial capacity and brain mass for a sample of 163 *Homo* individuals from the early Pleistocene to the present. They found the major increase in encephalization in *Homo* occurring between 600-150 kya, being preceded by a long period of stasis. Early in the Upper Pleistocene, between 150-100 kya, brain mass and cranial capacity equal present-day averages. Subsequently, both modern humans and Neanderthals attain even larger absolute brain sizes, peaking around 35 kya, before modern humans decline to present-day levels.

The sporadic appearance of ochre in both Eurasia and Africa between 300-200 kya fits well with the initial burst of encephalization. The more frequent African ochre record of the early Upper Pleistocene also fits, assuming low visibility obscures O.I. stage 6, but the lack of any comparable record in Eurasia seems puzzling because Neanderthal forebears matched modern human ancestors in respect of their absolute brain sizes.

#### 5.2.2 *Correlation with reduced robusticity/stress, and association with modern morphology*

These aspects, relating to predictions 5-6, are addressed together since reduced robusticity is a diagnostic of modern morphology (Stringer et al. 1984). But, sham menstruation does not immediately predict reduced robusticity in males; habitual cosmetic strategies should underpin routine hunting and a sexual division of labour. This would lead us to expect differential rates of gracilisation between the sexes, and specific reduction in stress for juveniles. Relaxation of sexual competition, combined with improvements in technology, could lead to subsequent reduction of robusticity for males.

It is not absolute brain size *per se* but reduction in body mass while large brain sizes are retained that is special

about modern humans (Ruff et al. 1997, Kappelman 1996). Deriving body mass predictions from both femoral and bi-iliac breadths, Ruff et al. (1997) found Neanderthals, with their hyperrobusticity, to be *relatively* slightly less encephalized than early moderns such as Skhul/Qafzeh or recent moderns of the Upper Palaeolithic. Kappelman (1996), using orbital area to estimate body mass, found the most dramatic change among modern humans from 100,000 years ago. Relative brain sizes increase as a result of selection for smaller body size rather than larger brains. Kappelman suggests that such selection for smaller bodies is a consequence of change in social structure and foraging behaviours, involving higher levels of cooperation among kin. He infers 'a decrease in mechanical loading and total energy output' from the reduced skeletal robusticity, and comments that these energy savings 'may have been more pronounced in smaller individuals' (1996: 272). In terms of energy efficiency, women and children have most to save if pressure for large body size relaxes. However, neither study by Ruff and colleagues or Kappelman attempted to compare gracilisation rates between the sexes.

A comparative study of femoral neck-shaft angles led Trinkaus to suggest that early modern human children from the Skhul-Qafzeh group participated less in day-to-day foraging mobility than did their Neanderthal counterparts from the same region (1993, 1994). This implies they were receiving more care and provisioning from a subset of adults at 'home', suggesting social division of labour. Citing evidence from Frayer (1986) for more rapid female gracilisation among recent moderns in Europe, and Brennan's (1988) study showing decrease of dental hypoplasia between Neanderthal and recent moderns in south-western France, Soffer (1992) compared data on juvenile and adult mortality rates of Neanderthals and recent moderns across the MP/UP transition in Northern Eurasia. She suggested that the different strategies of the two groups could be explained in terms of differences of social and economic organisation, specifically the absence and presence of a sexual division of labour.

At a gross level, Neanderthals, who did not develop habitual ochre use, show hyperrobusticity (cf. Churchill 1998) and heightened levels of stress indicators. Early modern humans in Africa, having developed habitual ochre use between 120-100,000 BP, showed reduced robusticity from 100,000 BP. But more data are needed for comparison on robusticity between the sexes in both species.

As far as association with modern morphology in Africa goes, dates for modern human origins are being

backdated into the Middle Pleistocene (Brauer et al. 1997). Uranium-thorium dates for the Ileret cranium (KNM-ER 3884) and Ileret femur (KNM-ER 999) from Lake Turkana give 270 kya and 300 kya respectively. Of similar age range to the late archaic Florisbad, the Ileret cranium shows a mix of modern and archaic features, with thin posterior vault walls and endocranial capacity estimated around 1,400 cc., in excess of the present-day mean. The femur, while robust, has modern features found in the Skhul/Qafzeh group. Brauer and colleagues propose that 'a very robust but basically modern morphology already existed in eastern Africa more than 200,000 years ago and probably as early as 300,000 years ago' (Brauer et al. 1997: 337). Transitional specimens like Jebel Irhoud and Laetoli now date back almost 200 kya, while the Singa calvaria from Sudan is placed in O.I. stage 6, predating Omo 1 at 130 kya. Although it has a pathology of the temporal bone, Singa shows a mix of archaic and modern traits; CT examination of the vault suggests it could belong to a population directly ancestral to modern humans (Spoor et al. 1998). Many of the fossils claimed as early anatomically modern humans in fact lie outside the modern range of variation, including Skhul 5 and Qafzeh 6 (c.100 kya), and Border Cave 1 (of problematic dating), but they are aligned with modern humans in the cladistic sense of sharing derived characteristics (Aiello 1993: 80). The very fragmentary collection of human remains from Klasies (c.110-100 kya) may evidence remarkable sexual dimorphism with some notably gracile specimens (Deacon and Shuurman 1992: 128). Robusticity in arm bones at Klasies (Churchill et al. 1996, Pearson and Grine 1997) and Border Cave (Pfeiffer and Zehr 1996) suggests mosaic evolution with retention of archaic postcranial traits, while faces become modern. Some of the bewildering variability of the southern African MSA fossil record could be accounted for by a model predicting differential gracilisation rates between the sexes.

Again, at a gross level, the sparse ochre record in Central Africa may stretch back as far as the earliest evidence for modern morphological traits in East and Central Africa. In southern Africa, ochre use is directly associated at certain sites, such as Klasies, Blombos and Border Cave, with human remains showing modern traits. If, as seems reasonable, the onset of cosmetic strategies occurs earlier in Central/East Africa, this would correlate well with molecular genetic evidence. Coalescence dates for a number of genetic markers, including mt-DNA (Stoneking et al. 1992, Horai et al. 1995, Ingman et al. 2000), Y-chromosomes (Underhill et al. 1997) and nuclear polymorphisms (Tishkoff et al. 1996) cluster in the region 200 kya (Ruvolo 1996, Lewin 1999: 178).

This is consistent with the idea that cosmetics as sexual signals had a role in modern human speciation. Wherever modern humans went – to the Middle East, to Australia and to Europe – they used quantities of ochre.

### *5.2.3 Did Neanderthals use cosmetics?*

We can infer that female Neanderthal forebears in Eurasia during O.I.6 experienced acute reproductive stress, with levels of encephalization comparable to moderns and severe climate challenge. Yet, no parallel industry of cosmetics is apparent once we emerge into the interglacial, O.I.5e. Only later during the Châtelperronian do we see significant Neanderthal interest in red ochre, possibly in response to stimulation from contact with moderns (but see d’Errico et al. 1998). It seems Neanderthals pursued different strategies. But why?

It is essentially the conditions during O.I.6 (186-128 kya, with glacial maximum 160-130 kya) that produced classic Neanderthals (Stringer and Gamble 1993: 45-6). They adapted to a climate shifting between cool temperate and periglacial conditions, showing features of stocky body form and foreshortened limbs; large noses, large brains, and the robusticity indicating high activity levels may all belong to the suite of cold adaptation (cf. Churchill 1998, but see Schwarz et al. 1999, Schwarz and Tattersall in press). However, it is important to bear in mind that Neanderthals survived over a vast climatically differentiated area through climatically unstable times. Schwarz and colleagues comment: ‘Given the apparent stability of their morphology over an extended period of time, it seems reasonable to suppose that they compensated by cultural means for the climatic and environmental vicissitudes they encountered’ (1999: 185). Any model of cognitive deficiency applied to the Neanderthals is unsatisfying. When operating in the same environments as early moderns, such as the Mousterian Middle East, their use of resources and technologies are barely distinguishable (Lieberman and Shea 1994). Middle Palaeolithic faunal assemblages show similar single-species specialization patterns to MSA assemblages (Marean and Assefa 1999: 34 and refs.), even though the high degree of Neanderthal skeletal trauma may be attributed to hunting by close contact – a non-modern and possibly ‘less adept’ approach (ibid., citing Berger and Trinkaus 1995). Again, we need to appeal to behavioural ecological and demographic models to explain difference (cf. Marean and Assefa 1999).

On the basis of evidence from Neanderthal infant and juvenile burials, at Devil's Tower, Gibraltar (Dean et al. 1986), Dederiyeh, Syria (Akazawa et al. 1995) and Engis, Belgium (Trinkaus and Tompkins 1990), it has been argued that Neanderthal children were on an advanced schedule for dental development and brain growth compared with moderns (cf. Churchill 1998). The Dederiyeh infant, under two at death, has a maximum breadth of cranium equivalent to a modern Japanese six-year-old. Dean, Stringer and Bromage (1986, Stringer et al. 1990) counted perikymata of the Devil's Tower child to arrive at an age between three and four. Estimates of 1,400 cc. (over the modern mean) for brain size seem remarkable, while molar development is also advanced for a three-year-old. Since they gained access to the Spitalfields collection of individuals of known age at death, Stringer et al. (1990, and see Stringer and Dean 1997) revised their initial ideas on precocious brain growth. There are basic life history and energetic constraints on building large brains *and* large well-developed bodies (see Chapter 2), which make it unlikely Neanderthals could lie far outside the modern human range of variation. However, Churchill (1998) argues for a model of accelerated growth producing large, advanced Neanderthal children as a response to cold climate. He sees the signature of endocrinal mechanisms of super-abundant growth hormones in characteristic Neanderthal robust skeletal features, which are present from an early age.

If Neanderthal children were under selection pressure for such precocity, this only places increasing stress on Neanderthal mothers. How could they cope with these energetic demands? If any female hominins of the entire genus *Homo* ever showed a profile of marked reproductive seasonality, it would be Neanderthal females during the Penultimate Glacial cycle. This is all the more so if they were under pressure to raise large-brained, robust and precocious offspring. Season of birth would be tied in to highly seasonal availability of resources. The modelling presented in Chapter 3 suggested that such marked seasonality of reproduction, linked with high levels of juvenile mortality, would set up conditions where males abandoned philandering strategies to offer more care. Strong birth seasonality promotes pair-bond stability because it curtails the benefits to philandering males from extra mating opportunities.

The idea that Neanderthals did not develop regular ritual traditions because they had better pair-bond stability, while African early Moderns developed those traditions because their pair-bonding was inherently less stable

turns received wisdom on its head. But it is worth exploring. Limited supporting evidence is suggested by the palaeodemography of the Atapuerca population from Sima de los Huesos, apparent Neanderthal forebears dating >300 kya, who have equal sex ratios (Bermudez de Castro and Nicolas 1997). It is also consistent with the comparison between Neanderthals and recent Moderns at the MP/UP transition in respect of 'social landscapes'. Soffer (1991, 1992) and Gamble (1993) contrast the localised, small-scale social networks of Neanderthals with the large-scale, ritually generated 'chains of connection' brought in by Moderns at the Upper Palaeolithic. Stable pair-bonds with sexual cooperation do not tally with Soffer's view of the Neanderthals as lacking a sexual division of labour. Instead, they fit Hayden's (1993) model of Neanderthals as generalised hunter-gatherers compared with the complex hunter-gatherers of the Upper Palaeolithic.

Power and Watts (1996) originally proposed that the combined stress of encephalization and the resource stress experienced during O.I. stage 6 would push females into ritual cosmetic strategies. Instead of a trigger of ice-age resource stress, we should consider a 'seasonality thermostat' model driving changes in male and female strategies. Where strong birth seasonality is maintained by cold/dry climate, and northerly latitude, males have restricted philandering opportunities and may be more cooperative in supporting females. A shift in climate towards warm or temperate that allows females to relax birth seasonality also allows males to do more philandering. This predicts that the periods when females would be driven to ritual means of countering male philandering will occur in terminal phases of glacial cycles and the relatively warmer periods following. Can this model account for the visible record of ochre use by both species and their forebears in Eurasia and Africa?

The first sporadic use of ochre in Europe clusters in the timeframe 250-220 kya, early in O.I. stage 7, a period of variable climate, but relatively warmer than the preceding glacial; it may be triggered by the termination of O.I.8 at c.245 kya. In Eurasia the record does not continue after 200 kya, but limited evidence suggests continuity in Africa. Eurasian females are expected to have very marked birth seasonality during O.I.6. In Central Africa, despite drier conditions, birth seasonality should not be so extreme, therefore patchy continuity of ritual traditions can be expected. In southern Africa use of ochre is witnessed from MSA2a; again, it may be triggered by termination of the Penultimate Glacial and the sudden shift into a considerably warmer climate,

which then becomes variable and cool. In Europe, there are a few ochre finds c.100 kya – in French sites at Pech de l’Azé and Combe Grenal, besides the notable Tata plaque in Hungary – suggesting return to the sporadic usage seen over 100,000 years previously in O.I. stage 7. By that time in Africa, ochre has taken off culturally and its use is no longer being determined by climate shifts. As the climate cools again in Eurasia with O.I.4, Neanderthals still have no regular tradition. The Châtelperronian, when French Neanderthals finally do reach for the jewellery and cosmetics, is also associated with a shift from cold at 40 kya into temperate around 37 kya (Harrold 1989: 687, Table 33.2). Even if the Châtelperronian is ascribed to culture contact, and this is debatable, the fact remains that Neanderthals were able to pick it up; the visual signals worked for them.

On the face of it, a ‘seasonality thermostat’ model fits with what we see. The confounding factor is that it is difficult to see anything during glacial cycles. But this model better explains the difference between Europe and Africa. It says that ritual took off in Africa because our forefathers behaved more badly than Neanderthal dads. Neanderthal mothers pursued the stable pair-bond route, underpinned by their marked reproductive seasonality, occasionally resorting to deceptive sexual signals when seasonality broke down in warmer phases. Modern African foremothers used ritual means to counter our philanderer forefathers and mobilise men’s hunting as mating effort. They did not rely on parental effort but promoted ‘showoff’ strategies. Ultimately, in terms of demographic factors of birth rate, and the ‘social’ exploitation of the landscape, this was the most successful strategy.

In comparing the explanatory power of models of cooperative parenting and reproductive conflict in accounts of the sexual division of labour, Bird remarks: ‘The puzzling pattern of the human sexual division of labour seems to make more sense as an outcome of conflicts rather than similarities in reproductive goals’ (1999: 72). Behavioural ecology suggests that greater or lesser mating opportunities for men may be a key factor underlying variability in the pattern within our species. The same principles can account for difference between ourselves and the Neanderthals.

### **5.3 Summary: review of archaeological and palaeontological evidence**

Key predictions of the ‘sham menstruation’ hypothesis are that the first ritual traditions will be evidenced by a

cosmetics industry of red pigment, and that such traditions will mark speciation of modern humans. A review of the archaeological and fossil records found support for the hypothesis. Sporadic use of red ochre occurs from c.300,000 BP in both Eurasia and Africa; from 200,000 BP, Eurasia shows discontinuity in the record, while Africa offers some evidence for continuity to the end of the Middle Pleistocene. From the Middle Stone Age 2b, an ochre 'explosion' occurs in southern Africa, with strong red and 'brilliant' materials being selected. This coincides with evidence for development of more modern logistical and spatial organisation. The initial sporadic ochre record is associated with *H. heidelbergensis*, at a period of rapid encephalization. The contrast in the subsequent Eurasian and African records suggests differences in the strategies of Neanderthals and the African ancestors of modern people. The generalisation of the ochre record in southern Africa is associated with evidence for reduction in robusticity.



## CHAPTER 6

### BEAUTY MAGIC

#### 6.1 Ornamentation and signal selection

Human body ornamentation takes a bewildering variety of forms across cultures. If there is any common characteristic, it lies in the conspicuously wasteful nature of display, reminiscent of sexually selected ornamentation in animal species (Fisher 1930, Zahavi 1991). Such extravagance may be viewed within a general framework of signal selection (Zahavi 1987), although Darwinian analyses of body decoration have couched this in terms of sexual selection particularly (e.g. Ludvico and Kurland 1995). Culturally specific forms of body ornament are read as signals advertising individual quality to prospective mates: endurance of wounds demonstrates pathogen resistance (Singh and Bronstad 1997) or commitment to mates (Rowanchilde 1996); valuable ornaments display wealth (Low 1979); make-up or bodypaint highlight features which indicate health and fertility. If sexual selection is understood as a subset of signal selection, this generalised approach allows for more complex social models, with advertisement of quality occurring between members of social groups and social strata, not only between the sexes.

#### 6.2 Cosmetics as cosmology

In this thesis, I refer to all types of body decoration or alteration generically as ‘cosmetics’, whether these are permanent (cicatrization, tatooing, genital or other mutilation) or non-permanent (use of pigments, jewellery, special garments or coiffure). The English term ‘cosmetics’ derives from the Greek word *κοσμος*, the plural form of which meant ornament or adornment. This word conveys the idea of the whole universe, or *cosmos*, and of order as opposed to chaos. In the Classical Greek worldview, ordered arrangement gave rise to a sense of both morality and beauty. The cultural anthropologist’s term ‘cosmology’ similarly links moral and symbolic systems to schematic order in the world (cf. Beidelman 1971: 30). The notion unites the rational, in the sense of

conceptual organisation, and the aesthetic.

A liberal European or American may regard inclusion of such traumatic initiatory experience as genital mutilation among cosmetic practices as morally problematic. Although clearly an important task, it is beyond the scope of the present thesis to engage with a phylogeny of circumcision practices. I am investigating a model for the evolution of art as the primary medium of political and ritual mobilisation, founded on costly signals expressed with and through the body. The 'sham menstruation' model can account for the emergence of genital mutilation in either sex as an extremely costly variant in certain political circumstances. Female initiation among the Hadza illustrates how 'alien' circumcision practice may be adopted and integrated within an indigenous framework of narrative and performance (see Power and Watts 1997, and below). In analysis of any representative sample of sub-Saharan African rites of initiation, forms of circumcision for both sexes occur centrally. These are the most costly signals involved and they appear fundamental to the cosmologies of the cultures concerned. It would seem illogical and artificial to categorise types of genital mutilation separately from other cosmetic forms, rather than view them on a spectrum of increasingly costly signals.

Part of the problem in associating the adjective 'cosmetic' with grave trauma is its typical English sense of mere surface, implying a trivial adjustment that does not affect underlying structure. It is important to appreciate the ritually charged significance of cosmetics usage in 'traditional' societies (that is, those with socioeconomic conditions most closely resembling the Pleistocene). Contrasting the Anglo-Saxon attitude towards adornment as trivial and superficial with that of the Wahgi of Western Highland New Guinea, O'Hanlon (1989: 10) notes: 'Far from being frivolous, adornment and display are felt to be deeply implicated in politics and religion, marriage and morality'. In their Preface to *Self-Decoration in Mount Hagen*, Andrew and Marilyn Strathern (1971: 1) speak of 'something more than a matter of fashion and cosmetics. In Hagen it is a medium through which people demonstrate their relationship to their ancestral spirits, express certain ideals and emotions, in short make statements about social and religious values'. We are dealing with art objects, they say, 'but the objects are human beings' (ibid.). As Terence Turner (1980: 112-4) puts it: 'The adornment and public presentation of the body, however inconsequential or frivolous a business it may appear to individuals, is for cultures a serious matter: *de la vie serieuse* as Durkheim said of religion.'

Writing of the Aurignacian industry of jewellery-making, White (1992: 539) decries ‘the fetishization of “art” as depiction and the trivialization of bodily adornment as “decorative art” or “trinkets”’. Personal ornaments, says White, ‘are a point of access for archaeologists into the social world of the past’ (ibid.). Drawing on work by anthropologists on body ornament as the site of social and cosmological signalling or communication, White highlights a seminal passage by Turner:-

‘The surface of the body, as the common frontier of society, the social self, and the psycho-biological individual, becomes the symbolic stage upon which the drama of socialisation is enacted, and bodily adornment (in all its culturally multifarious forms, from body-painting to clothing and from feather head-dresses to cosmetics) becomes the language through which it is expressed.’ (Turner 1980: 112, cited by White 1992: 539).

The identical quotation is used by Soffer, Adovasio and Hyland (2000: 517) to front their discussion of the ‘dressed’ “Venus” figurines of the Gravettian (c.30-25,000 BP). Among over 200 examples from West and particularly Central and Eastern Europe, there is a significant focus on sculpted figures with apparent special ornamentation, including caps and head-dresses, bandeaux, belts, skirts and jewellery. Regarding these within a framework of social signalling, Soffer and colleagues go beyond remarks about special ritual apparel rather than day-wear. Displayed in these usually hand-sized figures, they argue, are the valued products of an extensive textile industry – prestige items which were probably manufactured by women and worn by women of certain social status (2000: 524). The very fact of labour-intensive, costly manufacture conveys a social message about skills acquired or commanded, time and energy expended on luxuries far from necessary to survival in Ice Age Europe.

These two Upper Palaeolithic traditions, one the industrial manufacture of items of personal adornment, the other sculpted representation making social comment on the wearing of special items of adornment, appear highly sophisticated. White (1992: 538), following Conkey (1983, 1987), attacks as ethnocentric the notion of “art” as a separate entity. Representation, the term he prefers, must be understood in technological, economic, social and ideational context. He appeals to the concrete, convincing and authoritative quality of material objects, as against two-dimensional graphic imagery.

While material objects offer durability potentially down the generations, I make a parallel appeal to the convincing immediacy of human beings as ‘art’ objects. In Hagen, the most elaborate decoration is worn for temporary displays at dances which celebrate achievements in the ceremonial exchange system (Strathern and Strathern 1971: 3). It signals success in the current round of exchange, rather than lasting superiority. Nevertheless, claims to enduring reputation, authority and future good fortune are made: the reason for decorating is so that “people will make stories about us” (Strathern 1979: 246); the performance by the presenting clan is offered as evidence, subject to scrutiny of spectators, that ancestral ghosts are giving their support (1979: 247); ancestors make decorations bright (Strathern and Strathern 1971: 23). This concatenation of anxious immediacy of present performance, summoning the forces of the clan past to probe or test the clan future recalls Rappaport’s analysis of the two kinds of signalling going on in ritual (1979). Indexical signals provide information on the here and now state of the participants, while canonical signals invoke enduring moral authority from beyond the here and now. Both kinds of signal are needed to underwrite symbolic communication. The Gravettian tradition of dressed Venus figurines can be seen as play between these two levels: the precise depiction of ornaments may refer to specific ritual occasions, the immediate display preserved in enduring material form.

What I refer to as ‘beauty magic’ is this deployment of the ornamented body to invoke ‘other-worldly’ powers; ‘spells’ learned from the ‘ancestors’ create states of ‘taboo’ or ‘magical potency’ (cf. Malinowski 1941: 38, 345-57, Weiner 1988: 69). Ritual display locates the cosmeticised performer within the enduring social cosmos. These are ‘rituals of social magic’ (Bourdieu 1991: 111), cosmetic adornment casting a ‘spell’ over the performer – that is, transforming her status in the eyes of the community complicit in and represented by that magic.

A Darwinian analysis which addresses cosmetic usage purely in terms of competitive individual sexual display misses an enormous amount of what is going on. No doubt courtship display is part of it. In Hagen, ‘decorations are thought of as magically “pulling in” valuables and wives’ (Strathern and Strathern 1971: 16); omens taken before the display point to the man who makes such an impression that girls flock to his house afterwards (Strathern 1979: 247). Yet, the dancers ‘are decorated to the point of disguise...a dancer recognized

at once has decorated himself poorly' (Strathern 1979: 243). It is the decorations that should be noticed first before the wearer (1979: 244, 248). These may be differentiated between individuals, but should form a stylistically appropriate ensemble. In belief, the decorated bodies of the dancers are vehicles for the ancestors to make their presence felt. The audience judges the assemblages, becoming critical if 'items are sparse, elements badly arranged and not properly balanced, the total effect "too dark" or "too light"...and if the individual can be recognized easily. These all indicate failure and the absence of ghostly help.' (1979: 248) Why the emphasis on disguise? Strathern suggests one function 'is possibly to submerge individual in group identity' (1979: 249). She further argues that disguise acts as a mechanism of revelation of true or intrinsic quality, both for individual and clan. Only a 'rubbish man' attempts to wear decorations that are not fitting to him. The dances are occasions when what is normally kept secret or under wraps is 'brought outside' (1979: 248). The signals are indexical: 'wealth is laid out, the strength of a clan numbered by its dancing line' (1979: 249). A Darwinian applying Zahavi will be at ease with honest signalling of real wealth or alliance strength. But the interesting question, the aspect that ordinary Darwinian analysis fails to capture, is why ancestral ghosts, normally an unseen influence, must 'make their presence known' (ibid.)? This, in popular belief, is the ultimate criterion by which the display succeeds or fails.

The problem, then, for a narrowly individualistic sex selection account of cosmetics use is that collective ritual performance generally provides the occasion for the most spectacular and costly application of cosmetics. Moreover, the cosmetics used during these rituals are often directly linked to central religious and moral ideas of the societies concerned. This can be illustrated with a variety of sub-Saharan African examples. For instance, the mark of membership of the *Poro* initiation school for boys of the Kpelle comprises scars on the back of the neck, supposedly teethmarks of the devil, *ngamu*, who 'eats' the initiate (Bellman 1984: 92-3); so, 'inside the devil's stomach' becomes the metaphor for the initiation bush school (Bellman 1984: 101). Male priests of the Yoruba Agemo festival may only enter the shrine dressed and with hair braided as if women (Drewal 1992: 120); this solemn observance contrasts with the comic parody of cross-dressing by both men and women during the public festival (Drewal 1992: 177). It alludes to Yoruba beliefs in special female powers of transformation and duality, also associated with witchcraft (ibid.). In connection with circumcision of boys or excision of girls among the Dogon goes the idea of the uninitiated child possessing a symbolic twin of the

opposite sex, connecting them via the genitals to the earth by a 'thread of god', this being severed at initiation (Griaule 1965: 158-9). Kenyatta claimed *irua*, circumcision or clitoridectomy, as the founding moral institution of Kikuyu identity (1938: 133-5).

Finally, a Darwinian account should ask why the cosmeticised individuals at the centre of such ceremonial, rather than being sexually available, should be magically inaccessible, hedged by constructs of pollution, potency or taboo. The extensive cicatrization of Nuba women and girls took place in isolation on the mountainside above the village, 'for blood is extremely polluting, and must not be allowed to come into contact with productive apparatus such as agricultural implements, or cooking pots, or with weapons' (Faris 1972a: 33). The 'new maiden' among the Ju/'hoansi radiated special potency, *n/um*, which affected everybody in the camp during and immediately after her menstrual seclusion (Lewis-Williams 1981: 51-2); this was mirrored by the treatment of the new hunter when he was secluded and subsequently scarified at the first-kill rite (Lewis-Williams 1981: 62). The Nama female initiate, secluded at first menstruation, was in a dangerous and contaminant state called *!nau* (Hoernlé 1985: 57ff.); she and her visiting girl friends would decorate with a ground red stone powder called *!naop* (1985: 63, 65). A Venda girl attended the first stage of the tripartite initiation cycle, *vhusha*, at first menstruation; on emergence, smeared with red ochre, she was given clothes and ornaments, including for daughters of nobility a strange object tucked into the back of her girdle, called *thahu*. Woven from bark strips and string tassels, plastered with ochre and fat, this was worn for the following six days, during which the girl had to conduct herself with special humility (Stayt 1931: 109). While the meaning of *thahu* is unclear, it apparently signalled the girl's taboo state (Stayt 1931: 110).

### **6.3 Cosmetics as costly signals: why magic?**

Such ritual application of cosmetics at initiation is treated here as costly signalling that reliably indicates quality. But if a purely selfish-gene framework is utilised without resort to group selectionism, is it possible to understand the tight linkage between cosmetics, ritual display and religious belief? Cosmetics clearly are deployed for purposes of individualistic sexual selection. In Chapter 7, I address some premises for a behavioural ecology of cosmetics. Can their use be correlated with material economic variables such as division of labour by sex, in line with parental investment and sexual selection theory (Trivers 1972)? But here

the question is, why all the expensive religious packaging? I suggest that performers use cosmetics to display their alliances in 'hard-to-fake' and 'easy-to-judge' ways. Within this framework, it becomes possible to account for taboo and pollution beliefs, associated with prolonged seclusion in terms of reinforcement and perpetuation of the boundaries of alliances.

One of the first Darwinian anthropologists to view human body decoration as sexual display was Westermarck (1921). His student Karsten, who conducted fieldwork on cosmetics among South American groups, vigorously opposed Westermarck's position, contending that cosmetics served magico-religious functions (1926). In fact, there is no necessary contradiction between the two views: if cosmetics serve to display alliances and if humans (of both sexes) are in part selected for their ability to demonstrate such alliances, the sexual selection hypothesis remains valid at the level of ultimate cause. Ritual action engendering magical beliefs provides the mechanism for marking boundaries of enduring alliances.

In the example from Mount Hagen discussed above, the idea that disguise may be used to submerge individual in group identity is group selectionist, and unworkable if there is a cost in sexual competition to that individual. But, if the individual is gaining sexual advantage precisely from the context of dancing with allied clansmen, there is no necessary tension between individual and clan interest. What counts is not only that an individual is well-decorated, but that he dances with a well-decorated coalition, showing off health and numbers. The ritual invocation that decorations should be seen first, before any individual, and that ancestors make decorations bright, establishes the clan alliance as a body durable through time.

Hagen dancers are marked out by specific ornaments, the ability to acquire decorative objects being admired as an indication of influence or prestige (Strathern and Strathern 1971: 27). Items difficult to obtain, especially valued pearl shell, good ochre paints, and feathers, may have to be borrowed through trade or friendship networks (Strathern and Strathern 1971: 28). Big-men lend feathers to supporters, and generally men can borrow from clansmen, but rivalry *within the clan* for the best plumes forces men to turn to connections outside (Strathern and Strathern 1971: 30). At one *moka* feast, the Stratherns found that almost 70% of the plumes came from outside the clan: 'men's ability to obtain items, through whatever channels, demonstrates their individual skill; while the net display which results from their efforts shows the strength of their group *vis-à-vis*

its rivals.’ (1971: 32)

Rivalry among clan members threatens the alliance with disunity or even dissolution. Where that happens, the display might justifiably be described by a Darwinian as nothing but a *lek* – ritualistic display by males, gathered on one dance ground where they can be compared with each other, to attract mates (cf. Miller 2000). But the displays under consideration here cannot be conceptualised in this way. The magical insistence on ancestors being needed to make decorations bright is an insistence that any competition between individuals be subordinated to coalitionary needs. The audience must ‘see’, not dancing individuals, but representatives of the clan as a unit. If decorations are not seen first and are not bright, the individual members betray their too great rivalry and disunity. The clan may no longer prove a durable alliance. And – the key point from an evolutionary perspective – then *women will not flock* to those men, no matter how good any single individual looks. So, sexual selection is guided by the ‘presence’ of the ancestors.

Another example is furnished by the Bororo of Central Brazil. They have characteristic elaborate bodypaint designs and ornamentation belonging to specific clans which represent in public ceremonial the *aroe*, an immutable ‘essence’ or soul attached to social groups (Crocker 1985: 34). Clans do not wear the representations they own, but sponsor and decorate a particular group in the opposite moiety as performers, with each representation having an owning group and a performing group. The owner clan ‘is exceedingly jealous of its rights over these ornaments and traditionally would punish severely any illegal use of them’ (ibid.). The complexity of rights and distinctions in Bororo ceremonial property and items used in ritual prestations is enormous, a description of the system filling some 200 pages of the *Enciclopedia Bororo* (Crocker 1985: 35). Yet, as Crocker notes, ‘it is known to most adult Bororo men. When a strange Bororo arrives in the village, they can soon tell his name-group, sub-clan, clan and moiety just from the particular labrete he wears’ (ibid.). These symbolic materials not only act as identifiers but mark the channels of social and economic transaction. Collectively hunted game and private vegetable produce are directed in accordance with ceremonial ties defined by *aroe* representation: ‘As the Bororo say, ‘Where the *aroe* representations go, there also goes the food to nourish the children there.’ (Crocker 1985: 35). Here, body decorations allow certain religious ideas or entities to be made flesh. Those ideas stipulate social and economic transactions



between specific alliances with complete and enduring moral authority.

In the above illustrations from New Guinea and South America, superb ritual ornamentation marks the major occasions for economic exchange of valuables or food. In Mount Hagen, these feasts build and extend specifically male alliances, and are economically sustained by women's labour in the production of pigs. In the Bororo case, men of one moiety display to draw hunted produce from men of the other moiety, to feed the children of sisters of men of the first moiety (actually children of men from the second). On the one hand, we have exploitation of women's muscle power, on the other, of men's. Who wears the decorations, who signals to whom and who works for whom will vary according to specific ecological context, as discussed further in Chapter 7. But in both cases, the legitimacy of the transactions and claims involved in longterm economic circulation are guaranteed by the 'presence' of ghosts or *aroe*. The decorations embody that presence; symbolically they underwrite social and economic order.

In Bourdieu's terms, the 'magic' of the decorations is the 'accumulated symbolic capital of the group' (1991: 111); the wearer becomes a delegate of the group. Worn at the appropriate time by the appropriate person, decorations have performative force. Considering the question of how 'supernatural' power can exist in the form of 'word-magic', Bourdieu discusses the 'physics' of magic:

'The laws of social physics are only apparently independent of the laws of physics, and the power which certain *slogans* have to secure efforts from others without expending effort themselves – which is the very aim of magical action – is rooted in the capital which the group has accumulated through its effort and whose effective use is subordinate to a whole set of conditions, those which define the *rituals of social magic*.' (ibid.)

If we replace 'slogans' by 'cosmetics' in this passage, the same description applies to the efficacy of 'beauty magic' in motivating economic productive effort. Cosmetics may be likened to 'words' spoken by the body, except that cosmetics are intrinsically costlier, hence more reliable about the quality of the signaller. Like verbal utterances, they are performatives; that is their power. As Ogotemmêli told Marcel Griaule (1965: 82): 'To be naked is to be speechless.'

#### **6.4 Testing predictions about magic**

In the next chapter, I will apply standard sexual selection theory in an evolutionary ecological approach to cosmetics use during initiation. In this chapter, I aim to test predictions about magico-religious symbolism. This is a 'Darwinian' approach, in that the predictions are framed by the 'sham menstruation' model, which is fully Darwinian. But, as Luc de Heusch puts it, 'Instead of brutally eliminating it, for the first time we are going to take the marvelous seriously' (1982: 8). Darwinians have, in general, been silent on the details of religious systems. But 'sham menstruation' theory has something to say. It is a simple model of the evolutionary role of cosmetics in 'magically' motivating male investment and productive labour. It gives a clear account of the expected form for puberty, nubility or initiation rituals. It describes the archaic 'signature' of ritual power – the conjunction of 'wrong species/sex' signals with red/menstrual cosmetics (Prediction 7, Chapter 4, section 4.2); it expects a 'time-resistant' syntax of ritual potency derived from that archaic signal – potency should be enhanced by bloodflow, celibacy (or non-marital sex), wrong species/sex' signals etc. (Prediction 10, Chapter 4, section 4.2). There are strong theoretical grounds, in signal evolution theory, symbolic and cognitive anthropology (Zahavi and Zahavi 1997, Durkheim 1947, Boyer 1994), for expecting costly signals of ritual potency to replicate with extreme fidelity, and hence prove highly conservative. This makes it reasonable to test for the presence of that archaic signal of ritual potency in recent historic ethnography of initiation. Because the model expresses simple relationships between cosmetics, magic and economic effort, it is relatively easy to test. If it proves robust, it may offer a way into analysis of more complex, evolved systems of signalling such as those of Mount Hagen or of the Bororo.

The 'sham menstruation' model can also shed light on the 'theme of reversal', which according to Rodney Needham 'is... one of the most pervasive and fundamental problems of social anthropology' (1963: xxxix). From Durkheim and Mauss (1963) through Gluckman (1963b), Douglas (1966) and Turner (1974), we can trace a preoccupation with classification and contradiction, order and disorder in symbolic anthropology (see Rapport 1997: 654-8, Power and Watts 1999: 126-8, Sanders 2000). Where cosmetics establish cosmos, recurrently this is accompanied by ritual enactment of 'chaos'. A clear example is provided by the Hadza. Female initiation comprises group circumcision (Woodburn 1964, Power and Watts 1997: 550-1), an unusual

practice for foragers which may have been adopted from neighbours for purposes of hypergamy. Significantly, women of reproductive age may endure this ritual genital cutting more than once. What happens next is dramatic and characteristically Hadza. On emergence, circumcised women rush out and attack men with sticks, *dressed as men* – that is with naked buttocks in the traditional style of a hunter with a loincloth. This costume refers to the mythical heroine Mambedaka, who hunted male zebra, wore the zebra's penis and controlled the distribution of *epeme* meat (see Chapter 4, section 4.5.3, Power and Watts 1997: 551-2). The men targetted – husbands and lovers – are joking rather than avoidance relatives. They clear out of camp fast, making this action a sex-strike in all but name. Gusii women of Western Kenya likewise operate an effective sex-strike during their daughters' three-week seclusion following circumcision (Silberschmidt 1999: 64). Mothers are too busy tending daughters to 'service' husbands. Margarethe Silberschmidt recounts:

'In a very mocking voice women would sing about their husbands being left to their own devices.

'During and after the operation, the women shouted obscenities, expressed the desire for prohibited sexual relationships and referred to the sex act publicly. There was indecent exposure and hip movements; all of these ordinarily shocking acts are performed and expected by women.'  
(ibid.)

She goes on to describe being grabbed by a group of women swinging their pangas or wooden sticks wildly high: 'I was amazed nobody got hurt. Their movements were indecent and vulgar. I had never seen Gusii women – any women for that matter – behave like that.' (ibid.) Her observations match Robert and Barbara Levine's, who saw Gusii women at circumcision ceremonies 'playing the male sex role: holding sticks which represent phalluses, singing songs of sex from the man's point of view, engaging in mock military combat.' (1966/77: 171, cited by Silberschmidt 1999: 64)

These African performances of gender antagonism are far from anomalous, but typical, found in contexts of initiation, rainmaking, harvest and first-fruits rites. They form a class of 'rituals of rebellion' as Gluckman originally termed the classic example of Zulu rainmaking rites (1963b). Women and girls, first donning men's clothes and going out to herd cattle, later went naked and sang lewd songs, while men and boys ran to hide (1963b: 113). Gluckman defined this as 'an instituted protest demanded by sacred tradition, which is seemingly

against the established order, yet which aims to bless that order to achieve prosperity' (1963b: 114). Gluckman viewed these rituals as letting off steam against the dominant patriarchal order; periodic sanctioned protest worked a catharsis, dissipating anti-social forces and permitting the established order to be reinstated unchallenged (1963b: 126-7). But if such institutional protest functions as a psychosocial mechanism relieving political tensions, this does not answer why that tradition should be *sacred*, the overwhelmingly important 'task' of rainmaking being entrusted to women dressed as men.

Discussing similar contemporary material on women's rainmaking among the Ihanzu of Tanzania, Sanders (2000) contests Gluckman's model. Here, too, 'women danced naked and sang their way through the village, bellowing and gesticulating obscenities as they went. Men hurriedly removed themselves from their path, for fear of being caught, unceremoniously stripped of their clothing and "played with" by the unruly mob,' (2000: 469). Sanders himself was able to attend the dance without suffering such abuse through provision of a goat, or 'preferably, a twenty-litre bucket of beer, "it would please the ancestral spirits", the women reassured me.' (ibid.) He argues that rites of transformation in Ihanzu are premised on gender complementarity, that is, they 'work' if male and female combine as equals (2000: 481). Women's bodies, being 'wet' in Ihanzu conception, are 'better equipped to house *both* genders at once' (ibid.). Women have the wetness, which men can never have, and they can simply act out, in exaggerated manner, the maleness (2000: 482).

Central here is the idea that ritual potency to effect transformation depends on a combination of male and female, characteristic of the sacred. This compares with the Yoruba concepts of duality and transformation noted above: Agemo priests dress and have their hair done like women to enter the shrine. Gluckman's model cannot explain why men and boys mimic the attributes of women and girls. In Hollis's account of Nandi initiation, a girl prior to clitoridectomy was dressed as a warrior: her father smeared her newly shaved head with red ochre and gave her warrior's arm-clamps (1909: 58), while her boyfriend offered his clothes and thigh-bells, other lovers loading her with more thigh-bells. Kitted as a warrior, she was meant to behave with bravery; if she were cowardly during the operation, the warrior's things were thrown away (1909: 59). In their more recent account, Creider and Creider argue that Nandi girls' transvestism at initiation is 'women's way of achieving equality with men' saying 'We're just as good as you are' (1997: 58). Are the boys, then, claiming to

be 'as good as' the girls? Boys, prior to circumcision, received the garments and ornaments of girlfriends (Hollis 1909: 53). They proceeded to the ceremony loaded down with necklaces, the more the more popular they were. They were operated on dressed as girls. After the first few days of healing in seclusion, they were given women's garments, instead of girls', and a special necklace from their mothers (Hollis 1909: 55). For some time after their seclusion had ended, boys had to be dressed as women, while also carrying bows and arrows (1909: 56). Both boys and girls had the same name, *tarusiot*, when about to be circumcised, and wore the same (women's) garment, *nyorkit*, in the subsequent healing period. This speaks of the equivalence of male and female initiation, with both sexes achieving a *unified* gender containing power and attributes of each sex. Power and Watts (1997, 1999) have termed this state of ritual potency the 'gender of power'.

Other cases show boys 'playing' female at initiation: among the Korana Khoekhoe herders, a boy was dressed in a girl's hide cloak, with brass rings on his arms as women wore them, and covered in ochre (Engelbrecht (1936: 157). A Turkana boy would be smeared with red clay by his ceremonial godmother, who put on him a red mud-cap, supposedly 'like a womb', and then tied his head with a sinew shaped termed an umbilical cord. Once he had received these female procreative elements, he was addressed as *ateran*, or bride (Broch-Due 1999: 172). The Turkana 'turn boys into men by imitating girls' bodily growth', comments Broch-Due (ibid.). Among the Wiko, a collection of matrilineal groups of the Upper Zambesi, the all-night dancing before entry to the boys' circumcision lodge involved men dressed as women, and women dancing obscenely, miming copulation with drums (Gluckman 1949: 152-3). Normal avoidance classifications collapsed. According to one informant, 'A man is not even ashamed to see the genitals of his mothers-in-law' (ibid.). The lodge itself is compounded of a union of male and female principles, embodied by ritual fires called 'male- and female-elephants'. The blood from the boys' wounds 'is compared by some informants with a woman's menstrual blood' (1949: 155). The great song of the lodge, sung after the operation and during healing, describes an 'upsetting of nature when fish were caught in hives and honey was found in fish-traps...men prepared the food, while women sat in the men's place and tried cases.' (ibid.) Boys of the matrilineal Makonde were also circumcised, being guided through the ceremony by a sponsor, a close male relative who was named with the obscene word for 'clitoris'. The boy was so closely identified with this man that subsequently when he married, he might exchange wives with him, as he might with any member of his circumcision set (Harries 1944: 12).

Besides reversal of sexual characteristics, the other major theme of ritual inversion is the collapse of human and animal categories, with the 'animal' world invading the human, and *vice versa*. This, too, is a characteristic of puberty ritual. A classic example is found among the Chewa, a matrilineal and matrilocal people of Malawi: during puberty ceremonial, the world of Nyau, a secret association of men masked as wild animals, dances through the village (Kaspin 1999, and see Hodgson 1933). The masks of 'wild animals' (*zilombo*) are divided between animals of the day (carnivores) and those of the night (game) (Kaspin 1999: 86), this division mapping onto the sexes at initiation, with boys cast as carnivores, girls as game to be devoured. The consumption of meat 'is an enactment of sexual consumption' (1999: 86). Boys are first swallowed into the body of the huge Antelope mask, a nocturnal female animal, then roughed up and dragged out (Kaspin 1999: 90). The boy completes his passage by immolating a chicken which is referred to using the taboo word for 'menstruation' (*nkhole*) (ibid.). The boy is forced to lick up this blood, and he then consumes the chicken, half-cooked, to become a predatory animal. Girls go through a series of animal transformations, first becoming a snake, when the Nyau Serpent enters the village in the evening (Kaspin 1999: 91). This mask is a 'mother' carried by four men who, in Hodgson's account, were 'dressed as women with false breasts of bananas' (1933: 133). Identified as a python, the girl is ambiguous, neither predator nor prey (Kaspin 1999: 91). The next day, she becomes a game animal, given a peculiar hat called 'the great hartebeest'. On it sits a figurine, representing one of the major night-time masks, painted white 'with red and black spots, representing the spots of blood from menstruation and from spearing.' (ibid.). Once she wears the hat, women call her 'my meat', and it is women who bring her into the village as captured game (Kaspin 1999: 91-2). Before they do, men must show their 'success' in the hunt – that is the Elephant mask. This is conducted to the village by the 'hunters', but rather than being killed, the 'Elephant' has its trunk cut off and given to the women, and is released back to the bush. Only when the women have received this payment of 'men's meat', do they bring their 'game' to the village. While she wears the hat, the girl remains untouchable. When the women remove it, the Nyau masks can seize her, and then ransom her back to the women. So, exchange of 'meat' between the sexes is played out as a ritual contest.

These thematic reversals are not anomalies. They correspond precisely to predictions of 'sham menstruation'/'sex-strike' theory. Symbolism arises when women signal 'No access'. This is done by negating

the normal parameters of the species mate-recognition system, turning right species/sex/time into its precise opposite: signals communicating ‘we are the WRONG species, the WRONG sex and this is NOT the fertile time (we’re all menstruating – which implies that soon it will be the right time)’. Multimedia effects of song, dance, bodypaint and ritual pantomime will be needed to get that message across to outsider males who may initially be reluctant to comply. The result will be a collective repertoire of shared fantasy constructs, things that do not and cannot exist in the real world, but only in a symbolic realm – ‘gods’ that are simultaneously male and female, human and animal, uniting contradictory opposites. The flag which highlights these constructs of ritual power is predicted to be red. Females in a taboo state of menstruation are as if transformed into animals and males, while their male kin inside the protective coalition also become animal and bloody, gender ambiguous, quasi-female. In the mode of ritual action, perceptual categories break down to be replaced by a signal of ritual power which reads ‘WRONG!’. The sacred domain, from the outset, will be defined by reversal of perceptual reality (counter-reality) and reversal of normal power relations (counter-dominance).

These predictions about the form of the earliest religious constructs, or ‘collective representations’ in Durkheim’s terms, correspond well with Boyer’s arguments on the transmission and survival of religious ideas. He proposes that the religious and purely symbolic entities that are passed down will be ‘counter-intuitive’ phenomena – men with heads of animals, ghosts that pass through walls, trees that speak. Just because they conflict with our intuitive expectations of the real world, they are salient and grab our attention. If the phenomena also offer ‘inferential potential’ – that is, a certain psychological realism that allows us to manipulate the concepts as if we were dealing with ordinary humans – then they will be ripe for transmission as religious ideas. What Boyer does not tackle is the question why should humans put cognitive investment into representations that offend against the real world? Why not ignore such nonsense as noise?

Boyer (2000) advances the suggestion that certain supernatural agents – those most closely connected to morality, group identity and ritual – are constructed as ‘full-access strategic agents’, tacitly presumed to have access to all information crucial to social interaction. Boyer avoids answering the question, why people would assume something over and above the real agents they deal with has such strategic information? Knowing who knows what is the very stuff of Machiavellian politics. For a full account of the evolution of religion, we need

to ask, why construct such beings in the first place? The ‘sham menstruation’ hypothesis explains why coalitions of evolving humans became interested not only in sharing and propagating ‘other-world’ phenomena, but also expended large amounts of energy to create and embody such fantasies through costly ritual performance. Further, it tells us why ‘the gods’ should be constructed as vigilant defenders of food and sex taboos.

While the ‘sham menstruation’ model may supply motivation for Boyer’s general model of cultural evolution of religious systems, it is *prima facie* counter-intuitive from a ‘crude’ or ‘vulgar’ Darwinian perspective. This needs some emphasis. Darwinian psychologists may readily view puberty ritual as a means of advertising sexual availability for individuals of maximum reproductive value, with costly signalling of quality. But the *last thing* such analysts will predict is that the individuals concerned should be signalling ‘I am a member of the opposite sex’ at precisely that time. Can evolutionary psychologists account for the young Nandi warriors wearing women’s garments long after their seclusion, for instance? The key prediction (7) of ‘sham menstruation’ can be tested by checking a sample of initiation rites for the ‘signature’ RED + WRONG. Such signalling can be regarded as anomalous from the perspective of both symbolic anthropology and Darwinian psychology.

#### 6.4.1 Methods

##### 6.4.1.1 Sample

Rather than attempt an analysis on a worldwide cultural sample (cf. Low 1979, Ludvico and Kurland 1995, Singh and Bronstad 1997), I aimed to perform a more in-depth analysis on one major geographic region. This offers greater coherence for a study of magico-religious systems. The area chosen was sub-Saharan Africa, partly because of its diversity, partly because of the presence of aboriginal foraging groups whose religion may show structural continuity stretching back millennia (Barnard 1992, Lewis-Williams 1984).

The sample was constructed to provide representative diversity geographically, culturally, politically and economically, as well as to reflect linguistic and genetic diversity. Data were collected on 24 groups, listed with



major ethnographic sources, in Table 6.1. Map 6.1 shows their geographic distribution. Those identified by Ruhlen's linguistic classification (1987) are shown in Figure 6.1. Only the Mbuti, who have lost their indigenous language, are not classified.





**Map 6.1** Geographic distribution of sample.



The sample was largely selected on the basis of quality of available historic ethnography. With some exceptions, the ethnographies relate mainly to periods earlier than the 1950s, the aim being to assess costliness of ritual performance before wage economies had impacted on indigenous ritual systems. Because I am concerned with an evolutionary scenario, the sample is somewhat biased towards foragers as against complex state and stratified societies. In terms of linguistic affiliations, it is very broadly proportionate with numbers of languages spoken – though *not* with numbers of language speakers – within language groups. Khoisan languages, numbering 31, are over-represented with two, while North Central Niger-Congo languages, of which there are over 200, are under-represented, also with two. Otherwise, representation is of the order one per 50 languages.

#### *6.4.1.2 Data*

Two major categories of data were collected, the first broadly ‘symbolic’, the second ‘socioecological’ or ‘demographic’. The first comprised details of cosmetics usage, both specific to initiation and in wider contexts, alongside data on ritual performance at initiation and associated religious symbolism. The second, described more fully in the next chapter, comprised data on residence and descent rules, marriage systems, bride payments, division of labour by sex, population structure and density. Historically viable data in both categories were not available for all groups. Twenty-one cultures were involved in the symbolic analysis, 22 in the ecological analyses in the next chapter.

For most of the groups, there was no difficulty in identifying what constituted ‘initiation’. These were puberty or nubility rites generally marking off childhood from a new stage of maturity, usually associated with onset of sexual activity and, especially for girls, marital availability. In some cases, only one sex had formal initiation during the historic period under consideration. In one case, that of the Ganda, no initiation rituals effectively survived; ceremonial signalling was monopolised by royalty and the military. The two foraging groups, the Ju/’hoansi and the Mbuti, presented some ambiguity in respect of male ritual. Their first-kill rites could be regarded as the indigenous counterparts of female menarcheal rites, while both were involved in group forms of male initiation, probably for the Ju/’hoansi and certainly for the Mbuti, adopted from outside. Data were collected on both forms.

The colours of pigments and materials used prominently in initiation of both sexes were recorded. Fundamentally, these were restricted to red, black and white, with a few other colours mentioned occasionally (yellow, blue). Identifying this aspect of signalling presented few problems, but I aimed to find consistency between more than one account, or accounts by ethnographers who had seen repeated ceremonies.

More problematic was analysing ‘wrong’ signals. I focused on ‘wrong sex’ specifically, for simplification and because this is the most counter-intuitive from a Darwinian perspective. Difficulties arise because the ethnographies are highly variable in attention to detail, but I took it that if there was any discussion of such features by the ethnographer then something really was there in terms of ‘wrong sex’ symbolism. I noted ‘wrong’ signalling both by candidates themselves, and by close companions or allies.

I categorised the ‘wrong sex’ signals in the following way. *Overt* signals were scored where the initiate had to use clothes or gear, or perform actions (for instance hunting) normally associated with the opposite sex, or was given the name of body parts, such as genitals, of the opposite sex. Examples discussed above which would be classified as ‘overt’ include Hadza girls, Nandi girls and boys, or Turkana boys. In these cases there is little argument.

Also noted were what I term *esoteric* signals, connected to religious entities, deities or officials with androgynous characteristics, *where these were specifically linked to cosmetic marking (permanent or non-permanent) at initiation*. An example from above of ‘esoteric’ signalling is the label of ‘clitoris’ (a female penis?) attached to the boy’s sponsor at the beginning of the Makonde circumcision rite. These examples are less obvious and may be subject to interpretation.

I also noted the type and degree of any bloodshed that occurred during the initiation period. For girls, I viewed this as some form of amplification (or substitute) of a signal that was often (not always) already there (i.e. menstruation), whereas for boys, it was potentially mimicry of a female signal.

#### 6.4.2 Results

#### 6.4.2.1 Pigments

Table 6.2, Figure 6.2 show a simple breakdown by colour of the cosmetic pigments used most prominently during initiation rites by sex. Full references are listed in Appendix A. Red clearly predominates, used in over 70 % of cases compared with white in 45 %. Because initiate boys are using red signals just as much as girls, it would be possible to argue that therefore red pigments carry no connotation of fertility or specifically menstrual blood. However, that idea would be impossible to substantiate in relation to the girls' ceremonies – time and again, these associations are emphasized in the ethnographies. What is striking is the parallelism between male and female ceremonial. Some cultures do elaborate initiation for one sex and not the other, but generally there are considerable similarities in treatment of initiates of both sexes. An alternative view would be to read the boys' use of red as a kind of mimicry of female sexual signals. Is there further evidence to support such a view?

#### 6.4.2.2 'Wrong sex' signals

Table 6.3, Figure 6.3 show the results for each sex. These 21 groups provide 38 different initiation rituals, 19 for each sex. Over 63 per cent, 24 out of 38, involved overt signalling of 'wrong sex'. Fourteen of these provide additional evidence of esoteric 'wrong sex' signals. In six more cases, only esoteric evidence was found. In total, 30 rituals showed either overt, or esoteric, or both types of 'wrong sex' signal, over 70 per cent of the entire sample (including four cases where no rituals were recorded), nearly 80 per cent of the 38 recorded rituals. Overall, 19 of the 21 cultures showed some evidence of 'wrong sex' signalling.







**Figure 6.2** Cosmetics/pigment use at initiation in 21 sub-Saharan cultures.





**Figure 6.3** Wrong sex signalled at initiation in 21 sub-Saharan cultures.

Overt signalling was biased towards males, although the combined overt and esoteric category divided fairly evenly between males and females. The bias may partly be explained by greater historic attention to male rather than female ritual, implying some absence of evidence for females, but this is not necessarily the only cause. There appear to be two main contexts for ‘wrong sex’ signals by males. One takes the form of identity of initiates with female kin, mainly mothers, which entails no implicit claim to male superiority. The other, appropriation of and ideological claim to female reproductive potencies, frequently does. As men make such claims, in patriarchal sexual political conditions, we can expect them to contest and suppress overt expression of the corresponding claims by women. Possible examples of such suppression include ideologies of the Kpelle, Dogon or Sara, while groups such as the Chagga and Fang seem to exemplify a more even sexual political contest.

This argues that overt ‘wrong sex’ signals will be an index of sexual politics. The sex which mobilises ritual power signals overtly as the opposite sex; ritual power is monopolised if the other sex is prevented from responding in kind. Esoteric forms of signalling may develop under two different political pressures: one, men hiding the importance of ‘female’ signals from women; two, women being forced to hide expression of ‘male’ signals from men.

In respect of bloodshed at initiation, this was reported most frequently for boys – in 80 per cent of the boys’ sample, and in over 60 per cent, it took the form of genital bleeding, circumcision. The Dogon alone make explicit statement that boys are ‘menstruating’, but the implication is clear in other cases. For girls, bloodshed divided between forms of circumcision and scarification fairly equally.

#### *6.4.2.3 Red + ‘Wrong’*

Red cosmetics link with menstruation alone (no other forms of bloodshed) in the foraging and matrilineal groups in this sample (Ju/’hoansi, Nama, Mbuti, Bemba, Yombe) and to fertility or nubility among Fang and Hausa women. In nearly all these cases, ‘wrong sex’ signals are also found, lending support to the idea that female ‘wrong sex’ signals associate with less patriarchal conditions. Red cosmetics are found very frequently in connection with ‘extra’ bloodshed, mainly circumcision. In only one culture where there was bloodshed

during initiation were red cosmetics absent – the Kpelle.

Adopting the strictest criteria for testing Prediction 7 – the archaic signal of ritual potency was a conjunction or combination of red plus ‘wrong’ signals – we find red cosmetics directly associated with ‘wrong sex’ signals in at least 15 cases, mostly female. These are, for girls, Ju/’hoansi, Nama, Bemba, Venda, Ndembu, Kikuyu (mothers), Chagga, Fang, Ga’anda, Hausa; and, for boys, Tiv, Zande, Maasai, Sara, and Ga’anda. For the Dogon menstruation itself is decidedly associated with ‘wrong sex’. Bloodshed (including circumcision) is found together with ‘wrong’ signals in a further seven cases, specifically Mbuti girls, Ju/’hoansi, Venda, Chagga, Fang, Kpelle and Dogon boys. Over half the sampled cases, by the strictest criteria, meet the prediction. White cosmetics can be associated with ‘wrong’ signals in two definite cases (Kpelle and Fang boys) when bloodshed is also present, besides arguably Mbuti *molimo* and *elima*, and Yombe *kimba*. Black associates with ‘wrong’ signals through scarifications for Fang boys, Ju/’hoansi and Sara boys, and Ndembu men, these cases necessarily involving bloodshed.

#### 6.4.2.4 Lunar/menstrual ideology

While the intention here was to test Predictions 7 and 10, the sample provides considerable support for Prediction 8 – menstrual taboos should be widespread – and Prediction 9 – those taboos should be associated with prohibitions on sex before hunting within a lunar/menstrual ideological framework (see Chapter 4, section 4.2). A large majority of the groups had stringent taboos surrounding menstruation; more or less fuss might be made, but some form of taboo was virtually ubiquitous. Lunar idioms attached to menstruation and/or lunar scheduling of initiation for either sex are found in a clear majority. Only the Dogon made explicit the notion of male circumcision as ‘menstruation’; however, where male ritual involved bloodshed and was scheduled by the moon, this being allied to beliefs about the moon and menstruation, then boys’ rituals were implicitly ‘menstrual’ (e.g. Fang, Kikuyu, Ga’anda). Almost always this ties initiation/menstruation to dark/waxing moon (although the Chagga and Ndembu had circumcision timed for full moon). What is not found is initiation in waning moon. Those groups for whom hunting retained economic or ideological significance frequently had specific restrictions on sex before hunting (e.g. Ju/’hoan, Nama, Mbuti, Yombe, Ndembu, Fang, Zande, Sara).



#### 6.4.3 *The ethnographies: 'Wrong sex' signals*

The following is a breakdown by culture of overt and esoteric 'wrong sex' signalling, ordered by linguistic grouping and geographic contiguity.

##### 6.4.3.1 *Ju/'hoansi (Northern Khoisan)*

Female initiation:-

Overt – menarcheal girl described as a hunter: 'She has shot an eland' (Lewis-Williams 1981: 51).

Esoteric – identity of the girl with the Eland Bull because of 'fatness'. !Kun/obe, an old Ju/'hoan woman, told Lewis-Williams:

'The Eland Bull dance is danced because the eland is a good thing and has much fat. And the girl is also a good thing and she is all fat: therefore they are called the same thing.' (1981: 48)

This identity was further established by the red design drawn on her face (see Appendix Aa), description of menstruation as 'eland sickness' (Lewis-Williams 1981: 43), her use of respect or avoidance terms for eland, and her mimicry of eland movements on emergence, keeping her head down so the eland will not see the hunter. Because of its fatness, the Eland Bull is androgynous. Among antelopes, females are usually fattest except in the unique case of the eland (1981: 72). The Eland Song and Dance would be performed on each day of her menstrual flow (England 1995: 266), and in her hut she was at the centre of the dance. Women of the camp mimicked the posture of mating elands, wearing little 'tails', traditionally made of ostrich eggshell, and wagging their naked buttocks (England 1995: 274, Lewis-Williams 1981: 44). Some older men, wearing 'horns' as bulls might join the dance, sidling up to the women, but men were not always involved among the Ju/'hoansi (Lewis-Williams 1981: 45), and in some Kalahari groups women were known to act out with the horns (Valiente-Noailles 1993: 95-6). This unique occasion of collective exposure by women also signals 'male', since only men would normally wear loincloths with buttocks naked.

Male initiation:-

Overt – strong similarity of treatment of the boy to the menarcheal girl from the moment he shot the arrow into the eland. Like the girl, he could not touch the arrow shaft, in case the arrow poison ‘cooled’ – a specific taboo applied to menstrual women; like the girl, he had to stay silent out in the veld until someone noticed him (Lewis-Williams 1981: 58). Once in camp, he was isolated and had to lie on a bed of scratchy grass in discomfort (1981: 59). He obeyed all the same ritual injunctions in this period concerning food, keeping away from cooking fire, out of the sun, and not touching the earth. Besides further similarities of ritual performance, the same word was used to connote ‘creating’ the new hunter as the new maiden, in connection with ritualized bloodshed. The scarifications were said to ‘create’ the hunter, as the Eland dance around the menstrual hut ‘created’ the new maiden (Lewis-Williams 1981: 62). While this is not recorded for the Ju/’hoansi, the extinct Bushmen of the Cape Province, the /Xam, explicitly likened the first-kill hunter to a menarcheal girl (Lloyd n.d. VI: 4386).

Esoteric – identity with the Eland, through design on the face, movements and smearing with eland fat. This renders the boy symbolically androgynous (Lewis-Williams 1981: 72).

The male group initiation practice known as *choma* probably came originally from the Bantu Tswana (see England 1995: 232-40 for discussion of the history), reaching the Ju/’hoansi from the Nharo within living memory (1995: 233). The practice was highly secretive, and recruitment voluntary rather than compulsory, whereas First-Kill would normally be performed for all hunters (1995: 134-5). In one group, the !Xõ, the First-Kill ceremony appears to have been incorporated into the bush-camp format (Heinz 1966). Guenther discusses non-Bushman elements of these rites, especially the appearance of circumcision in places, distortion of kinship classifications, and the very fact of gathering a group of boys together (1999: 170-1); to this could be added the bull-roarer (England 1995: 239). However, the Bushmen have made the rites characteristically their own with emphasis on hunting practice, use of scarifications which help the hunter ‘see’, and assimilation of the supernatural being encountered at the climax of the ceremonies to typical Bushman ‘trickster’ or lesser gods. Named as //Gã\_wa or Gausi, given a voice by the bull-roarer, this creature is profoundly ambiguous, identified sometimes as an animal or bird, manifest sometimes as male or female, either plural or singular (e.g. historic

accounts of Bleek 1928a,b; and see Guenther 1999: 169, England 1995: 246). The name Hishe, used in some places, can be related to Haitisi, the trickster deity of the Nama (see below). According to Fourie's description of the ceremony of the *!Au//eisi*, neighbours of the Ju/'hoansi in the Ghanzi area, belonging to the same ethnolinguistic group, boys were smoked by the 'devil's fire' and made to drink 'devil's urine' (1928: 92, cited by Schapera 1930: 124-5). The next day their skin was blackened from head to foot. Finally, they were introduced to *//Gã\_wa*, and had to partake of the 'devil's honey'. Here, we can relate cosmetics usage to a distinctively 'wrong' or 'androgynous' entity, whose powers or medicine the candidates were meant to imbibe.

#### 6.4.3.2 Nama (*Central Khoisan*)

Female initiation:-

Esoteric - suggested by two lines of evidence. Hoernlé notes that when the girl is purified at the end of seclusion, being cleansed with cow dung and *!naop* in front of the *!nau* fire, she is being cleaned of *\_xa/urip*, translated literally as 'boy dirt' (1985: 64). This may only mean that the girl is leaving behind dirt of childhood. However, in the context of purification after first menstruation, it implies that menstruation has a symbolic male aspect.

Evidence from the most dramatic episode of the girl's ritual, together with certain songs documented by Hahn (1881), suggests identity between the powers of the menstrual girl and those of Tsûi-//goab, the Supreme Being of the Khoekhoe. The link is established through the symbolism of cosmetics. Hoernlé noted the belief that on the day after a girl had emerged 'it was sure to rain and there would be plenty in the land' (1985: 66). Hahn described how initiate girls on emergence 'must run about in the first thunderstorm, but they must be quite naked so that the rain which pours down washes the whole body' (1881: 87n.26). This was supposed to ensure their fertility. He himself saw three times 'this running in the thunder-rain, when the roar of the thunder was deafening and the whole sky appeared to be one continual flash of lightning' (ibid.). Certain Bushmen groups – the /Xam, G/wi and !Xu – likewise enacted beliefs linking the menarcheal girl's potency with violent 'male'

rain and lightning (Power and Watts 1997: 545-6 for refs.). Ts\_i-//goab, identifiable with both thunder and lightning, was celebrated in a series of magnificent ceremonial rain hymns, in one of which he is addressed as ‘Copper-bodied Man’ or ‘Man with a Brass-coloured Backbone, thou who painteth thyself with red ochre’ (Hahn 1881: 124, 140). In the *dance song of the Lightning*, the lightning, who has killed a man, is described precisely in terms of a girl in seclusion: she lies ‘in a hole’; she has painted her body red; she ‘does not drop the menses’ – the familiar injunction that the initiate should not touch the earth (Hahn 1881: 60). Here, she is ‘the wife of the Copper-bodied Man’, but they are clearly identifiable powers, equally painted with ochre. Hahn interpreted these hymns through the ritual practice of women painting themselves, either with ochre or red tannic juices, to make offerings at the sacred cairns of Haitsi-aibib, Ts\_i-//goab’s earthly manifestation (1881: 140).

Also noteworthy are the feasting practices around the secluded girl. While she was secluded, only female animals were killed, and these went to *kharú ≠<sub>p</sub>*, the great feast for the women in which initiated women took part, but ‘no man or boy is allowed to have any share in it at all’ (Hoernlé 1985: 64). The only exceptions were that no menstruating woman can eat the meat, in case the ‘girl’s period never stop’, and no pregnant woman, in case her period never return (ibid.). Youths were only allowed to join the feast after the girl’s emergence if she had treated their genitals (see Appendix Ab). These restrictions reflected the privileges of initiated men, who always ate apart from women and the uninitiated for fear of contamination, usually referring to menstruation (Schapera 1930: 278, citing Kolb 1731). At her final feast, the girl had the fat of the heifer killed for her hung over her head, to make her fruitful (Hoernlé 1985: 66); this was mirrored in the boy’s rite when he was draped with fat of the kill (see Appendix Ab). Arguably, there may be symbolic identity of girl and heifer, hence ‘wrong species’.

Male initiation:-

Esoteric – arguably, but it is not scored. Schapera distinguishes Khoekhoe and Bushmen boys’ rites by remarking that there is nothing at all to indicate that religious mysteries of supernatural beings were revealed to boys in Khoekhoe initiation (1930: 284). Given the sparse historic accounts, this is true, but elements of mythology associated with Ts\_i-//goab and Haitsi-aibib – both androgynous beings – intimate references to

male initiation. While the Nama do not present any definite 'wrong sex' signal in boy's initiation, the fullest account of Khoekhoe boy's initiation, that of Engelbrecht on the Korana, recorded overt transvestism (1936: 157).

#### 6.4.3.3 Mbuti

Female initiation:-

Overt – most obviously, this lies in the predatory behaviour of the girls who periodically march, painted, out of the *elima* girls' seclusion house to chase the boys in the forest, armed with long, thin *fito* whips (Turnbull 1960a: 183, 1984: 171). Aggressive targetting of desired boyfriends increased towards the end of the festivities which climaxed in a battle 'waged, in effect, between the Alima and the Lusumba (=molimo)' (1957: 208). Youths who had been hit on by the girls were expected to fight their way to a date in the *elima* house, past a vigilant guard of women grouped around it, and a defence force of 'between fifteen and twenty girls armed with long whips' (1960a: 188). If they objected to any candidate, the women 'were more than able to stop him...I have known them to throw a brave but unwanted suitor into the river after beating him soundly' (ibid.). One who did succeed, the reluctant Pumba, a skilled hunter, expressed his disdain for the 'reverse' dynamic by saying that if he wanted a girl he wanted to do the chasing (ibid.). In the old days, the old men claimed, youths would use real arrows, not merely banana skins, as ammunition, and several people would be wounded (1960a: 187). Turnbull also records public performance of 'a number of swearing and sex songs, and erotic dances' by *elima* girls (1960a: 185).

A remarkable feature of the 1958 *elima* at Epulu was the girls' specific mimicry of the village boys' *nkumbi* initiation school (1960a: 186). At first, girls started making skirts and painting with white *nkumbi* designs around mouth and eyes, drawing strong objection from the 'mother' of the *elima*, and older Mbuti men. Sulkily, the girls abandoned their skirts for a couple of days, but then, started painting up again. Turnbull records:

‘by the time the Bantu interfered, [girls] were not only wearing the *nkumbi* skirts, they were also painted up like the boy initiates, singing songs that were similar if not identical, wearing leaf masks in their mouths when they went out of the house and the bulky *abeka* vines over each shoulder – all in exactly the same style as that of the boys. This brought loud objections not only from the Bira and Ndaka chiefs, but also and more particularly from the *nkumbi* “doctors”.’ (ibid.)

The girls continued in defiance until ‘finally the *nkumbi* leaders threatened to curse them all’ (ibid.). Sufficiently wary, they grudgingly reverted to ‘more orthodox behavior and dress’ (1960a: 187). In their final ablutions before their coming out, the girls carried their skirts, and strung them up in the trees over the pool – an *nkumbi* custom – but later took them down, being scared of the doctors (1960a: 189). The *fito* whips so important to the girls also feature in *nkumbi*, where they are used to administer discipline to the boys, and sometimes by the boys themselves (1957: 200-1).

Besides apparently singing *nkumbi* songs, both women and girls would also sing *molimo* songs, even though these were supposed to be men’s (1960b: 324, 1984: 137), or mimic the sounds of the *molimo* trumpets (1960a: 187).

Another instance of institutional mimicry of the opposite sex occurred in *ekokomea* (see below).

Male initiation:-

This depends on what constitutes 'initiation' for the Mbuti. Boys participated in the *nkumbi* circumcision rite and bush camp of the Black villagers, comprising a harsh régime of ordeals for children between nine and twelve (Turnbull 1957: 211-6). But passage through *nkumbi* had no effect on status in Mbuti life (Turnbull 1984: 204), or participation in Mbuti rites of *elima* or *molimo* (1960a: 184). Boys could become 'men' in the eyes of Bantu villagers while remaining boys among Mbuti themselves. Mbuti involvement was purely a matter of maintaining respect before the villagers (1984: 204). They shared nothing of the villagers' beliefs in the supernatural aspects of the ceremonies (1957: 208). Nevertheless, from the perspective of costly signalling, they performed it. The July 1954 ceremony reported by Turnbull was unusual in having only Mbuti candidates (1957: 192), the Mbuti fathers being frequently in dispute with the villagers over the severity of the régime (1957: 195).

Among the Mbuti themselves, a youth would become a member of *molimo* once he was proven as a hunter, having killed his first antelope, usually by the age of fourteen (1957: 206-7). Any hunter was part of *molimo* and had to attend the meetings. *Molimo* presents the only Mbuti equivalent to *elima*. Both are solidary associations for adults of each sex, with their formal body of songs, called out on occasions of social or life crisis (ibid.). Hence, they might be called out at the same time, performances overlapping, in rivalry, or one leading into the other.

In *nkumbi*, there are a number of potentially androgynous elements – the *ngosa* bird-spirit mask, and its voice, the bull-roarer, as well as the *ndolo* skirts which are left as flags in the trees to rot, marking the boys' camp site as taboo (1957: 206). But nothing is definitively established, and they had no such significance in Mbuti eyes.

In the case of *molimo*, we can score overt and esoteric signals.

Overt – two aspects. The dance *ekokomea*, only performed during celebration of a *molimo* and headed by young hunters, involved hilarious imitation by each sex of the other (1960b: 314-5). Women adjusted their bark cloths to look like those worn by men, stuffing them with objects to represent male genitalia; men

pretended to wash their privates in the manner of women (1960b: 315). The dance becomes uncontrollable with everybody falling about laughing.

*Molimo* itself was structured as a virtual 'ritual of rebellion', climaxing with the women staging a takeover of the 'place of the *molimo*'. Painted with black *kangay*, singing the sacred *molimo* songs, led by an old woman, women and girls danced around the *molimo* fire (1960b: 327-9, 1984: 136-7. In a dramatic ritualized contest with the men, the old woman strove to extinguish the fire, a performance that took place 'once or twice in every great *molimo*' (1960b: 338). She 'tied up' the men, looping twine for hunting nets round the neck of each, so they were tied together, to which they submitted, falling silent (1984: 141). Only once she was given presents could the *molimo* and the 'hunt' be unbound (ibid.). Turnbull viewed this as enactment of the myth of women's former possession of *molimo* (1960b: 338, 1984: 140).

Esoteric – this hinges on the androgyny of the *molimo* trumpets which operate as a 'sexed' pair, one larger, one smaller (1960b: 316), the first brought out by the elders for the night-time singing, growling powerfully like a leopard in the dark forest, the second wielded by the youths, trumpeting and rampaging like an elephant around the morning camp (1960b: 331-2). Zeusse summarises the *molimo* trumpets' contradictory oppositions: both 'fiery' and 'wet'; phallic, yet its mouth filled with coal, with which dancers mime intercourse; hidden when not in use in dense groves of trees, suspended between heaven and earth, a monstrous and ambiguous 'animal' (1979: 50-1). To this can be added that women should never 'see' the animal, yet once, in myth, they possessed it. It is justifiable to ascribe a dual gender to the trumpet, which men of the *molimo* now owned.



#### 6.4.3.4 Venda (Central Bantu)

Female initiation:- see Chapter 8 for more detail on performance.

Esoteric – a number of signals, some associating with *domba*, some with the imported *sungwi* school. During *vhusha* (first menstruation rite) and *tshikanda* (preliminary to *domba*), the older women in charge of initiates were addressed as *\_ematei*, that is a male appellation, *\_e-* connoting ‘master of’, while the man in charge of *domba* school had the female form *Nyamungozwa* (*Nya-*, ‘mistress of’) (Blacking 1969a: 10n.12, 1985: 74). Van Warmelo records *\_ematei* once (1932: 59), and has a different name, *Nyalumati*, still a *female* prefix, for the so-called ‘master’ (1932: 62). The same name, *Nyalumati*, was used for the novices, girl and boy, who led the dances (ibid.), suggesting that those boys who joined *domba* had a quasi-female leader.

During *domba* girls played the drums, including the two tall alto drums called *mirumba*, clasped between their thighs (see Stayt 1931, Plate XXIX). Van Warmelo collected the *milayo* – sayings or riddles characteristic of an initiation school – for both *domba* and *sungwi*, which are formally very similar (compare 1932: 73-4, *domba*, and 91, *sungwi*, cf. Blacking 1969b: 81). In the *sungwi* collection, *mirumba* were called ‘the lion’s penis’ (1932: 91). These drums figured importantly in the boys’ rites, below.

Other motifs and actions in *domba* which may signify androgynous reversals include the rainbow and bat (Blacking 1969b: 86, 1969d: 229), and the ‘grasshopper’ sequence recorded by Stayt (1931: 119), but these are arguable, as is the symbolism around the python, created during the great *domba* dance.

*Sungwi*, the girls’ circumcision school, supposedly brought from Sotholand, involved a relatively mild form of genital cutting, with marks also made on the thighs (Van Warmelo 1932: 99). Central to *sungwi* was the peculiar figure of *Nonyana* (1932: 79). Each girl candidate would be brought into the hut to touch *Nonyana*, as he sat on a wooden frame (1932: 82). Speaking through a reed, he responded ‘I could devour you’, terrifying the candidate (Stayt 1931: 139, Van Warmelo 1932: 82-3). *Nonyana* wore a fringed costume of bark and fibre that covered the face completely; walked with a dragging gait; and had a tonsure, apparently in imitation of girls (1932: 83-4). Such a tonsure also marked certain legendary ancestral snakes (1932: 191). *Nonyana*

emerged with clothes soaking wet, and extinguished all fires (1932: 84-5). At the time of circumcision – new moon – *Nonyana* led the procession to the river, entered a deep pool, and sat there upstream while the girls washed prior to the operation (1932: 98). Androgynous, wet, lunar, hungry and anti-fire, *Nonyana* conforms precisely to the syntax specified by Knight et al. (1995: 91). In Laydevant's account of the Sotho rite, the office of the 'great snake' is performed by an old woman, hideously masked (1978: 49-50).

Male initiation:-

Overt – boys at the end of *vhutuka*, just as girls at the end of *vhusha*, were forced by beating to sit soaking up to their necks and shivering in a cold pool (Van Warmelo 1932: 104, 106-7). This in itself would not be sufficient to describe the boys' actions as female, but on return that morning from the river, the boys took *mirumba* drums between their knees, something which, according to Van Warmelo 'only girls do usually' (1932: 107). Girls responded by coming out of their huts and drumming, these being the drums called, in *sungwi*, 'the lion's penis'.

Esoteric – seen in *murundu*, the imported circumcision school. Once the boys' were circumcised, their mothers and sisters had to cook for them a special thick porridge with a lump on top called a 'clitoris' (Van Warmelo 1932: 128). When these women brought the food out to the veld near the boys' camp, they called out 'We are burning', to which the boys responded 'Burn, Madam Clitoris', following this up with obscene songs insulting to their own mothers and sisters, according to Van Warmelo (ibid.). Meanwhile their guardians fetch the porridge called *tshivhanelo*, clitoris. The boys had to eat every scrap of this to the point of being sick (1932: 129). Here, we see collapse of normal classifications and avoidance relations, in connection with circumcision and a symbolic female penis.

#### 6.4.3.5 Ila (Central Bantu)

Male initiation:-

Overt – The boys' initiation, *kushinga*, consisted of a few days of ordeals (Smith and Dale 1920 II:28-34). On the first evening, they were subjected to *Kukoma*, or discipline, a game of 'Simon says' when the men called out for the boys to do something, and they had to perform it. This included various dances: "Dance as your mothers dance...Dance as your fathers dance...Dance the *mwandu* as your mothers dance...." and so on. Then other orders. "Grind corn as your mothers grind," and the boys have to flop down on their knees and go through the action of grinding corn between two stones.' (1920 II: 29). *Mwandu* may be associated with the female puberty rite (1920 II: 22, 24). Boys called their initiator *mulumi* or husband, and subsequently had sexual rights in this man's wife (1920 II: 31, and n.2). At the end of the ceremony, boys were dressed in a similar way to girl initiates, decorated with beads, anklets and *impande* shells (1920 II: 36).

Women's 'phallic' and obscene songs were associated with the New Year's Festival (1920 II: 191), while the main androgynous symbolism of Ila religion linked village chiefs to Itoshi water monsters (1920 II: 114).

#### 6.4.3.6 Bemba (Central Bantu)

##### Female initiation:-

Overt – Red camwood (*nkula*) was rubbed on warriors, and ‘is still daubed on lion-killers’ (Richards 1956: 66). The initiates, returning in triumph at the end of their ceremony with a log as a ‘dead lion’, were so treated along with their whole company (1956: 96, and see photo opposite p.97). Also stained red with *nkula* were the ‘mock bridegrooms’, sisters of the bridegrooms who engaged in transvestite clowning, swaggering around and pretending to speak in bass voices (1956: 73-4). As Richards describes it: ‘They carried male symbols – the bow and arrow, the red cam wood powder of the successful warrior and lion-killer, and the salt, which the husband had to fetch for the household in the old days’ (1956: 74). The mistress of ceremonies, *nacimbusa*, adopted accoutrements of warriors or lion-killers such as an axe or plumed helmet (1956: 96, 101). The girls, too, had to perform ‘male’ tasks of ritual firelighting (Richards 1956: 77), while the entire company built, decorated and occupied a ‘man’s shelter’ (*nsaka* – a place where soldiers would gather in the evening), just after the ‘whitening magic’ ceremony (Richards 1956: 90-1).

Esoteric – Several obscure motifs in the rituals focus on reversal, such as the girls being made to climb backwards as ‘tortoises’ up a tree (Richards 1956: 70). The upside-down or counter-reality logic of these mimes was finally brought to an end by the coming of the bridegrooms, who sang ‘I have tracked my game; now I have speared my meat’, and shot arrows into marks on the wall over their brides’ heads (1956: 106-7). Such ritual treatment of the female initiate as a hunted game animal is a feature of several *chisungu*-type ceremonies in matrilineal Central Africa, notably the Makonde ritual gazelle hunt (Richards 1956: 173, 182, 185, citing Harries 1944).

#### 6.4.3.7 Ndembu (Central Bantu)

##### Female initiation:-

Overt – signalling by both the girl herself and women around her, and also possibly by men. During the women's first dance once the girl has been laid under the *mudyi* tree, women would wear male apparel, for instance men's hats, or mime male actions, pretending to limp as old men (Turner 1981: 217), engaging in standard lewd and obscene songs, mocking marriage. This was 'according to custom', whereas the transvestite men whom Turner also saw on these occasions were said to be merely idiosyncratic, which he clearly doubted (ibid.). The sex songs and exhortations to adultery were so effective that *nkang'a* was usually marked by fighting between husbands and women's lovers (1981: 231).

During her seclusion, the girl learned several dances for her coming out, among them the 'bee dance' and hunters' dances (1981: 246-7). In *mpuka*, the bee dance, the novice mimicked the 'masculine and hazardous task of cutting honey from a wild bees' nest on a tree' (1981: 246). Pretending to be stung, she handed around the honey. For novices 'unlike other girls and women, do not fear bees' (ibid.). At the actual coming-out performance, the girl 'is given the eland-tail switch of authority belonging to the village headman' (1981: 258, and see Plate 12b, opp.p.227). Amid the sequence of dances that followed, 'she is given a gun and does the *Wuyang'a* hunters' dance' (V. Turner 1981: 259; E. Turner 1987: 79).

Esoteric – the Turners heard the instructress singing the circumcision song of *mukanda*, the boys' rite, just as she was preparing the novice's hair for coming out (V. Turner 1981: 252). In addition, one of the drums that welcomed the novice when she came out should have been used in performance of *mukanda* (1981: 257).

There is possible androgynous connotation in the novice being turned from her left to her right side during the day when she lies covered under the *mudyi* tree (1981: 221-2), but the major bisexual symbolism rests in the arrow, given by the bridegroom as a symbol of bridewealth, and the important ritual object called *kasenzi*, a miniature bow and white beads (V. Turner 1981: 214, 221, 261; E. Turner 1987: 76-7). These were subsequently hidden in the girl's hair, packed under red clay. Victor Turner discusses the Ndembu fertility

symbolism of the bow and arrow (1981: 202), but by any reading, the girl has a bow and arrow, linked by the beads to her 'children'. This compares to Bushman practice of initiate girls shooting arrows in seclusion, and to the Ndembu ritual of *nkula*, where a woman seeking fertility medicine dressed as a hunter with a bow and arrow (1967: 42, 1981: 70).

#### Male initiation:-

Overt – During *mukanda*, the boys' circumcision rite, the Lodge Instructor's title was 'husband of the novices', and each boy was called *mwadi*, which may translate as senior wife (Turner 1967: 222-3). There were two distinct episodes of mock, homosexual or 'wrong' sex. The first involved the boys and a transvestite character called *Nyakayowa*, right at the end of seclusion, before the boys were carried back to the village (1967: 253-4). According to Muchona, *Nyakayowa* was a special word used for 'woman' in the lodge, when the ordinary word was taboo (1967: 254). An elder played the part, covered in a blanket with a hole, through which he put his penis. Sitting with legs apart – as a female – he mimed sex with each of the initiates in turn (ibid.). Then, each boy was given a cucumber or fruit, told to make a hole in it, and feign sex with that. These acts are meant to remove the 'sickness, pain... and all bad things' after the healing period (ibid.). The Senior Circumciser gave the boys small scars, rubbing them with *nfunda*, which they had to lick off his knife "to give them their bodies back again". This marked the point where they were cured of circumcision wounds, and therefore sexually capable. The implication is that while the boys' wounds were healing they were effectively 'female'; by having their first 'woman', they became fully initiated males (despite being eight-year-olds).

Shortly after this, the lodge was burnt, and *nfunda* medicine, which comprised these burnt remains, was prepared (1967: 195-6, 256). The senior circumcisers replenished their stocks, and treated two men who wished 'to catch *nfunda*', that is become full circumcisers in the near future. They had to enter the burnt lodge naked, sit down and perform a mock copulation 'the legs of one over the other's thighs' (1967: 196). A senior circumciser wrapped chicken entrails around their genitals and legs. Hopping around, thus tied together, they were beaten before receiving small scars (1967: 197). Each circumciser was cicatrized, the accumulation of scars acting as a tally for the *mukanda* ceremonies each had attended. So, to get *nfunda* medicine, without which no *mukanda* can be held, it is necessary to perform 'wrong' sex.

#### 6.4.3.8 Yombe (Central Bantu)

Male (also female) initiation:-

Esoteric – this refers to the *kimba* sect rather than puberty ceremonial. The elaborate *kimba* ceremonial arose in the colonial era, specifically in areas of early Roman Catholic missions (Jacobson-Widding 1979: 197n.1); nevertheless, it centred on the *nkisi* or fetish of a double-sexed statuette called Mbumba Luangu or Thafu Maloango, which was incarnation of the indigenous Rainbow-Snake Mbumba (1979: 60, 339-40). A red *nkisi*, Mbumba influenced dangerous and unpredictable activities such as hunting (1979: 238-9), or, in modern contexts, lorry-driving (1979: 59). Besides the dual-sex rainbow, or snake living in the water, the moon was also called a ‘snake’ in one of the initiate’s songs of the *kimba* sect (1979: 340). The colour red also defines the qualities of the moon – unpredictability, deceitfulness and magical power (1979: 329), particularly useful qualities for *kimba* initiates in their trade and legal dealings (1979: 195).

#### 6.4.3.9 Kikuyu (Central Bantu)

Female and male initiation:-

Overt – these rites are treated together since *irua* was celebrated for age-sets of both sexes and, while there was some distinction of dress, treatment of all candidates was essentially similar. Historically, girls would have been somewhat younger than boys (Leakey 1977: 588; Routledge 1910: 155), it being most important that they should not have menstruated before the *irua* operation (a sunna-type clitoridectomy) was performed. Within one age-set, girls and boys treated each other as brothers and sisters, and could not marry (Leakey 1977: 630); nevertheless, during the period of the initiation lodge, boys might as of right stay in the girls’ bedroom, and they would exchange symbolic love tokens, to signal their new status of sexual maturity (Leakey 1977: 627-8,

630). The kinship bond therefore carries a sexual tinge. Accounts of the elaborate ceremonies are variable, but there are examples of girls using male accoutrements, boys using female ornament, and especially, mothers of initiates parading themselves as male.

Kenyatta gives detail of the rattles used in the ritual dances, in particular *kegamba*, a large rattle or thigh bell worn strapped to the knee ‘only on special occasions such as war dances, initiation ceremonies, *kebata* and *nguro* dances’ (i.e. warrior’s dances’) (1938: 96, and see Plate CXV in Routledge 1910: opp. p.181). According to Kenya, *kegamba* was used by men, ‘the only time when women use it is during initiation ceremonies’ (1938: 97). In his account of the day of the great dance, *matuumo*, he describes the girl initiate in the procession leading to the *irua* homestead. She is naked, but for the beads lent her by women relatives and friends; she is also given a *kegamba* bell, strapped to her right leg. In the middle of the procession, she provides the rhythm for the dances (1938: 138). Here, she is as if a warrior.

Two accounts indicate boys’ use of female ornament during the period of seclusion at the *irua* homestead after the operation. Leakey gives a close comparison of the differences in ritual observance between the two classes or so-called ‘guilds’ of the age-set, the Kikuyu and the *\_kabi*, that is the Kikuyu name for their historic enemy, the Maasai (1977: 587-706). In the Kikuyu guild case, on the second day of seclusion, candidates had their ears pierced, and both boys and girls received iron rings called *ngunju* (Leakey 1977: 632), later to be replaced by wooden ear plugs (1977: 638). In the *\_kabi* case, both boys and girls initially received wrist rings from their sponsors, but these were replaced, for boys, with ‘women’s coiled brass ear ornaments’, for girls, with leather (1977: 681). Leakey strenuously denies that the name *\_kabi* indicates adoption of Maasai practice, since the rituals were distinctively Kikuyu (1977: 665). However, it is possible that the Kikuyu were making deliberate cultural reference to Maasai custom in the case of the earrings (see below). Routledge’s brief account of the rituals during seclusion mentions special treatment of bead ornaments for the boys when they were ritually shaved on the fourth day of seclusion (1910: 165). The beads were given to the boy by a small girl; they were put on him by the older woman, a relative, who shaved him. ‘The beads are slept in one night by the mother of the homestead and given back’ writes Routledge (ibid.). This indicates that the beads are effectively ornaments of the woman who stands in as the initiates’ mother.



The main account of the behaviour of the real mothers of the initiate comes from Routledge (1910: 158-9, and see Pl. CIII, opp.p.141). In the great dance (called by Routledge Mam-bú-ra), the mothers had a place of honour with special festival attire. They adopted a squatting posture, while blowing on a bamboo tube as a horn. Occasionally rushing about the dance ground, each woman brandished her husband's club 'which she is privileged to have for the day on this one occasion only' (Routledge 1910: 140h). Orde-Brown gives a similar account of women's behaviour at circumcision of the closely related Mwimbi, where they carry 'little dancing shields' and 'short wooden clubs' (1913: 137).

The other possible symbolic reversal in Kikuyu rites took place at *gothiga*, and was the final act needed to make the initiate marriageable or sexually available. The boys were meant to perform a 'ceremonial rape' of a married woman who was a stranger, preferably Kamba, rather than Kikuyu (Lambert 1956: 53), this act being euphemistically referred to as 'smearing with salt earth' (Leakey 1977: 691). Girls were supposed to find a sex partner who would cleanse them 'of the soot of the knife' (Lambert 1956: 54). The first sex act for initiates of both sexes was adulterous and non-marital. In fact, *gothiga* could mean 'adultery' (1956: 34). Red ochre was used at this point (see Appendix Aj).

#### 6.4.3.10 Chagga (Central Bantu)

##### Female initiation:-

Overt – at the final parade in the market following seclusion after her circumcision operation (involving clitoridectomy and excision), the girl, covered in ochre. flowers and ornaments, wore 'on her head the covering called *Kale*, formerly worn by warriors' (Dundas 1924: 214). Dundas also describes the girl dancing on the day of the operation wearing the bells used by Kamba warriors (1924: 230n.1).

Esoteric – *shiga*, the second phase of initiation following circumcision, involves several acts referring to the esoteric 'myth' of male supremacy. *Shiga* and its male counterpart *ngosi* can be viewed as competing claims

between the sexes to androgynous powers of reproduction. At the beginning of *shiga*, this was directly connected to cosmetic marking. The myth was that initiated men never defecate (Dundas 1924: 220n.1; Moore 1976; Raum 1940: 318-9); *ngoso* referred to a mythical plug that stopped the anus (Raum 1940: 318); the secret of the men's camp was that this plug was a fraud (Moore and Puritt 1977: 59). The *shiga* teacher was a woman who had found out men's secret, by seeing a man defecate, and stealing some of the faeces (Moore and Puritt 1977: 61-2; Raum 1940: 350). Mixed with ochre and water, she used this to daub the heads of the *shiga* novices. Faeces and menstrual blood appear analogous: if a man allowed any woman to steal his faeces, she would have power to make him sterile; similarly, a woman could be made sterile if anyone took her menstrual blood (Moore and Puritt 1977: 59). Where *ngosi* taught the initiate never to let anyone see him defecate, *shiga* taught girls never to show menstrual blood (Moore and Puritt 1977: 62; Raum 1940: 355). The secret of *shiga* is revealed after the first of a series of mock 'hunts', when a frog is captured (Dundas 1924: 225) but called a leopard (Raum 1940: 353). On being shown the *shiga*, girls learned that women formerly had what men now have, "but those possessed of horns came, and by force robbed us of our manhood" (Dundas 1924: 225; Raum 1940: 353). Women still claim the original *ngoso* plug – it is pregnancy, which stops menstruation (Moore and Puritt 1977: 62; Raum 1940: 353n.1). Raum also records the rebellious words of the songs taught to the girls (1940: 352).

The above implies that men, in their claim to the 'plug' are claiming procreative powers of pregnancy. In the 'hunts' which take place during both boys' and girls' rites, hunting and capture of prey is equated with pregnancy and giving birth (Moore and Puritt 1977: 62). A foetus was likened 'to a trapped or arrow-pierced animal struggling to free itself' (Moore 1976: 360, citing Gutmann 1932). In her first public appearance after a birth, at the market, a woman was dressed in an obsolete type of skin garment, and welcomed with songs 'such as were sung to the warriors returning from battle' (Dundas 1924: 200).

Male initiation:-

Overt – the obvious 'wrong sex' signals occurred after the boys' circumcision operation. Returning home 'the boys are given their mother's dress, a sheep-skin, to wear and are addressed as *mpora* (novice), a term generally used of young women' (Raum 1940: 309).

Esoteric – this hinges on the secret of *ngosi*, as discussed above. The ordeals of *ngosi* allow an initiate to get children (Dundas 1924: 215). By claiming to be stoppered up with the *ngoso* plug, men are claiming the procreative power of pregnancy (Moore and Puritt 1977: 48). On the last day of the *ngosi* rites, the initiate had tied round his waist a string belt which gave him ‘permission to extend the line. It was pointed out that a similar string would be tied around his wife when she was with child’ (Raum 1940: 322). In the weeks after *ngosi*, initiates roamed in groups with licence to rape (cf. the Kikuyu *gothiga*).

In the first phase of initiation, circumcision, the obligation of male solidarity was expressed through an idiom of shared bloodshed, since ‘they had been permanently joined when their blood mingled on the ground’ (Raum 1940: 309). During *ngosi*, certain small animals were hunted (and named as ‘leopard’ or ‘elephant’, Dundas 1924: 218-9); these were smeared with faeces, which the novices had to lick while uttering the oath of secrecy, starting ‘I swear by the blood pact of the men...’ (Raum 1940: 320). In both stages of initiation we see forms of male menstruation; once he has endured these, the initiate becomes stoppered up, or ‘closed’ – that is, no longer menstruates, but full of procreative power (cf. Moore 1976: 358).

#### 6.4.3.11 Fang (North West Bantu)

The ritual complex of *so* and its female counterpart *mevungu* was prevalent among several southern Cameroon groups including the Fang, Bulu, and Ewondo, classified by Ruhlen (1987: 312) as Ewondo within Northwest Bantu Zone A.

Female initiation:-

Overt – candidates for *mevungu* – the name may refer to female pubes (Alexandre et Binet 1958: 88) – were married women, co-wives from outside the village patrilineage (Laburthe-Tolra 1985b: 233; Bochet de Thé 1985: 248). The ritual was run by women, but men might call for it at times when the village was ‘hard’ – no animals were caught; plantations failed; wives were sterile (Laburthe-Tolra 1985b: 234). Above all, lack of

game drove men to ask women to restore the fecundity of the bush through celebration of their own fecundity (ibid.). As far as women were concerned, *mevungu* helped them to resist the patrilineage, giving them protection against the tyranny of men (Bochet de Thé 1985: 248). After the whole village had danced, men and children would be chased out of the way; women would carry on dancing and singing the *mevungu* chant (Bochet de Thé 1985: 249). Led by a ‘mother of *mevungu*’, a ritual specialist who was menopausal but had proved her fertility (Laburthe-Tolra 1985b: 236), the secret ceremony had vociferous, rebellious anti-male overtones. This took the form of celebration of the great powers of the clitoris of the ‘mother’ (Laburthe-Tolra 1985b: 237-8, Bochet de Thé 1985: 250), which were to be transmitted to the candidates, a process clearly involving lesbian sex. Laburthe-Tolra cites various horrified accounts of clitorises being manipulated and stretched ‘until they were as big as a man’s member’, and records how Tessmann did not dare report the words of songs so grossly insulting to the male sex (1985b: 238).

Esoteric – the codeword used by women in praising the ‘mother’s’ clitoris, so as to fool any man overhearing the ceremony, was *nkón* (Laburthe-Tolra 1985b: 237), referring to a gong with a double tone, therefore possibly androgynous (cf. Stoll 1955: 156, 168). This was one of the instruments played by *so* initiates when they were at large to warn the profane to keep their distance (Laburthe-Tolra 1985a: 295). Although Laburthe-Tolra is sceptical about Stoll’s scheme of androgynous symbolism applied to *so*, he is forced to concede: ‘but we can be sure of one thing, *mevungu* requires self-sufficiency of fertility in a woman, just as *So* requires it in a man’ (1985a: 332, my translation). Within each cult, each sex laid claim to androgynous powers of procreation.

Another ambiguous aspect of *mevungu*, of which too little is known, concerns *evu*, the principle of sorcery, which is identifiable with the clitoris (Laburthe-Tolra 1985a: 74). It lurks inside a woman’s vagina, ready to sit on the penis of a man who has sex with her, and squeeze him. The medicine for a man thus afflicted includes padouk powder (*bâ*), symbolic blood, applied to the spot (Laburthe-Tolra 1985a: 74n.28). In *mevungu* the adepts are painted red with padouk, yet the *evu*-clitoris of the ‘femme-forte’ is celebrated as the source of fecund power (1985b: 239).

Male initiation:-

Overt – Boys underwent circumcision, which lifted the prohibition on sex (Alexandre et Binet 1958: 95) as a preliminary to initiation proper, *So* (Alexandre et Binet 1958: 97). This lengthy rite of passage conferred on the boy the right to eat certain meat restricted to initiated men, including the python (*mvom*) and the antelope, *so* (Laburthe-Tolra 1985a: 234). To ‘eat the python’ or ‘eat *so*’ was to be initiated (1985a: 163). Most noble food of all, the Gabon viper, could only be eaten by a *nnyamodo* (ibid.), a male sorcerer with androgynous power approaching the divine, designated by Laburthe-Tolra ‘l’homme-mère’ (1985a: 173). The *so* initiate entered the first stage of a hierarchy of androgyny. *So* divided society into three: the uninitiated, women and boys, who could not eat the meat; the initiated, *mkpangos*, who could; and in between the initiate, *mvón* (1985a: 234). Stoll relates *mvón* to ‘vulva’ (1955: 159), though this is disputed by Laburthe-Tolra (see below). Both Stoll and Laburthe-Tolra read *mkpangos* as ‘homme-femme’ (ibid.; Laburthe-Tolra 1985a: 321), the second half of the word relating to *ngon*, which carries all the meanings of ‘young girl’, ‘moon’ and ‘menstruation’ (Laburthe-Tolra 1985a: 38).

The most obvious way in which the boys are made female, however, is to be treated as widows. After the death of their husband, and in the face of the furious onslaught of his matrilineage, widows had to pass a month in seclusion, naked but for ash or white clay, subjected to various tests, including a particular dance when they pretended to be antelopes (Laburthe-Tolra 1985a: 201-2). A woman who did not perform these rites would lose her memory and become senile. Finally, a year later, the widows returned to normal life, after they had gone to give presents to the husband’s matrilineage, then washed and made themselves beautiful with *bâ* (1985a: 205). A week later, they asserted their right to go abroad, wearing a special costume, with baskets on their backs, into which people had to put presents as they went from house to house (1985a: 206). Among the Ewondo, this costume was used by *so* candidates, who were treated in certain respects as widows. They too passed a strict month of seclusion, during which they were subjected to ordeals, and painted white (1985a: 247-8, 295). They were made to eat the ‘fat of *So*’, in fact excrement (1985a: 253). Only after they received the tattoo (below) did life become easier (1985a: 256-7); they especially resembled the widows in going from house to house, carrying baskets for presents, something only women normally do (1985a: 258-9). When they returned to the

forest to hunt *so*, the initiates had to perform the same dance of the antelopes as the widows did, as one of their tests (1985a: 261). Besides this special dance, the initiates would perform other women's dances in the villages (1985a: 295).

Esoteric – relates chiefly to the androgynous symbolism of the *so* antelope owing to its red coat and white belly, a combination of 'male' and 'female' coloration (Stoll 1955: 159). Laburthe-Tolra links *mvón* to the tattoo representing the antelope's marking, rather than to the word for vulva (1985a: 234n.79, 256). Comprising a line down the spine, and a trident on the nape of the neck, this mark is read by Stoll as a combined phallus and vulva (1955: 159). Because the candidates for *mevungu* were also *mvón*, the meaning remains ambiguous. At the culmination of the rite, the initiate performed the 'death of *So*' in an underground chamber, 'dying' as the antelope in a trap (Laburthe-Tolra 1985a: 287) or the actual animal sacrificed (Stoll 1955: 161). On emerging the boy cried out for his father. After this, in some places, the tattoo on the spine was completed (Laburthe-Tolra 1985a: 289). While Laburthe-Tolra is cautious about Stoll's 'double sex' interpretation, he too understands the action as a claim by men, the fathers of the boys, to give birth (1985a: 320-1).

#### 6.4.3.12 Tiv (*Non Bantu Bantoid*)

Male initiation:-

Overt – Bohannan's informants gave him this account of 'dressing up for circumcision':

'In the old days when no one was circumcised until puberty, a recently circumcised youth would rub himself with camwood, and, dressed only in women's beads at the neck, waist and calves, go into the market to dance and display himself' (1954: 5).

#### 6.4.3.13 Kpelle (*Mande*)

*Poro* and *sande*, the brother and sister schools of initiation among the Kpelle, belong to a ritual complex widespread in several groups in Liberia, Guinea and Sierra Leone, with *bondo* equivalent to *sande* among the Mende and Temne. Supporting data are drawn from these related cultures.

Female initiation:-

Esoteric – Bellman compares the androgynous symbolism in both *poro* and *sande*, noting the Kpelle ideology that before a girl is initiated, she is partially male, her clitoris being a penis (1984: 135). Losing that, she became fully female. Mendelson also discusses this belief for the Mende, where ‘girls would consume the products of male circumcision’ and vice versa (1967: 29-30). This can be construed as girls eating the discarded ‘female’ parts of boys, while boys receive the ‘male’ parts of girls, but the signalling is androgynous on any reading. Among the Gola, close neighbours of the Kpelle, the Zogbé mask paraded by the *sande* leaders had a masculine personification (d’Azevedo 1994: 351, and see Lamp 1985: 30-2 on the Temne). But even this powerful manifestation feared ‘the big thing of Sande’ – the medicine bundle called *kínú* (d’Azevedo 1994: 349). Ingredients of *kínú* could include ‘prepuces, or an amalgam of male and female genital residue’ (1994: 350), as argued by Jedrej for the Mende (1976). Alternatively, or as well, it could be menstrual blood (d’Azevedo 1994: 360n.6). *Sande* mothers were considered ritually as ‘men’ (Bledsoe 1980: 66n.14). The chief *sande zo*, or medicine person, called Tipe by the Kpelle, uniquely belonged to both societies. As related by Bellman’s informant: ‘She join both man and woman. She can visit there’ (i.e. to the *poro* school) (Bellman 1984: 91).

Another aspect of androgyny concerns the gendering of the devil whose teeth scar the initiate (see below).

Among the Temne, where the society was called *bondo*, transvestism during girls’ coming out ceremonial, *elukne*, was overt. The whole village was taken over by carnival, as youths wore padded breasts and girls strutted with gourds stuffed in their shorts, the rites being timed according to the lunar cycle (Lamp 1988: 218-221).

Male initiation:-

Overt – when boys proceeded to the scarring ceremony, they carried swords dipped in chicken blood, with which to battle the ‘devil’, *ngamu*; at the same time, they wore head ties, presented to them by male relatives (Bellman 1984: 80). These were the head ties of women (1984: 111). Discussing the signalling associated with Kpelle initiate boys, Bellman saw that ‘symbols worn during entrance into the initiation process represented contradictory sexual categories’, while those at reentry played with contradictory symbols of ‘youth and age within the same sexual domain’ (1984: 135).

In another incident recorded by Bellman which caused some friction between *poro* and *sande*, some Zo women enacted a ritual with fish nets and buckets, their bodies covered in mud, lifting their *lappas*, or cloth wraps, ‘in mockingly lewd gestures’ (1984: 102).

Esoteric – apart from the consumption of female parts by boys, noted above, there is a question over the gender of the ‘devil’, *ngamu*, possibly incestuous and androgynous. A mask with regalia and attendants, *ngamu* would speak in a ‘special disguising falsetto’ (Gibbs 1965: 219). A female counterpart, his ‘sister’, governed *sande* ritual (Bledsoe 1980: 66) implying a relation of kinship between *sande* and *poro* leaders (1980: 73). In *poro* initiation, his female other half was a ‘wife’: *ngamu* was supposed to swallow the initiates, grind them down in his stomach and then put them into his wife’s womb (Bellman 1984: 116). At the completion of the initiation period, the mask came into town to announce that in the evening, his wife would deliver the boys: ‘That evening the pregnancy is theatrically enacted while nonmembers are behind closed doors’ (Bellman 1984: 81). In the ensuing dramatised dialogue between the mask and *poro* Zo, ‘the stomach of the *ngamu* becomes transformed into the womb of his wife’ (1984: 119) until it is described as ‘the *ngamu*’s pregnancy’ (1984: 122, 132-3). A singer accompanied *ngamu*, a man who sang the part of women, expressing their fear of the initiation period, signalling their alienation from the process of rebirth of the initiates by males (1984: 134).



#### 6.4.3.14 Dogon (North Central Niger-Congo)

##### Female initiation:-

Overt – the idea of the androgynous twin souls of each individual, the ‘wrong’ sex located in the clitoris of the girl, the prepuce of the boy, permeated Dogon cosmology (Griaule 1965: 22, 155-61). Candidates for initiation were effectively double-sexed, and even after their operation this state was symbolically represented by ornamentation. Women wore Nummo ornaments, recalling the appearance of the Nummo spirits (Griaule 1965: 80-1, Plate IIb opp.p.111), supposedly ‘sons’ of God, mythical pairs of male and female twins (1965: 18-9, 22, Griaule and Dieterlen 1954: 86).

At menstruation a woman revisited the androgynous state (see below), while images of the ‘male’ clitoris were sculpted in or outside menstrual huts (Calame-Griaule 1986: 211, 1965: 185). Plate 6.1 illustrates these figures.

Yasigui, the prototypical ancestress who suffered clitoridectomy and excision, was recalled at the reaping of fonio; the cutting of this plant with the scythe represented her excision (Calame-Griaule 1986: 161-2, 1965: 160-1). Fonio (*Digitaria exilis*) was so impure that priests were defiled by merely touching it (Griaule 1965: 149). Ogotemmêli related fonio directly to menses, the two Dogon words coming from one root (1965: 150). At the harvest of fonio, the sexes worked alongside each other in an atmosphere of great ribaldry (1965: 149). Women sang songs in the role of circumcised boys, complaining how their penises had been cut, while men responded with ‘they cut off my clitoris’, each sex walking with feet apart, mimicking the wounds of the other (Calame-Griaule 1986: 355, 1965: 304). Men hurled insults at female genitals, notably ‘the vulva that is red all over’ (1986: 356, 1965: 305), until the obscene taunts ended with men saying ‘Enough of cunts!’, women responding ‘Enough of cocks!’. Women had the last word, joking that their husbands would go without dinner that day (1986: 356, 1965: 305), implying that they were too busy with lovers. References to both menstruation and circumcision were associated with these rituals of rebellion and role reversal.



The other significant occasion of role reversal occurred at the *dáma*, funerary rites, of the Hogon, the earth priest who himself had female aspects. According to the Dogon: 'On that day...women are considered to be like men and men like women' (Calame-Griaule 1986: 350, 1965: 299). Women performed a parody of men's masked dances, with men as amused spectators.

Esoteric – when she menstruated and retired to the menstrual hut, a woman returned to that double-sexed condition prior to excision. In particular, she was possessed by a 'male animal' principle (Calame-Griaule 1986: 22, 24-6, 1965: 37, 40-1). For both sexes, these sexual *kikínu* were 'left over from what circumcision is meant to remove: femininity from a man and masculinity from a woman' (1986: 24, 1965: 40). This led to impotence and passivity in men, menstruation in women (1986: 28, 1965: 44). Calame-Griaule notes the anomaly of the 'speech of menstruating women' being aligned to a male principle, but resolves it as a 'masculine attitude of refusal to procreate' (1986: 28, 38, 1965: 44, 55).

Male initiation:-

Overt – circumcised boys and men who were dyeing the red fibres for masks were called 'men having their periods' (Calame-Griaule 1986: 159, 182, 1965: 158, 183-4); women were barred from any approach on such occasions. In circumcision songs, boys referred to menstruating women as their sisters, with whom they were identified (1986: 130, 1965: 127). A woman who came into contact with masks would menstruate unceasingly (1986: 349, 1965: 298). In story, the red dye of the fibres in masks and skirts came from the world's first menstrual flow after an incestuous act of mother and son (Griaule 1965: 21, 170). It was women who first had both masks and skirts. The woman who stole the fibre skirt reigned as a queen, spreading terror, until men took it from her, and forbade its use to women (Griaule 1965: 169-70, and see Beckwith and Fisher 1999 II: 289 for photo of masks and skirts of dancers imitating the original female owner of masks). Ogotemmêli comments:-

'When men wear the fibre skirts, it is as if they were dressing up as women, for this dress represents the female sexual parts; furthermore, when dressed like this, they represent, not women in general, but pregnant women' (Griaule 1965: 171).

This establishes the relation circumcised boys:menstruants as masked dancers:pregnant women (but wearing skirts stained by menstrual blood).

Esoteric – a boy had his ear pierced as preparation for the ordeal of circumcision, but did not receive the single earring until before his marriage, to guard against the ‘bad speech’ of his wife (Calame-Griaule 1986: 357-8, 1965: 307). This ring was made of ‘female’ metal – copper – and placed in the left, or ‘female’, ear (1986: 310, 1965: 268). The earlobe is named as ‘testicle’; Calame-Griaule goes further to associate the ear and the foreskin, ‘man’s most feminine and delicate part’ (1986: 310, 1965: 269n.3).

As descendants of the first mythical initiates, the category of ‘impure men’ was marked out by a female sexual animal in their totemic shrine. Such men could withstand the impurities of corpses, menstruants and the great mask, fitting them to perform duties of corpse-dressing and repairing the house of menstruating women (Calame-Griaule 1986: 30-1, 1965: 46-7, citing Dieterlen 1941).

#### 6.4.3.15 Azande (Adamawa-Ubangian)

Male initiation:-

Overt – boys were each conducted through circumcision by a man called *samba*, that is a midwife (Larken 1926: 29). In the camp, while healing the boy should not see relatives (ibid.). Finally, the boy would be collected by a female relative, who retained a special status in the boy’s life subsequently. Once home, he was decked in new clothes, with strings of *areke* beads round his neck and his waist – in the style of women – and red powder put in his hair (Larken 1926: 30).

Seligman and Seligman regarded male circumcision as a ‘recent introduction’ which had spread with the waning of chiefly power; they noted it took place at the first quarter of the moon (1932: 518), since the Zande would not start any undertaking when the moon waned (Baxter and Butt 1953: 43). Women refused

uncircumcised men (Larken 1926: 30).

#### 6.4.3.16 Maasai (Nilotic)

Female initiation:-

Overt – not so pronounced as for the boys, but I draw in particular on Hurskainen's (1980) account of Baraguyu female initiation to show evidence for role reversal with women identifying as male. A Maa-speaking group of Tanzania, the Baraguyu belonged historically to the Maasai pastoral confederacy, but were pushed out during conflicts between expansionary sectional alliances in the nineteenth century (Galaty 1993a). Regrouping on the southern margins, the Baraguyu retained the pastoral lifestyle, much classic Maasai cultural practice, and today claim Maasai identity, which may be grudgingly acknowledged by other Maasai (Galaty 1993b: 181-2).

Hurskainen notes the significant similarity of the ritual sequences around circumcision for both sexes (1980: 183). But the opening of the rite for a girl – the catching of the initiate – was staged as a fight between her age-mates, uncircumcised girls, and the women gathered at the kraal, with warriors intervening (1980: 184). Girls approached the kraal singing as usual when dancing with *moran*. The women came out to grab the initiate, whom the girls defended by beating women, including their own mothers, with long whips, hard and with enthusiasm (ibid.). Protecting their faces, women ran in to catch the girl; the fight did not last long, since warriors stopped it getting too rough (surprisingly enough since they were losing the girl as a legitimate sex partner). Nevertheless, women were left with swelling, bleeding wounds on their heads. While the girls wailed, women carried the girl to the initiation hut, singing the special initiation song *Ejo kira oltim* – the Cattle Robbers' song (1980: 185). In this song, also sung just before or after a boy's circumcision, women claimed to be the guardians of cattle (i.e. *moran*) where men failed to be (1980: 165). The story tells of cattle being robbed when only one old man was in the village; he took women to the place where the robbers were; the women had bags filled with dust and cow's tail fly whisks. They told the old man to stand and attack the enemy, while they raised dust to trick the robbers into thinking *moran* were coming, whereupon the enemy left

the cattle and fled. The song praises women's trickery: "'The enemy thought that they were men, but alas, they were women'" (ibid.). So, by deceptive sexual signals, women recaptured the animals. The story compares with other Maasai tales of women as the original warriors and owners of cattle (Llewelyn-Davies 1978: 215, 230).

While Maasai women would normally be submissive to the patriarchal authority and violence of their husbands, on two occasions they would organise formidable resistance in large gatherings: this occurred in cases of offence against the respect rules governing elders and their age-set 'daughters', or in cases of offence against women's fertility (Spencer 1988: 198-209; Llewelyn-Davies 1978). When mustered in this force, Maasai women would dance and sing comparing themselves with the diehards, most uncompromising of all the *moran* (Spencer 1988: 207). Unstoppable, like diehards, they scorn the opposite sex, warning them to keep away, demanding food and gifts from the villages they visit: 'no sensible man would attempt to stand in their path' (ibid.). Spencer notes that the Matapato Maasai word for diehards is identical with the Samburu term for the women's gathering (1988: 209n.2).

Male initiation:-

Overt – the transvestism of boys at and following initiation has been well observed historically (Hollis 1905: 298, and see Plate XIX; Huntingford 1953: 116; Hurskainen 1980: 145, 169). As *o-sipoloi*, the newly circumcised boy wore a married woman's garment, his mother's *isurutia* earrings, and carried a bow with blocked arrows, used for 'hunting' girls, as well as small birds whose feathers he used to make an ornamental headdress. During this seclusion period, the boy used chalk cosmetics, but Hurskainen describes the Baraguyu candidate in his mother's clothes and ornaments smeared with ochre and fat prior to the operation (1980: 145).

The Frontispiece of this thesis shows Fisher's picture (1996: 24) of the *eunoto* ritual leader, ochred, wearing his mother's *isurutia*. His ritual designation in this ultimate celebration of warriorhood is *loosurutia*, 'the one who wears the pendants', referring to his mother's ornaments.

Apart from the 'Cattle Robbers' song (above), another significant sexual reversal can be connected to male (or female) initiation. Before one of his children could be initiated, a father had to celebrate his 'Great Ox' or 'Ox

of the Wounds' (*loolbaa*), his final ceremonial (Spencer 1988: 57, 59, 252-5; Llewelyn-Davies 1981: 344). 'Women from surrounding villages' writes Llewelyn-Davies, 'make themselves sticks and engage in a mock battle with the men which is regarded as very hilarious. Women describe the ceremony as the time that "they beat up the elders"' (1978: 222). Spencer describes this as 'the one ritual of reversal in which both sexes confront one another on equal terms' (1988: 254). It was staged as a contest for the ox's fat between age-mates of the celebrant and women who were neither daughters nor mothers-in-law (i.e. possible sex partners), which the women would win.

#### 6.4.3.17 Sara (West Central Sudanic)

##### Male initiation:-

Overt – boys wore several of the same ornaments as the girls on coming out, especially red and blue bead necklaces, with red cosmetics (see Appendix As). In addition, the same terminology was used for boys and girls (e.g. *koy*, child, *ndo*, initiate). In particular, boys, like girls, had a *kóondo*, ‘mother of initiation’, actually a young man of the previous age-set initiation (upwards of seven years earlier) (Fortier 1982: 215, Jaulin 1967: 60). The *kóondo*’s job was to wash, care for and bring food to the initiate, as if a mother with a newborn (Jaulin 1967: 74, 76, 93). To this end, the *kóondo* acted as go-between, running a shuttle to the camp-kitchen set up by the initiates’ mothers and sisters (Fortier 1982: 215). Established at a place called *Gargara*, this marked the dangerous boundary between the village and the bush of the ancestors, as close as the women dared approach (1982: 219). If the bullroarer – ‘voice of the ancestors’ sounded – these women had to cover their heads; they endured virtual seclusion as well, observing food and sex taboos themselves, under supervision of an older woman, *korbega*, who uniquely had discovered secrets of male initiation (Fortier 1982: 223). The *kóondos* waited in their tunics of leaves away from the kitchen, not looking at women; an intermediary had to translate their orders in the secret *ndo* language to the Sar language, and carry food back to them (1982: 223-4). These precautions prevented female contamination of initiates’ food (primarily by menstrual blood) and avoided all connotation of incest in too close contact with female relatives at this time (Jaulin 1967: 103-4; Fortier 1982: 229-31). Dancing on return to the village, boys would strike their sisters’ loins with an ochre-coated wand (Fortier 1982: 226). Jaulin, who himself experienced the role of *ndo*, described the motherly care of his *kóondo*, including washing, feeding with ‘babyfood’ and chastisement (1967: 76-7). He compared the special eye-bathing applied to the *ndo* with the treatment used on women who had succumbed to a disease of the bush (1967: 93).

Esoteric – the secret of initiation was that the *ndo* were meant to be eaten by the ancestors, die and be reborn after being vomited up (Jaulin 1967: 61). For at least one of the Sara groups, the Dai, the central revelations of initiation were connected with royalty. The royal python appeared on the first day, and advanced on the initiates hissing; anyone who failed to see this remained *koy*, a child (Fortier 1982: 53). The initiation priest had



a *miya-bo*, the sacred emblem of Sara royalty which, in myth, had fallen from the sky. This double-sexed object transformed itself into the sacred snake (ibid., and see photo between pp.144-5). Unfortunately, we lack evidence of a direct connection between scarifications and the swallowing python. Modelled on the traditional weapon of hunting and war, the *miya-bo* comprised a male and female pair, of which the female was the most important, possessing the personality of a jealous wife needing to be fed (1982: 126-7).

#### 6.4.3.18 Ga'anda (Biu-Mandara Chadic)

##### Female initiation:-

Esoteric – girls were linked through their accumulation of elaborate scarifications to certain sacred ‘male’ pots which were sculpted with ‘scarifications’ closely resembling the girls’ (Berns 1988: 72-4). Initiate girls bore the same marks as the spirit Ngum-Ngumi, a being ‘conceptualized as a pot, moving on its own volition, which led the Ga’anda in their migration from “the East”’ (Berns 1988: 73). Ngum-Ngumi’s movements legitimized the land rights of specific groups. The sacred pots appear in places where Ngum-Ngumi ‘stopped’; the vessels were modelled with hands, breasts, navel and distinctively male genitalia (1988: 73-4, figs.19-20). Their ‘scarifications’, a column down the torso, seem to be stylized versions of *njoxtimeta*, which formed the penultimate stage of *hleeta*, received when a girl reached puberty (Berns 1988: 59, 61 fig.5g). These marks served notice to the groom’s family to complete collection of the substantial bride payment before the final scarification could be made (1988: 62).

##### Male initiation:-

Esoteric – this is arguable, but not very certain. The cosmetic combination of red and white, used by both girls and boys at coming out, is linked by Berns to menstrual blood and semen, implying each sex owned these reproductive potencies (1988: 65). During *sapta*, the boys’ initiation ordeal, they were flogged quite mercilessly, this bloodshed being scheduled at the new moon (Boyle 1916a: 245-7). Ornaments used by boys

in Boyle's early account included bracelets covering their whole arms, as women wore them, given them by women (1916a: 251). As an example of 'wrong species', boys were meant to act out as monkeys during seclusion (1916a).

#### *6.4.3.19 Hausa (West Chadic)*

Female (and male) initiation:-

Overt – here the Islamic nubility rites preceding first marriage are taken as the key rite of passage for both sexes (see Appendix Au). Having been treated with henna in seclusion, and comforted by her bondfriends, the bride was washed and dressed in new clothes sent by the bridegroom (Smith 1954: 92). When put on the back of a horse for transport to the groom's compound, she wore a man's trousers (Smith 1954: 93). This compares closely with Moroccan practices (Westermarck 1914: 27, 163, 174). In Baba's account, after initial resistance by the bride's friends to her leaving, her girlfriends' sang 'The great hunt was a good hunt/the great hunt brought meat', going on to list all the animals caught, as the bride was brought to the groom's (Smith 1954: 93). Another recurrent 'deceptive' feature of Hausa rites involved switching the bride with a 'mock bride', a young girl, who would be put on the horse (Hassan and Shuaibu 1952: 54; Rattray 1913 II: 164).

Some evidence suggests mimicry of the bride by the groom. Smith comments that this was the only occasion she knew when all Hausa men used henna (1954: 267n.11) (although Tremearne recorded boys stained with henna at circumcision among Hausa at Tunis (1914: 60)). Rattray describes the groom sitting veiled after henna is rubbed on him (1913 II: 170).

Tremearne (1914: 400-5) made an intriguing argument based in comparative etymology that the Pagan *bori* cult could be linked to a range of initiation and circumcision schools across West Africa. While his connections with sacred prostitution in the Middle East may be fanciful, if *bori* is considered as an indigenous Hausa initiation school, the largely female adepts are regularly possessed by cross-sex, androgynous or lewd spirits

(cf. Greenberg 1946: 56-8; Onwuejeogwu 1969: 286-7).

### **6.5 Summary: Beauty Magic**

A narrowly individualistic Darwinian account of cosmetics usage, focused on competitive sexual display, does not account for ‘beauty magic’ – deployment of the ornamented body to invoke ‘other-worldly’ powers. In ‘rituals of social magic’ (cf. Bourdieu 1991), cosmetic adornment casts a ‘spell’ over the performer, transforming her status in the eyes of the community complicit in and represented by that ‘magic’. But these magico-religious functions do not form a separate level of analysis from Darwinian sexual selection; the expensive religious packaging is intrinsic to the attraction. Cosmetics constitute performers as members of bounded and enduring ritual coalitions; individuals must display this quality in coalitionary contexts before they become attractive as individuals.

This analysis of magico-religious symbolism associated with initiation and other ritual in 21 sub-Saharan cultures shows a high degree of cultural variability. I have not attempted here to interpret cultural meaning, but to analyse initiation rites as systems of signalling. African initiation presents certain persistent features – widespread occurrence of ‘wrong sex’ signalling by initiates of both sexes in conjunction with use of predominantly red cosmetics. Sometimes directly associated with menstruation, these were most frequently used to highlight or amplify ‘extra’ forms of bloodshed, most often genital.

The gender-ambiguous aspect of religious entities conforms to expectations of Boyer’s theory of religious transmission of counter-intuitive phenomena. But it more specifically matches predictions of the ‘sham menstruation/cosmetics’ hypothesis. In this model, ritual and symbolism arise as a set of signals in a female-driven strategy of resistance to male philandering. Female coalitions (involving also male kin, opposed to mates) developed and displayed earliest symbolism through the medium of cosmetics mimicking menstruation. Red pigment marked the mobilisation of ritual power for both sexes. The sacred domain was defined by reversal both of perceptual reality and of normal dominance relations. This characteristic of thematic reversal, counter-reality and counter-dominance remains central to African initiation.

## CHAPTER 7

### A BEHAVIOURAL ECOLOGY OF COSMETICS

#### 7.1 Premises of ‘sham menstruation’ theory

The aim of this chapter is to explore the ‘sham menstruation’ hypothesis as a framework for a behavioural ecology of cosmetics usage. In Chapter 4, section 4.2e. I advanced some premises (1-3) for such a behavioural ecology of natural fertility populations. In the light of these, specific predictions could be formulated in particular ecological contexts. The fundamental assumption of ‘sham menstruation’ (Premise 1) is that, for lack of better information about female fertility, men will be interested in tracking women’s menstrual cycles, by noting menstruation; women will respond to that male interest by advertising imminent fertility. Does ethnographic evidence support this as a basis for cosmetic signalling? In line with sexual selection theory, elaborate ornamentation in one sex may correlate with increased investment by the other sex (Trivers 1972, Andersson 1994). Therefore, we can expect variability in degree of ornamentation between the sexes according to levels of parental investment (Premise 2). Here, I apply some basic tests to the sub-Saharan sample. The main body of the chapter addresses Premise 3, that cosmetic signals function to demonstrate coalitionary alliances, by investigating alternative models for the evolution of costly signals. ‘Sham menstruation’ hypothesis argues that ritual display of cosmetics took off as a sexually selected trait (with men initially choosing cosmeticised women) because such display reliably demonstrated quality of an individual’s coalitionary alliances. Costly signals are needed to establish alliances; initiation rites may perform that function. But how can we model the evolution of such costly signalling as a process of selection on the individual bearing the cost? I test predictions arising from two different models – reciprocity and ‘handicap’ principle – using the sub-Saharan sample.

## **7.2 Are men interested in menstruation and do women respond to that interest?**

Within Christian culture, evidence of menstruation in daily life is so suppressed that the idea it might be a signal seems counter-intuitive. However, such suppression is to be expected, given Christian ideology of lifelong monogamous bonding. A display of imminent fertility by a woman to anyone other than her husband would be socially disruptive. Among Darwinians, because menstruation is not itself the fertile time, ovulation has been the focus of studies on men's ability to track women's cycles, with inconclusive results. Social and cultural anthropologists, familiar with the extensive taboos and pollution beliefs surrounding menstruation, have documented the negative ideology but rarely looked into discrepancies between behaviour and beliefs. Sham menstruation theory expects taboos, because it posits coalitionary control of access to imminently fertile and reproductively valuable women; but it is premised on the idea that men will be interested in locating prospectively fertile women, therefore interested in knowing which women are menstruating. I have no space here for any comprehensive ethnographic survey. I will discuss the major behavioural ecological study on men, women and menstruation in a natural fertility population – Beverly Strassmann's work on the Dogon (1992, 1996c, 1997b). But first, it is worth citing a couple of examples from cultures well known for the severity of their menstrual pollution beliefs, the Gimi of Highland New Guinea and Aboriginal groups from Arnhem Land.

Gillian Gillison (1980) offers a glimpse of the gap between behaviour and ideology among the Gimi. Men exhibit and profess horror of contact with menstrual blood, these notions being elaborated in an entire cosmology (1980: 149-50, 153-63). Yet,

‘Their songs celebrate the eroticism of menstrual blood: “I follow the River \_\_\_ to its source. As I climb along its course, I see blood staining the rocks. As I round the bend I see you standing naked in the water, beautiful red blood streaming down your shiny black legs! When shall we have sex? Now? In a moment?”’ Indeed sexual intercourse often took place inside menstrual huts built (before missionaries prohibited them) at the outskirts of the settlement in order to isolate women for the period during the month when they supposedly reach their peak as a source of danger to the community. According to female informants, these huts were routinely used as the sites of assignations arranged by men...’ (1980: 153).

Gillison considers that women lost the autonomy and protection afforded by the taboos, so much were they being pestered by husbands and lovers inside the huts.

Similar fantasies pervade the *Love Songs of Arnhem Land* recorded by Ronald Berndt (1978). Again, strict prohibitions applied at menstruation, and women were normatively supposed to stay in seclusion (Berndt and Berndt 1970: 180). Recurrently, the songs celebrate sex with menstruating and/or deflowered girls, including ritually sanctioned coitus (e.g. Song 11, Rose River Cycle, Berndt 1978: 92-3) and hidden or illicit assignations (e.g. Songs 9-10, Goulburn Island Cycle 1978: 57-8), in both cases with classificatory kinsmen. In Song 14 of the Goulburn Island Cycle, the blood is menarcheal, sex being believed to cause menstrual onset:

‘Blood is running down from the men’s penes, men from Goulburn Islands...  
Blood running down from the young girls, like blood from a speared kangaroo...  
Running down among the cabbage palm foliage...  
Blood that is sacred, running down from the young girl’s uterus...’ (1978: 61-2).

The palm foliage provides the hiding place for meeting with lovers (1978: 58-9) and ‘might even be regarded as the girl’s seclusion camp’ (1978: 63). Throughout the cycles, the imagery of defloration, menarcheal and menstrual blood, and red ochre is conflated, the girls being smeared with these substances (e.g. Rose River Cycle, Songs 15-16).

In Chapter 6, section 6.4.3.14, I discussed the negative and indeed masculine connotations of menstruation in Dogon cosmology. Yet, besides this ideology, Calame-Griaule records the actual ‘causerie des femmes en règles’ when a Dogon husband would talk to his wife in the evening from outside the menstrual hut; if he failed to do so, he showed he did not love her (1965: 242-3). In Dogon belief, a woman is most likely to conceive in the first sex act following menses; her husband is therefore anxious it should be with him. Realising that menstruation was a good indicator of non-pregnancy, Strassmann proposed that Dogon menstrual taboos functioned as an anti-cuckoldry device; by forcing women to go to menstrual huts, husbands could keep track of their reproductive status (1992: 98, 104). After monitoring hormonal profiles of 70 women for ten weeks, Strassmann found only one occasion when a non-menstrual woman went to the hut, a pregnant woman who was spotting blood (1996c). So, Dogon women were not faking menstruation, and visits to huts were reliable

indicators to men of their status (although menstruating women did not go in 14 % of cycles). The problem with Strassmann's argument is why it should be in the husband's interest for other men to know when his wife menstruates. The huts in Dogon villages are positioned in full view of the men's shelters; usually lying outside, the women tend to be highly visible. When a woman goes to the hut 'her menses are advertised to the entire village' (Strassmann 1992: 112). Would it not serve her husband's interest better to keep his wife at home, so only he, if anyone, knew? Strassmann argues that because husbands work separately from their wives during the days, and, owing to polygyny, do not sleep with them every night, they could fail to monitor the occurrence of menstruation (1992: 98). A good test here would be whether women who do not go to menstrual huts tend to be wives of monogamous men. But even more than improve the husband's monitoring of his wife's menstrual status, Dogon huts allow monitoring by men of the patrilineage (1992: 112). Key resources in Dogon economy are the millet fields held by patrilineages, the rights to use these being passed from father to son. Legitimacy is therefore a serious concern for the patrilineage, in case their landholdings be alienated. Clearly, surveillance of women's cycles is being done, but rather than being left to husbands, it is the responsibility of the patrilineage. Strassmann argues that it is rare for men in the same village to exploit knowledge of other men's wives; the men who do steal wives are outsiders who have no knowledge of menstrual hut visits (1992: 119-20). Penalties – loss of land use rights – are stiff for adulterous men of the same patrilineage. Even if women are not manipulating menstrual signals to widen their mate choice within the village – and, given Dogon conditions of gerontocratic polygyny, it is hard to believe this does not happen – at the very least, they use advertisement of menstrual status to probe their husband's support and commitment, as reported by Calame-Griaule. Any lack of support could increase the chances of their seduction by another man from outside. Young married women, according to Calame-Griaule, pursued a career of regular partner change with divorce and remarriage (1965: 325; 1982: 376); Strassmann records only 20 % of remarriages within the same village, and those most often to former husbands (1992: 120). Because of wife shortage, few sanctions prevent women from exercising freedom of choice outside the village (Calame-Griaule 1965: 313, 324; 1982: 364, 375); the best patrilineages can do is hang on to their legitimate male children.

In the light of Gowaty's 'sexual dialectics' (1997), we expect mating systems and the associated elaboration of signalling to evolve as a result of an arms race, with males attempting to control access to reproductive females

while females attempt to resist that control to maintain choice. Strassmann acknowledges the theoretical difficulty of arguing that a female signal could evolve to be used against female interests (1992: 102). This is impossible under natural selection (Krebs and Dawkins 1984), but Strassmann proposes that with cultural selection, signals may be perpetuated because they benefit receivers, even when they do not benefit signallers. While this is reasonable once the signal already exists within a system of coercion, it is not reasonable to argue that the signal could arise in such conditions. As patrilineal sedentary agriculturalists with severe shortages of fertile land, the Dogon are not living in Pleistocene conditions, and their elaborate cosmology and taboos centred on menstruation cannot be regarded as the prototype. It is highly unlikely that men could so control women's menstrual signalling in the context of a foraging economy. *Love Songs of Arnhem Land* may testify to the failure of an Aboriginal gerontocracy, with equally elaborate menstrual cosmology, to establish similar control over women's menstrual seclusion.

When Khoisan women in Namibia painted their faces with red haematite 'especially at the time of menstruation' (Rudner 1982: 218, citing Fischer 1913); when a menstruating Ju/'hoan mother smeared her inner thighs with fat and painted soot around her eyes, or cut a tonsure in the hair of her youngest child to paint that (Wilhelm 1954: 118); or a Ju/'hoan girl dressed her fine kaross with red ochre as a sign to men that she was menstruating (Thomas 1959: 234), this is because the women concerned were choosing to signal imminent fertility, not because men were forcing them to. Women themselves expended the most energy in obtaining the necessary cosmetics; and it paid them to advertise their condition. Men received the signals in a context of taboos on contact between menstrual blood and hunting weapons; clearly, they were also gathering information about female reproductive status. Another example from matrilineal Central Africa reveals the 'advertising' dynamic behind menstrual signalling. Among the Tonga, girls in menarcheal seclusion 'passed the time grinding red ochre with which to anoint their bodies' (Colson 1958: 285). Mission-educated Tonga found such practices reprehensible: 'Seclusion is a bad thing as it advertises the fact that the girl is now mature, thus attracting the attention of men who might otherwise ignore her as a small girl' (1958: 283). This confirms the Christian attitude towards menstrual signalling exemplified by the missionaries among the Gimi.

The progressive scarification which constituted female initiation among the Nuba (see Appendix Aq) also



offered costly signalling of reproductive status. Again, it is difficult to argue that women were made to bear these costs against their own interests. The main traumatic scarrings occurred at menarche, all over the torso (Faris 1972a: 15, 32-3), and again, when a woman had weaned her first child, all over her back (1972a: 35-6). This signalled her return to sexual availability after long post-partum taboos. Her husband was supposed to pay the considerable cost of the operation; if he did not, she was likely to elope with a lover. By signalling in this way, a Nuba woman demonstrated her own quality and tested her husband's commitment, at the time when she returned to cycling. Singh and Bronstad (1997: 412) argue that such extensive scarifications as those of the Nuba function as costly signalling of pathogen resistance. In addition to this biological level, such signals convey messages about social value; in the Nuba case, a woman shows her husband's material support, as well as that of female coalitions involved in her operations and seclusion at both menarche and first weaning.

In the Dogon and Nuba cases, costly signalling is reliably attached to menstruation. 'Sham menstruation' includes deceitful signalling designed to exploit male sensory biases, that is, female manipulation of cosmetics that may confuse males about reproductive status. Nama women would 'hideously paint their faces with a blackish red salve during the period of menstruation or early pregnancy' (Vedder 1928: 137). Red cosmetics were frequently used during pregnancy and/or lactation (e.g. Fang, Alexandre et Binet 1958: 91; Tiv, Abraham 1933: 218; Katab, Gunn 1956: 76; Buissi, Jacobson-Widding 1979: 162-3). A couple of cases of post-partum ceremonial indicate apparent male collusion in cosmetic confusion of reproductive status. Before a Venda mother could leave her hut after a birth, her husband had to visit her with a preparation 'made from the blood of a menstruating woman, which he rubs on the palms of his hands and the soles of his feet' (Stayt 1931: 87). His wife thereupon gave him a bracelet, the name of which means 'an intense desire'. In Baba's account of the Hausa naming ceremony, seven days after birth, the mother was beautifully made up with henna by her kinswomen and *kawaye* (bond friends) (Smith 1954: 140). Before all the guests, she pantomimed persistent refusal to care for the child when it was brought to her. Here, the red signal associated with fertility was publicly stressed, lactation suppressed.

### **7.3 Ornamentation and parental investment**

The above examples from the Venda and Hausa can be considered as female cosmetic application designed to

elicit continued male support just after birth of a child. In the standard formulation of parental investment and sexual selection (Trivers 1972), the sex which invests least in offspring comes under pressure of sexual selection in competition for access to the sex which invests most. Hence, in sexually reproducing species, costly sexually selected ornament which shows quality is generally seen in males competing for access to heavily investing females. But selection for cultural traits of human body ornamentation, by the sham menstruation hypothesis, is initially linked to increasing levels of male investment. Females compete with costly cosmetic ornament for investment from discriminating males. Intensity of female-female competition in cosmetic display should correlate with levels of investment offered by men (Premise 2); conversely, where men do not invest much in offspring, we can expect to see increasing male-male competition in cosmetic display. Before considering whether the evidence from the sub-Saharan sample supports this hypothesis, it is worth noting the Stratherns' discussion of the effects of incoming protestantism on Hageners' traditions of ritual display (1971: 3, 16, 129). In the ceremonial *moka* exchange system, aspiring leaders were polygynists whose several wives raised pigs for the exchanges (1971: 16). Prominent in the formal dance displays, their decorations made the wearers 'more attractive to potential exchange partners and to potential wives' (ibid.). The influence of Baptist Lutheran missions led men to forsake both *moka*-making and polygyny; these Hageners became 'ashamed' of decorations before Europeans (1971: 129). Linked with these ideological shifts were economic changes with the onset of wage-earning; monogamous, undecorated wage-earners offered relatively higher investment in their wife's offspring than traditional, ritually ornamented polygynists.

Demonstrating that sexual selection drives ornamentation and correlates with levels of investment is fraught with difficulty. A sexual selection study should focus on variation between individuals, showing that better ornamented individuals receive greater investment in their offspring from partners. Here, an 'average' or standard degree of ornamentation within one culture is compared with that in other cultures. The justification for the method is that standard cultural practice presumably reflects fit or adaptive behaviour in the context of that culture. Do differences in relative ornamentation between the sexes across cultures reflect underlying differences in relative investment in offspring between the sexes?

In her pioneering article on sexual selection and human ornamentation, Bobbi Low (1979: 471) highlighted the

problem of assessing relative amounts of ornamentation between different cultures given huge diversity in types of ornament. How do you compare and evaluate elaborate decor in gold or in leather, for instance? The problem is to an extent circumvented if we compare relative levels between the sexes inside each culture. Even then, if the sexes use different ornaments, and different amounts at various stages of life history, valid comparison is difficult. Ideally, we should have a measure of time and energy costs in making or acquiring the ornaments worn, but the ethnographies rarely provide such data. Low assessed whether ornaments distinguished puberty vs. marriage, and/or rank in one sex more than the other (1979: 473), but it is unclear how differentiation of categories of ornament relates to costliness.

In trying to produce a crude relative measure of ornament in each sex, I looked essentially for *extravagance*, in the sense of Zahavi's 'Handicap Principle' – obviously costly, time-consuming and energetically wasteful forms of decoration. I considered ornament in general, both for everyday use and special ritual occasions, focusing on prime reproductive years, from puberty through early years of marriage. I scored 1 to either sex if that sex displayed at least one form of extravagant *non-permanent* ornamentation (e.g. hair-dressing, jewellery, use of costly pigment, design etc.). I scored a further 1 to either sex if there was some form of *permanent* body marking (e.g. traumatic mutilation, scarification) where this seemed clearly motivated by sexual selection. An additional point was awarded to the sex which appeared to invest most energy in ornament, particularly in the everyday. If I could not choose one sex over the other, I split the mark 0.5 to each where the culture used a lot of ornamentation. Where the culture was muted in ornamentation, I did not add to the score. There are clearly problems with this subjective method, and it is uncertain whether scores would be replicated by another person familiar with the ethnographies, but some degree of relative cost should be reflected in the scores. I had adequate data to make this assessment in 18 cultures of the sub-Saharan sample which are listed with scores in Table 7.1.

Low (1979: 473, Fig.18-2) tested degree of ornament differentiation between the sexes against marriage type, with a sample of 138 societies approximating Murdock's World Ethnographic Sample. She was able to show that men had the greatest relative differentiation of ornament in polygynous societies, while women had the most differentiation in a small number of polyandrous societies and in socially monogamous groups. This

confirms the sexual selection hypothesis that ornamentation relates to levels of investment. However, marriage type is at best an indirect reflection of parental investment. By polygyny threshold models, a rich polygynist may offer more resources than a poor monogamist (Borgerhoff Mulder 1990). Bridewealth payments could be used as an index of relative levels of investment between societies, but this raises the problem of comparability given diverse currencies. How is brideservice to be evaluated against bridewealth? Do Azande spears count for more than Hausa cloth and



cowries? How do transfers of land use or cattle compare? An alternative that does offer a universal currency across cultures is to assess variability in the division of labour between the sexes. Contribution to food production is a good proxy for ongoing investment in offspring. I used Murdock's *Ethnographic Atlas* (1967) to score a percentage contribution by males to productive labour, shown in Table 7.1.

Figure 7.1 shows the median ornament scores for each sex at each level of male contribution to labour. The number of groups involved at each level is very small, however there is a clear difference between groups with less than 50 per cent male contribution to labour – where it is impossible to distinguish the amount of ornamentation between the sexes – and higher levels of male contribution, where female ornamentation clearly scores over male. A far larger sample is needed for any firm conclusions, but this conforms to basic expectations of sexual selection. Females are using more ornament where males offer more parental investment.

#### **7.4 Initiation rites as mechanisms of alliance formation**

Where initiation rites involve very costly, apparently maladaptive, forms of signalling, such as traumatic mutilation, we should be wary of traditional functional explanations, for instance that costly body marking is designed to indicate membership of social groups. Such an account risks group selectionism; if these practices are maladaptive for the individual, they cannot be evolutionarily stable, no matter if they may be advantageous at the level of the group. We need to explain what the individuals who bear the costs of signalling stand to gain. As discussed above in regard to Dogon menstrual hut visits, such costly signalling will not evolve unless there are benefits to the signaller.

In a study of scarification practices using the Standard Cross-Cultural Sample of 186 societies (Murdock and White 1969), Ludvico and Kurland (1995) examined sexual selection hypotheses alongside the cultural anthropological hypothesis that marks obtained in *rites de passage* identify the individual as a member of a social group. In their African subsample of 23 groups, they found support for this 'rite of passage'



**Figure 7.1** Median ornament scores by sex and male contribution to labour in 18 sub-Saharan cultures.



hypothesis, in that male rituals involved either scarification or genital mutilation, but rarely both – a result fairly well supported in my sub-Saharan sample (see Table 6.3). They also found an association of polygyny with male scarification in Africa (1995: 166), supporting a sexual selection model. They treated the ‘rite of passage’ hypothesis as a proximate rather than ultimate level of explanation (1995: 156), hence not necessarily in competition with sexual selection hypotheses.

Their view implies that complex social interactions act as proximate triggers of costly body decoration which occurs for independent evolutionary reasons. But what is being selected and what is being displayed on such occasions? If selection for Machiavellian intelligence was the motor of human encephalization (Byrne and Whiten 1988a, Aiello and Dunbar 1993, Dunbar 1998a), it is reasonable to assume that human ancestors throughout the evolutionary environments of the Pleistocene have selected mates precisely for the ability to negotiate social alliances. Costly body marking in special ritual contexts may be a good way of showing off those alliances.

For humans, factors that determine offspring survivorship include not only genetic qualities of individuals, but very importantly in the conditions of evolution, the ability to garner resources. And in Pleistocene conditions, this would primarily have been determined by *social resources* and *alliances*. The Ju/'hoansi, unable to store material goods to secure themselves against shortages, instead stored up social obligations through *hxaro* exchange networks (Wiessner 1977: 13-4); this enabled them to spread risk among wider groups of people. Among primate species known for their ‘Machiavellian’ manipulation of social relationships, to acquire social alliances it is necessary to demonstrate commitment to coalitions via *costly* signalling (especially, time-consuming grooming, see Dunbar 1988, Cheney and Seyfarth 1990, Byrne 1995: 202, de Waal 1997). The high cost of acquiring a coalitionary relationship counteracts the risk of defection by freeriders, those who take benefits from allies but fail to reciprocate (Dunbar 1999, Enquist and Leimar 1993). Humans, as the most Machiavellian of all primates, have developed a wide variety of costly mechanisms for establishing long-term coalitions. Other than exchange networks exemplified by the Ju/'hoansi *hxaro*, one of the most fundamental such mechanisms is ritual. Initiation rites in particular form a key context for demonstration of *commitment* to a specific alliance (often precluding such demonstration to any other possible alliance); and once that alliance is

established, for display of the alliance to prospective mates. 'Alliance' is used here in a sense deriving from primatology, meaning any stable coalition, which might include same-sex age cohorts, or specific kin groupings. It does not necessarily entail alliance in the technical sense of marital exchange networks in structural anthropology (Lévi-Strauss 1969).

When a Ju/'hoan or Nama girl emerged from seclusion, she would be loaded down with presents of ornaments from women friends and relatives (England 1995: 267, Hoernlé 1985: 65), walking testimony to the extent of her connections. The materials might only be loaned, but with no urgency over return, and some could enter *hxaro* networks. Wiessner notes use of *hxaro* items to advertise connections: 'Fine beadwork on an eligible woman not only adds to her beauty, but shows that she has relatives who care about her enough to give her such beautiful gifts – mothers of eligible offspring frequently wear gaudy amounts of beadwork expressing the many contacts of their family' (1977: 142). Wiessner found Ju/'hoan women preferred to do *hxaro* with other women, since "women are more interested in making beautiful things" (1977: 252, and see Table 13, p.255). Another aspect of coalitionary display found frequently in initiation contexts is the presence of same-sex companions or partners, who were often treated identically with the secluded initiate (e.g. Mbuti, Turnbull 1960a: 180; Ndembu, Turner 1981: 245, and see photo, frontispiece; Cewa, Hodgson 1933: 131).

Bemba men summed up the importance of the girl's initiation ceremonial, *chisungu*, in this way:-

'No one would want to marry a girl who had not had her *chisungu* danced. She would not know what her fellow women knew. She would not be invited to other *chisungu* feasts. She would just be a piece of rubbish; an uncultivated weed; an unfired pot; a fool; or just 'not a woman'.'  
(Richards 1956: 120).

In traditional Bemba society, a girl who failed to have *chisungu* performed lost reproductive value to the point where she was almost unmarriageable. The implication behind the men's statement is that *chisungu* signals a girl's entry to a women's alliance network. It is specifically the occasions for celebrating girls' initiation when reciprocal exchanges, such as beer feasts, occur. A girl whose family could not arrange her entry to the women's community would be a poor match.

#### 7.4.1 Models for ritual as costly signalling

Alexander (1987) viewed morality as emergent from a dynamic of competition between human groups. In evolutionary environments, humans organised within increasingly large, kin-based coalitions mainly for protection against other such coalitions. In competition for scarce resources, larger, better-organised coalitions won out over smaller, less well-organised coalitions. Pressures of between-group competition affected within-group relations, fostering a need for indirect or generalised reciprocity within alliances (Alexander 1987: 79-88). In such a system, return of benefits is expected to come from a different alliance member than the original recipient. An individual gains a 'moral' reputation to the extent she or he places the interests of the alliance above her own selfish interest by upholding such generalised reciprocity. But how can this be effectively monitored or policed?

Ritual in general – initiation in particular – forms the primary arena for proving commitment to an alliance. Where an individual receives costly, permanent cosmetic marks, these are means to demonstrate *permanent* commitment. The evolution of such costly signalling can be modelled in two ways as a process of selection on the individual bearing the costs. The first model is that high-cost signals serve to guarantee a generalised system of reciprocal altruism between individual members of a coalition (cf. Trivers 1971). If the individual joining an alliance receives no benefits of membership until the entry costs have been paid, the high cost deters opportunistic freeriding. In this system, established alliance members will be concerned to monitor conduct of probationary members and, in particular, to detect cheats (cf. Cosmides and Tooby 1992). The second model, in line with the 'Handicap Principle' (Zahavi and Zahavi 1997), argues that an individual who shows the ability to bear costs of entry to the alliance receives benefits via a system of 'prestige' accorded by other members of the coalition. To summarise the difference between the models, high signal costs evolve to deter freeriding under the reciprocity model; they indicate individual quality in the 'handicap' model.

In the case of reciprocity, ritual mechanisms guard against freeriding. The reciprocity model expects that where risks of freeriding and costs of defection increase, costs of alliance formation should correspondingly increase. Factors such as size, density, mobility and dispersal of population affect the rate at which cheats will encounter naive individuals whom they may exploit (Enquist and Leimar 1993). In terms of Enquist and Leimar's

modelling, costly ritual is a form of 'suspiciousness' (1993: 750); by being 'suspicious' of strangers before offering cooperation, individuals may guard against exploitation by freeriders. The evolutionary stability of a strategy of cooperation depends not only on its ability to resist exploitation (Enquist and Leimar 1993: 751). It must also maintain defence against defection when other less conditional cooperative strategies exist in the population. Curmudgeonly, suspicious individuals may successfully resist being cheated, but may gain few benefits of cooperation if other more naive, easygoing cooperators allow freeriders to flourish. Ritual solves this problem by standardising and synchronising levels of suspiciousness in a population. Alliance members maintain an initially suspicious stance towards those entering the alliance. Once the initiate has publicly met the cost of entry, suspicion is relaxed, allowing for efficient, unconditional forms of cooperation.

Severity of costs of defection rise in situations of endemic warfare or persistent hostility between groups. Kin relatedness mitigates freeriding or affects the degree to which it is tolerated (Dunbar 1999, Wiessner 1977: 124), while circumstances of ecological risk may promote the need for reciprocity and suppress freeriding (Wiessner 1982, Smith 1988, Cashdan 1990). Conditions where unrelated individuals must live and work together, and where people are relatively mobile or change domicile frequently, should foster freeriding. In those circumstances, counter-mechanisms should be elaborated.

There are a range of possibilities for establishing generalised reciprocity within a bounded group. Permanent body marking, such as tattooing or scarification, distinguishes 'insiders' from 'outsiders', protecting the alliance. It can prevent an individual identified as a member of one group from moving into another, blocking off the avenues for would-be freeriders. Use of secret language, acquired in the course of lengthy initiation, can vouch for passage through particular rites where candidates demonstrate costly signals of commitment to a generalised alliance network (see Chapter 8). This enables checks on insiders, but does not necessarily prevent individuals from moving elsewhere. A system of gift exchange such as the Ju/'hoan *hxaro* works as direct reciprocity by raising the costs of forming alliances and continually probing the partner's level of commitment to the alliance. The same kind of effect could sustain generalised reciprocity through persistent public ritual performance with high energetic costs of participation, for instance Ju/'hoan trance dances (Katz 1982). This works through the regularity with which an individual's commitment is tested and publicly demonstrated.

Another system providing continuous assessment of an individual's commitment to a social group may be found in observance of food taboos. In the Ituri Forest, pregnant women among Sudanic villagers may suffer reduced fitness through avoidance of valued foods (Aunger 1994); such costly signals may prove their 'conformist intentions' as newcomers to village patrilineages (Aunger pers. comm. 1996).

Initiation rites specifically involve counter-mechanisms to promote cooperation within sex, within age cohorts, and/or between age cohorts. Because initiation represents the major initial cost of entering an alliance network – the entry fee – the reciprocity model predicts that initiation should elaborate as risks of alliance defection increase (or costs of defection become more severe). The need for within-sex cooperation to counteract risk of freeriding drives the costliness of initiation rites.

By contrast, the 'handicap' model stresses within-sex competition. Initiation rites provide the major platform for public advertisement of individual quality and entry to the prestige system. Costs of signals displayed at initiation are predicted to increase as within-sex competition for high quality mates increases. A general framework of signal selection theory should apply to costly ritual performance as a 'handicap'. In stratified societies, high-cost ritual display by members of elite sections of populations may be used to signal quality to ritually deprived sections (cf. Shennan 1996, Owens and Hayden 1997). However, forces of sexual selection are likely to be implicated in driving costs of signalling specifically during puberty or initiation rites. Although they did not consider ritual contexts, Singh and Bronstad (1997) were able to demonstrate occurrence of female scarification as a signal of mate quality in areas with high pathogen prevalence.

In the prototype model for ritual coalitions, 'sham menstruation', both components – prestige and reciprocity – are present, with costly signals demonstrating quality to outsiders, also establishing alliances with insiders. But as ritual signals evolve increasing costliness, which component drives costs upwards? Predictions of the two models may be confounded where prestige is acquired by *competing* to demonstrate commitment to a *cooperative* alliance (cf. Alexander 1987). In certain conditions of strong inter-generational competition between males for females (e.g. Maasai, Spencer 1988: 195, 209), sexual selection could generate effective reciprocity – within-sex cooperation in age cohorts – confounding the two models. This is evident in cases where age-set reciprocity extends even to shared rights of sexual access (e.g. Kikuyu, Middleton 1953: 34,

Leakey 1977: 810; Maasai, Spencer 1988: 188-90; and see Faris 1972b: 12-13 on Nuba reciprocal brideservice cooperatives). Alexander (1987: 142) links the establishment of indirect reciprocity within groups to leveling of reproductive opportunities among members of those groups. Despite these potentially confounding factors, the models identify distinct underlying causes for elaboration of initiation rites. Costs of signalling are driven upwards by the need for intrasex cooperation in one case (reciprocity) and by degree of intrasex competition in the other (handicap).

#### *7.4.2 Methods and measures*

To test which of the above models, reciprocity or handicap, could best account for increase in ritual costs I used 22 groups in the sub-Saharan sample. I aimed to relate costs of initiation to independent variables affecting risks of freeriding and intensity of sexual competition.

##### *7.4.2.1 Ritual costs*

For each culture, a separate rating of costs for male and female initiation was obtained. The factors involved in making this assessment were: a) severity of trauma incurred by initiate; b) length of seclusion and rigour of taboos observed; c) cosmetic materials and expert assistance required; d) accumulation of supplies needed for coming-out feasts. For most of these sub-Saharan cultures, a) and b) tend to be standardised to all individuals, while c) and d) offer some scope to display variable quality. Costs were coded on a scale from 0-4 as follows:-

4 - extreme elaboration of initiation as social institution;

3 - very high costs involving traumatic ordeal or mutilation; long periods of seclusion (over one month) with rigorous taboos and/or injunctions to secrecy; elaborate decoration usually requiring expert knowledge; extensive involvement of kin in providing resources;

2 - considerable costs involving some trauma or ordeal, but not necessarily permanent mutilation; seclusion of periods up to a month; some costly materials provided by kin;

1 - low costs with lack of permanent mutilation but some attention to cosmetics during initiation; short

seclusion periods and lack of taboos or injunctions to secrecy;

0 - zero or token cost.

A rating of 4 implied all the costs of 3 but indicated cultures where initiation was a hegemonic force of social organisation, dominating other ritual occasions. Ratings are shown in Table 7.2. For the Mbuti, the indigenous first-kill rite (Turnbull 1957: 207) is a low-cost affair with little formality, reliably assessed as code level 1. Contact with village cultures has seen the introduction of a high-cost circumcision ritual (code level 3) in which the Mbuti are impelled to take part to maintain their status in the eyes of the villagers (Turnbull 1984: 204). For the purpose of this study, the lower cost was







considered more applicable to Mbuti demographics, but the effect of the alternative rating on robusticity of results is noted here.

#### *7.4.2.2 Risks of freeriding*

This is the most difficult variable to assess. The simplest proxy for quantifying vulnerability to freeriders is population density, reasonable estimates of which were available for most of these populations (see Table 7.2). Greater risk is assumed at higher densities, but there is also an argument that higher density populations allow for more exchange of social information, acting as a check on freeriders. Some groups displayed a wide range of densities and in a few cases (e.g. Sebei, Tiv) it was possible to gain insight into variation of ritual practice in relation to changes of density within the same culture.

A more complicated assessment of freerider risk would take account of clumping and viscosity of populations: are settlements contiguous, permitting mobility of persons and information, or isolated and inherently suspicious? It is not spatial mobility *per se* but mobility between groups that counts for successful freeriding: do people have good reasons for moving around? Are kin living in one place or dispersed? Does marital instability generate frequent domicile change? Historic factors affecting personal mobility include warfare and slave-raiding. Relaxation of these risks could allow proliferation of freerider strategies as formerly isolated societies develop increased mobility and contact with other ethnic groups. Factors of ecological risk act as a check on freeriding, since individuals need to maintain goodwill as insurance for times of scarcity. Because the reciprocity model expects requirements of intrasex cooperation to drive ritual costs, attention was paid here to the impact of residence and descent rules on labour organisation: in particular, does the sex which tends to move at marriage need to engage in extensive economic cooperation with non-kin?

Information available on these factors was variable, ranging from little historically viable data on a group such as the Nama, to meticulous data on mobility by age and sex provided by Turner for the Ndembu (1957: 34-60). For present purposes, cultures were grouped crudely as low, medium and high risk. An alternative, more sensitive five-level code (1-5, very low to very high) was also used. I considered four major indicators for risk, as follows:-

- i) contiguous settlement in high density populations;
- ii) good excuses for moving around;
- iii) frequent domicile change;
- iv) regular economic contact of unrelated individuals.

In general, groups with 3 or more of these present were coded high risk (3, 3-level code; 4/5, 5-level); with 2 of these present, medium (2, 3-level; 3, 5-level); with none or one present, low (1, 3-level; 1/2, 5-level). Assessments are shown in Table 7.2.

#### 7.4.2.3 *Sexual competition*

The basic proxy used for intensity of male-male competition was degree of polygyny. Only 13 societies in the present sample could provide reasonable estimates reflecting conditions before significant missionizing. These generally took the form of percentage of men with two or more wives. In her discussion of polygyny measures in humans, Low (1988) notes that for two societies with identical percentage of men married polygynously, factors which increase variance of reproductive success are number of women married polygynously, greater maximum harem size, and more frequent extra-pair copulations (EPCs). The best measure of intensity of selection may be number of men *not* married but this cannot be assessed from available data. I am not convinced that EPCs increase variance in all cases, rather than level it. Some (probably most) of the cultures in this sample were virtually polygynandrous, with ritually defined institutions for recognition of women's extra-marital relations (e.g. Ila *lubambo*, Smith and Dale 1920, II: 67-8; Ju/'hoansi *záāku*, Tanaka 1989; Tiv sister/companion marriage, Bohannan and Bohannan 1969: 75). In some of the more polygynous societies (e.g. Sebei, Kpelle), men might farm out wives to provide a source of income in the form of adultery fees. Until a study is done on such an institutionally polygynandrous culture, the effect of EPCs on variance is not clear.

For female competition, the proxy measure used was male contribution to productive labour, on the assumption that intensity of selection on females increases as parental investment by males increases (Trivers 1972). Data were drawn from Murdock's *Ethnographic Atlas* (1967), as above.

### 7.4.3 Results

Distribution of costs was similar for each sex (see summary, Table 7.2a). Within cultures, half the sample showed discrepancy between the sexes, half the same level of cost for each. An equal number of cultures showed females exceeding male costs as males exceeding female costs.

To assess the association of ritual costs for either sex with risk of social defection, the rank correlation test, Kendall's Tau- $\beta$  was used. Female ritual costs showed a significant positive relationship with population density (Kendall's Tau- $\beta$  = .383,  $p$  < .05). Male ritual costs were not significantly associated with population density (Kendall's Tau- $\beta$  = .278, n.s.). Using the higher ritual cost rating for the low density Mbuti population further weakens the association of male ritual cost and density. All the most elaborated female ritual systems in the sample occur at density levels > 100 per sq. mi. Two cultures with low ritual costs (both sexes) but high density populations are the only two state societies (see Discussion below).

The sample was assessed for risk of freeriding, using three-level and five-level codes, taking social and economic factors into consideration as well as population density. Rather than compare female vs. male ritual costs, in this case the costs of the non-philopatric sex vs. philopatric sex were compared. However, the non-philopatric sex was in the vast majority of cases female. The level of risk applied to experience of the non-philopatric sex (predominantly females) and should be higher than that encountered by the philopatric sex (predominantly males), who are protected from risk of defection by factors of kinship. Boxplots of ritual costs at different levels of risk are shown in Figures 7.2a, 7.2b. Both sexes experience increasing costs with increasing risk. But, arguably, costs of the non-philopatric sex show greater sensitivity to level of freerider risk. In particular, a clustering of costly rituals for (philopatric) males are found in societies with intermediate risks. Since this is the philopatric sex, actual risks tend towards lower levels. The Mbuti here are assessed as low cost for philopatric males, low risk. If they were scored with high costs, an intermediate level of risk should apply (five-level code 2), since this encompasses economic cooperation with outsiders. This leaves the result robust because it adds to the clustering of high cost (philopatric) male ritual at low to intermediate levels of risk. The few instances of high-cost (non-philopatric) female ritual at low to intermediate risk include several brideservice societies (see Discussion).

Turning to indicators of intensity of sexual competition, the association of male ritual costs with degree of male polygyny was investigated. Only 13 societies in the sample provided trustworthy data on percentage of men married polygynously. The rank correlation coefficient of male initiation costs with polygyny was significant (Kendall's Tau- $\beta = .53$ ,  $p < .05$ ). The Mbuti were scored here as low-cost, at the lower end of the polygyny scale. It is unclear why the high costs of outsider-imposed rituals should be related to levels of sexual competition among the Mbuti, since there is little intermarriage. Overall, female ritual costs showed no relationship with degree of polygyny.

Costs of female initiation also showed no correlation with male contribution to production. This result contrasts with the correlation of general ornamentation and male contribution to labour observed in section 7.3, Figure 7.1. The majority of the costliest female rituals occur where male contribution is low. To sum up, there is some support for female initiation becoming costly as risk of social defection increases, and definite support for male initiation becoming costly with increasing sexual competition. By contrast, there is less clear support for male initiation costs increasing with freerider risk, and none for female costs increasing with female competition.

**Figure 7.2a** Boxplot of ritual costs for non-philopatric vs. philopatric sex at different levels of risk (3-level code).

**Figure 7.2b** Boxplot of ritual costs for non-philopatric sex vs. philopatric sex at different levels of risk (5-level code).

#### 7.4.4 Discussion

This sample is small and the difficulties in obtaining historically viable data are considerable. Nevertheless, the results suggest that costs of initiation are driven by different factors for each sex in these sub-Saharan groups. In general terms, requirements of reciprocity and intrasex cooperation appear to drive elaboration of female rites, while factors of sexual competition and display of individual quality drive up costs of male rites. However, there are clear counter-examples for each sex. Some female rites in the sample exemplify spectacular female ‘handicap’ display, notably in brideservice societies (e.g. Ga'anda, Nuba, as well as the moderately costly Bemba and hunter-gatherer rituals). Strong intrasex competition does not preclude male ritual from engendering forms of reciprocity and cooperation. Males can compete by demonstrating commitment to alliances. Some of the alliances forged are so strong that reciprocity extends to the level of sexual hospitality. In highly structured, *manyata*-type warrior age-set organisation, the alliances are formed to defend bridewealth (principally cattle) which represents future sexual access to wives.

In another case of elaboration of male rites, that of the Fang, the ritual alliances (*So*) generated had widespread currency among several groups in Cameroon (Alexandre and Binet 1958). Here, needs of reciprocity in specific social circumstances of ethnic contact could be driving elaboration. Balandier noted that *Bieri* (equivalent of *So* for the Fang in Gabon) created cohesion among fragmented clans and related villages ‘at times of insecurity’ (1970: 148). Nevertheless, control of land by patrilineages and, hence, access to women remains the probable ultimate cause. The need to establish reciprocal contact with other ethnic groups certainly seems to be a factor in the case of another Cameroon culture, the Kpe (or Bakweri). The female initiation complex (*liengu*) had currency among several coastal groups, while another notable example of this inter-ethnic potential is furnished by the *Poro/Sande* schools belonging to several Mande-speaking groups (see further discussion in Chapter 8). A case study on the Kpelle (cf. Bledsoe 1980) would be very revealing on the mechanics of competition via ritual display of commitment to cooperate. Female leaders are strongly motivated to support the reproductive interests of male patrilineal kin, mainly through acquisition of land and ultimately wives. But in doing this, they are constrained by the mechanisms – ritual, symbolism and rhetoric – of cooperative alliance formation. The emphasis is on loyalty to initiate women (vs. men) as a solidary group and



obedience to seniority, with defection policed by threat of terroristic reprisal for revelation of secret knowledge.

Such examples warn us against simplistic distinctions between male and female ritual strategies. On the one hand, intense sexual competition can foster male reciprocity within age cohorts; on the other, female coalitionary networks can be exploited for (male kin's) reproductive interests. However, the underlying reasons for rituals driving to elaboration, and thereby becoming powerful media for political manipulation, are likely to differ between the sexes.

One example here provides a case study of variation in ritual practice within a single culture, the Sebei, a Kalenjin group of the Kenyan-Ugandan border area. Goldschmidt (1976) analysed two different Sebei communities, comparing in detail both the demographics and the erosion and preservation of initiation traditions. The first community, Sasur, had a dense population (1,000 per sq. mi.) of contiguous villages where a farming economy had produced permanence of residence and land shortage; the second, Kapsirika, had a much lower density population (25 per sq. mi.) and a pastoralist economy traditional to the Sebei, with typical mobility and impermanence of residence (1976: 84-5). There was marked discrepancy of polygyny in the two communities, with only 17 per cent of Sasur farmers married polygynously compared with 37 per cent of the pastoralists (1976: 81); both sexes pursued extra-marital affairs as the norm. Women were reported to favour marriages to the less polygynous farmers of communities like Sasur where they had more scope for economic independence from men, and even prospects of acquisition of land (although this was strongly discouraged) (1976: 238-9, 242). Goldschmidt noted with some surprise the lack of village-wide social and ritual action in the supposedly more established Sasur, compared with considerable community action in Kapsirika. The farmers preferred not to formalize their ties through ritual. In the jostling for land at Sasur, conflict was endemic even within families, with disputes occurring between co-wives, or wives of a father and son (1976: 234). It is likely that the modern rule of law took the strain as counter-mechanism to freeriding instead of ritual. Traditional Sebei initiation consisted of a harsh, public, collective circumcision regime, performed on mature adolescents of both sexes, and imposed with a stringent ideology of bearing pain with unflinching fortitude (as much, or more, for girls as boys) (1976: 267-301). Elaboration involved systematic medication and taboos,

significant contribution of livestock by kin, and sex-specific secret knowledge. Goldschmidt noted the erosion taking place in the farming areas, in particular the laxity of seclusion restrictions, and the lack of kin contribution, contrasted with the 'lavish' display that persisted in pastoralist initiation ceremonies (1976: 297-8). Traditionally, among highly sexually competitive and polygynous Sebei pastoralists, the male circumcision rite produced age-set unity for military action, particularly cattle defence. Goldschmidt regarded the female circumcision sets as solidary sisterhoods resisting the severe male dominance of Sebei culture (1976: 299-300). The magic they learn in the women's rites, he said, 'is directed against men' (1976: 300). This is similarly characteristic of the elaborate Kpelle and Kikuyu female circumcision schools (see Bledsoe 1980: 68, and cf. d'Azevedo 1994; Brinkman 1996: 51-6).

In the Sebei case, relaxation of male sexual competition and less pressure for collective male alliance to defend bridewealth has resulted in reduction of ritual costs. Goldschmidt argues that circumcision is maintained among the farming communities largely because of the need to interact with other traditional Sebei men (1976: 300). Ritual unity is less valued, and since the farmers tend to treat women more leniently, women are under less pressure to 'assert their unity against their men' (ibid.). At Sasur, women may be intensely competitive for male-controlled resources, but this does not lead to increased ritual costs. Among the pastoralists of Kapsirika, meanwhile, some livestock defence still continues, maintaining values of warrior prowess even as military action declines. Goldschmidt reports a new element of 'potlatch' display – extravagant slaughtering of stock for circumcision feasts – suggesting that male advertisement of quality is driving up ritual costs at Kapsirika (1976: 301).

Another direct comparison is worth making between two groups with strong similarities in terms of population densities, economies, political organisation and historic background: the Ndembu and the Bemba. The key distinction between these two matrilineal cultures lay in the tendency of the Bemba to maintain uxorilocality, while the Ndembu were virilocal. Turner (1967) suspected that the extraordinarily prolific ritual culture of the Ndembu (quite apart from initiation) was generated by the tensions of matrilineal descent conflicting with virilocal residence. A systematic process of women marrying out, divorcing, returning to their brothers' villages with children, and then marrying again elsewhere, produced an extraordinary rate of turnover of

personnel in villages that were themselves spatially mobile. Analysing by the boundaries of chiefdoms which, unlike villages, stay still, Turner calculated that half the population were immigrants (1957: 57), with a higher proportion among women than men. By comparison, Bemba society was not so conflict-ridden; social defection among Bemba women in particular was mitigated by kinship. In line with the different levels of freerider risk encountered by women in these cultures, their ritual systems responded differently to change introduced by colonialism. Richards only just caught the end of the Bemba *chisungu* tradition in fieldwork of the early 1930s before it disintegrated in the face of wage economies, while Turner documented a vigorous culture of female puberty ritual, involving costly cicatrization, two and three decades later among the Ndembu (1981: 248-9). *Chisungu* appears designed as a display of female quality to attract the labour of inmarrying husbands in the form of brideservice; once men were engaged in cash economies, they aimed to collect bridewealth, and thereby remove brides from matrilineal homes more quickly. Increasingly, *chisungu* lost its economic purpose.

Historic effects of change in the centralization of authority are liable to alter the experience of ritual, or the distribution of ritual costs, throughout a population. The two state societies in this sample, the military kingdom of the Ganda and the islamised Hausa, are characterised by very low, or no effective costs of initiation. When encountered by Europeans in the mid-to-late nineteenth century, Ganda royalty with its supporting priesthood and tributary economy was intensively ritualized. Clans were dispersed, with any involvement in ritual generating clan-level affiliation suppressed; cosmetic mutilation was especially regarded with suspicion by the ruling elite as if it were a mechanism of resistance to central power. No woman who bore scarification was permitted to be the king's wife, since such a woman was thought capable of killing him (Roscoe 1911: 7, 81, 86). The Hausa had an islamised form of male circumcision, performed privately on young boys with little fuss (Rattray 1913), and relatively low-cost nubility ceremonial involving henna application (Smith 1954: 88). Urban Hausa women had sophisticated networks of gift exchange (Smith 1954: 191-2), as well as access to erstwhile pagan cults such as *Bori* to maintain social ties. The Azande illustrate a situation of breakdown of chiefly or state power, apparently leading to increased costs of initiation as a consequence. Azande men adopted a high-cost form of circumcision rite, supposedly driven by demands of women (Larken 1926: 30, Seligman and Seligman 1932: 518, Baxter and Butt 1953: 73). Factors which appear to undermine

circumcision as a signal of commitment to alliance are performance of the operation on someone too young to make a 'moral' decision, or having it done with modern medical facilities, therefore removed from a context of collective, public ritual (see e.g. views of Kaguru men, Beidelman 1997: 134-136; Sebei men, Goldschmidt 1976: 297).

In this study, there has been bias towards demonstrating the importance of female intrasex cooperation because females tend to be non-philopatric, and have to engage with non-kin. That is the fact of life in historically recent African economies. If we consider evolutionary environments of the Pleistocene, the situation is likely to have been different. Virtually all societies would have functioned on a basis of brideservice economics; this is likely to have produced far more emphasis on female 'handicap' display. The effective difference here is that in brideservice economy, bride's kin maintain control over sexual access to the bride in return for male production of goods or services. In these circumstances, bride's kin have every motive for dragging out initiation and periods of seclusion if that means they can extract greater economic effort from the son-in-law as a result. Here, costly initiation literally adds to the value of a girl, by forcing her bridegroom to work harder to get access. She has to be worth it – the ritual signals have to be 'hard-to-fake' – or he would be tempted to go elsewhere. Owens and Hayden (1997) have done the most extensive study of ritual costs among 'transegalitarian' or complex hunter-gatherers – societies intermediate between egalitarian and stratified, with incipient socioeconomic inequality. Cultures of the European Upper Palaeolithic or African Later Stone Age would have fallen into this category. Drawing on historic ethnography of Australian, Siberian, Japanese and North American groups, Owens and Hayden investigated the distribution of costs between the sexes of puberty and initiation (defined by them as entry to elite or secret societies). They noted few differences in general between females and males (1997: 134), but highlighted the extremely costly puberty seclusion of elite females: 'the data hint that as sociopolitical complexity increases, so does the severity of female seclusion at puberty for girls of highranking families' (1997: 138). In the present study, no relation was found between female initiation costs and male productive labour. A further study is needed to compare the results for a sample of brideservice societies against a sample of bridewealth societies. In the current sample, the extremely elaborate female rites of the Ga'anda are directly related to male labour (Berns 1988: 58-62). A girl receives extensive scarification over six biennial stages, culminating in a fifth and sixth stage around puberty as her

reproductive value peaks. At each stage, the demands placed upon her prospective groom by her kin are stepped up, commensurate with the costs of the scars. Her final and most costly seclusion period may be drawn out as her parents try to keep their son-in-law hanging around doing work for them, finally allowing him to remove the bride (Berns 1988: 62).

In their extensive worldwide study, *The Politics of Reproductive Ritual*, Paige and Paige (1981) also treated initiation rites as mechanisms of alliance formation and mobilisation. However, rituals were considered only from the perspective of male reproductive interest while female strategies were either ignored or not considered a possibility. This is problematic within a Darwinian framework of signal evolution theory – those who bear costs of signals must have an interest in signalling – as well as ‘sexual dialectics’, which expects coevolution between male attempts to control and female attempts to resist control. Indeed, elaborate signalling at initiation may result from this very coevolutionary arms race (see below). Ritual costs in this sub-Saharan sample distributed equally between the sexes, supporting the notion of coevolution.

Paige and Paige’s hypotheses on initiation were guided by the presence or absence of ‘fraternal interest groups’ – where influential political units are formed by men with common residence and kinship (1981: 53-5). In Paige and Paige’s view, menarcheal seclusion and ceremonial is a paternal strategy characteristic of societies where fraternal interest groups are weak or absent (1981: 87-8). A father solves the dilemma of guarding his daughter when she is most reproductively valuable by mobilising a ‘temporary coalition of supporters’ (1981: 88). In strong fraternal interest group societies, they view rituals with checks on virginity as most characteristic, referring to infibulation but paying no attention to other forms of female genital mutilation (1981: 88-9). Apart from the aspect of virginity testing, they offer little explanatory account of such elaborate, collective and costly female initiation schools as those of the Kikuyu, Kpelle or Venda, where so much more is going on. They argue that male circumcision is found in strong fraternal interest societies with risks of fission between lineage groups (1981: 126-8). This corresponds quite closely to the reciprocity argument of the need for costly signals to establish trust and alliance where both risks and costs of defection are high. Surprisingly, however, they choose as an illustration the Ndembu (1981: 157-60), not a society with obviously powerful fraternal interest groups. Turner emphasized the transient and ideal nature of the Ndembu ritual male community; in practice,

village headmen needed to influence the residential decisions of their sisters and sisters' offspring to maintain village membership (1957).

By contrast with Paige and Paige, I have focused on initiation as the means by which individuals who bear the associated costs establish and demonstrate alliances. I have not assumed that all alliances will be male, or that they only involve kin. Indeed, the reciprocity model argues that ritual should become elaborated in circumstances where non-relatives need to cooperate. Where Paige and Paige focus entirely on male coalitionary interests, this examination of factors underlying the evolution of costly ritual signalling for each sex has emphasized the fundamental importance of female coalitionary activity, an area that has until recently been omitted from models of human evolution (e.g. Tooby and DeVore 1987, but see Knight 1991, Knight et al. 1995, Power and Aiello 1997, Key and Aiello 1999, Power 1999, and cf. Parish 1996 on alliance mechanisms of unrelated bonobo females). Female ritual often has shown greater resilience than male in the face of changing economic and political conditions (e.g. among Khoisan groups: England 1995: 233, Valiente-Noailles 1993: 97). This could be because female networks tend to be more localised and less vulnerable to change at the macro-level. But this is not always the case, as is spectacularly illustrated by the elaborate girls' initiation schools among the Venda (Blacking 1969b: 69, 74, and see 1985: 86). Persisting even in the teeth of apartheid and urbanisation, the long-term cycles of initiation feasts formed the backbone of a 'Pan-Venda mutual aid society' (1969a: 5, see Chapter 8). Several other groups with high-cost female initiation included here provide dramatic instances of women's collective 'direct action' (e.g. Kikuyu, Lambert 1956: 99, and see Robertson 1996; Kpe, S. Ardener 1975: 33; Maasai, Spencer 1988: 200-9). Ultimate sanctions of 'magical' power are possessed by women, for instance, the threat of a mere touch of a Chagga woman's apron (Raum 1940: 365), or 'the big thing of Sande...a special thing women have, the most powerful medicine, and men must respect it' (d'Azevedo 1994: 349). Associated with obscene display and taboos on menstrual and reproductive functions, these are typical strategies of African women's resistance engendered by ritual organisation.

In this study, the association of increased female ritual costs with increased risk of freeriding meets the predictions of a reciprocity model. Increase of male ritual costs in more polygynous societies conforms to the

handicap model of display of mate quality. These results can be viewed within the framework of Gowaty's 'sexual dialectics' hypothesis (1997). Gowaty proposed that the evolution of mating systems in general is driven by 'sexual dialectics', a process of male ability to manipulate and control female reproductive capacities co-evolving with female ability to resist such control and retain choice. In the case of human ritual, male signal costs increase as males compete, using alliances, to gain control of resources with which they can broker access to females. Female signal costs increase as they form alliances to resist such male control.

### **7.5 Summary: A behavioural ecology of cosmetics**

Sham menstruation theory offers premises for a behavioural ecology of cosmetics which may be formulated as predictions in specific ecological contexts. Here, I have reviewed evidence that menstruation as an indicator of imminent fertility is tracked by men and advertised by women. I performed a pilot test of the sexual selection hypothesis that ornamentation in one sex will vary in relation to levels of parental investment in the other. Finally, I examined factors underlying the elaboration and increasing costliness of initiation rites. I tested predictions arising from two possible models for the evolution of costly signals. One, the need for costly signals to establish reciprocity, predicts that ritual costs rise with increasing risk of social defection; the other, the handicap model of costly signals indicating quality, predicts that ritual costs rise with increasing intensity of sexual competition. There is limited evidence to suggest differences between the sexes in their strategies of ritual signalling. Female ritual costs do increase in line with increasing risk of freeriding, as the reciprocity model predicts, but show no relationship with increasing levels of female sexual competition for male investment. Male ritual costs increase with risk of social defection, but appear more strongly associated with increase in sexual competition and levels of polygyny.

## CHAPTER 8

### SECRET LANGUAGE USE AT FEMALE INITIATION:

#### GOSSIP AND RELEVANCE

##### 8.1 Ritual signalling and models for language

Dunbar's 'vocal grooming and gossip' model (1996) for the evolution of language rests on an argument about saving time on social bonding in larger, more complex human groups. This is contradictory from the perspective of costly signalling theory, since grooming works as a mechanism of social bonding among primates through the currency of time (Byrne 1995: 200-02). The time an individual spends grooming an ally reliably quantifies its commitment to their relationship. If vocal grooming and gossip mechanisms reduced time spent grooming, this implies a reduction in commitment signalled to each individual (not necessarily equally distributed). Alliances may become more numerous, but at the same time less intrinsically reliable. The notion that too many exchange partners dilute the value of the relationship to each is illustrated by the attitude of the Ju/'hoansi to the sensible number of *hxaro* partners: too many risks spreading oneself too thin or making oneself out as a 'bigshot' (Wiessner 1977: 149). *Kawaye* or bond friends of the same woman among the Hausa can be jealous of each other as if co-wives, demanding reduction in numbers (Smith 1954: 200-1). Too many, as Baba put it: 'is not good, you cannot really like so many people' (1954: 198).

The difficulty of lack of reliability and potential alliance fickleness is magnified when we consider the nature of gossip. Social information received can only be valuable to the recipient, by definition, if she acquires information she would not otherwise acquire. Therefore, the information comes second-hand, at best, and must be taken on trust. Yet, if the costs of forming coalitions have been lowered relative to time-consuming one-to-one primate grooming, then the trustworthiness of any relationship has been undermined.

One way to get around this problem would be for the recipient of gossip to check with other witnesses, but



seeking corroboration drives up the costs of the listener's social time budget. Alternatively, honest transmitters of gossip could use increasingly costly forms of signalling to demonstrate their reliability (cf. Zahavi 1987), driving up the gossipers' social costs. But we know that is not how gossip works in real life. Instead, it resembles what Krebs and Dawkins (1984) term 'conspiratorial whispering', comprising low-cost, highly encoded, cryptic signals which are easy to fake. Listeners show an extraordinary propensity to decode signals and absorb information which they cannot corroborate. This apparent assumption that gossipers are honest – or at least worth listening to – flies in the face of expectations of Machiavellian Intelligence theory (cf. Knight 1998).

This anomaly led Power (1998) to argue that for gossip to function as a means of social bonding, it necessarily co-evolved with another independent mechanism for establishing commitment to alliances. Raising the costs, in terms of time and energy, of forming coalitions safeguards against exploitation by freeriders – those who accept benefits of social cooperation without paying the costs (Enquist and Leimar 1993, Dunbar 1999). Knight et al. (1995, Knight 1998) posit costly ritual performance as the means for securing trustworthy long-term alliances and sealing the boundaries of speech communities. In Chapter 4, section 4.3.1, I argued that 'sham menstruation', as the precursor to ritual, and specifically puberty ritual, was well designed as a costly demonstration of *long-term* commitment, lasting at least an interbirth interval. It can guarantee veracity of gossip within extensive female alliances.

In this chapter, I investigate initiation rituals drawn predominantly from ethnography of Bantu groups. In recent times, these rituals may have functioned to demarcate communities within which gossip was assumed to be reliable. In particular, I will look at how forms of special or secret language are integrated with ritual acts to provide mechanisms that prevent freeriding. Does elaboration of these mechanisms correlate with increased risk of defection from gossiping alliances? And what is the role of 'deceptive' or secret entities? These case studies of the interface between linguistic and ritual signals in complex modern societies can shed light on the politics of communication among Machiavellian gossiping hominins. If gossip is a means of social bonding, should it be modelled as a reciprocal trade of information (Enquist and Leimar 1993) or as a trade of relevant information for status (Dessalles 1998)? Words may be cheap, therefore easy to fake, but *relevance* is difficult

to achieve and is a requirement of human conversation (Dessalles 2000: 77). Rather than a means of exchanging jealously hoarded and valued items, conversation appears as a 'sport' in which individuals compete for social esteem by offering relevant utterances (Dessalles 2000: 63). But is it technical, environmental or social relevance that counts?

## **8.2 Bantu puberty ceremonial: Cosmetics, control and secret language**

Puberty schools, for either sex, function as probationary periods, when behaviour, especially contact with the opposite sex, comes under strictest regulation. They feature centrally some trauma or ordeal which the candidate must endure to become a member of the adult community. Prior to initiation, individuals are not considered as responsible adults; their words carry no weight, they are not trustworthy (cf. Bellman 1984: 8). For girls particularly, the rites advertise onset of fertility and act as a prelude to marriage, taking place in the context of extensive female coalitions.

The key examples of female initiation discussed here are the Venda *vhusha/domba* complex, the Bemba *chisungu* and the Kpe (or Bakweri) *liengu* schools. The *sande* bush school of the Mande-speaking Kpelle, a classic illustration from the literature on secret societies, is drawn on for comparison. The Bantu schools maintained operative 'secret' languages even as their male counterparts had virtually become defunct (Ardener 1956: 85-6, Blacking 1969b: 69, 74). Certain common features are identifiable which offer a template for African girls' initiation.

First of all, the ceremonies were costly affairs. The girl's immediate kin would have to pay ritual experts, providing food for her throughout as well as for visitors at coming out feasts. The girl herself would be removed from the labour force for the lengthy periods of seclusion – several months or upwards of a year in traditional circumstances. The primary impact of economic changes under colonialism was the cutting of these costs by reducing the length of seclusion (Richards 1956: 133, Bellman 1984: 9). However, the generosity of provisioning, the numbers of people drawn into celebrations and the duration of the rituals directly reflected on the status of the girl and her kin (Richards 1956: 133-4).

Secondly, older women controlled access to the girl and would be highly aggressive to male interlopers (e.g. Stayt 1931: 107). While certain men might act as ritual officials, these would often adopt a female identity, as if to stress the non-sexual, ritual relationship with the candidate (e.g. Blacking 1969a: 10, and see Bellman 1984: 34 on the single male involved in the activities of *sande*). Throughout, the subordinate status of the girl was repeatedly emphasized (Richards 1956: 67, Blacking 1969a: 6, 12, Bledsoe 1980: 68). One of several vivid metaphors for first menstruation among the Venda is 'to abuse the old ladies' (Blacking 1969a: 9). This expression, known only to women, according to van Warmelo (1932: 39-40), indicates the tension between cycling and non-cycling women.

Thirdly, there is advertisement of the girl's imminent fertility, which happens even where she has already been betrothed and is about to marry. The primary medium for this is some kind of red cosmetic – ochre in the Venda case, red camwood among the Bemba and Kpe – which connotes menstruation and which is usually passed between the girl and female associates. The rituals follow a general form of the girl first being made dirty and unkempt, then proceeding through a ritual immersion prior to an emergence ceremony which is highlighted by cosmetics. The Kpelle used white clay, together with scarification and genital mutilation, and therefore bloodshed (see Appendix An).

These features of costly performance, control of access and coalitionary use of cosmetics match expectations of the 'sham menstruation' model for establishing alliances between cycling and non-cycling women. The last common aspect concerns education, though it is not always clear what girls are really learning. Richards (1956) and Bledsoe (1980) challenge the functionalist view of puberty schools as an all-purpose tribal education in norms and values from a perspective of close involvement in Bemba and Kpelle rites, respectively. According to Richards, there was little opportunity for formal instruction. Girl candidates would be shoved out of the way, told not to look at what was going on, and usually had their heads covered in blankets (Richards 1956: 126). If any useful information was handed out, comments Richards, 'the candidates themselves would be the last people to have a chance of acquiring it' (1956: 126). Both Richards (1956: 126-7) and Bledsoe (1980: 67) explicitly deny that girls acquire any practical skills that they would not have learned anyway.

Rather than be considered as practical classes, these rites are frameworks for transmission of social knowledge

that is constructed as *secret* knowledge (cf. Bellman 1984: 6). What Bemba girls learn, contends Richards, is ‘a secret language’. One aspect comprises secret terms and rhymes which refer to specific actions and objects within the *chisungu* rite. Richards writes: ‘What seems to the educationist to be the most mumbo-jumbo and useless aspect of the whole affair may actually constitute one of the most prized items of information to the people concerned.’ (1956: 127) A second aspect is a ‘secret language of marriage’, referring especially to the taboos that constrain the physical relationship of husband and wife. Bledsoe emphasizes that ‘what young initiates do learn in the bush schools is absolute obedience to Sande leaders’ (1980: 68), women who are believed to wield sanctions of infertility and death. One of the legends of *sande* is that girls are taught the art of poisoning food to keep husbands in line (Bledsoe 1980: 67, citing Harley 1941). So, while a régime of total obedience is instilled in the girls, they are also being introduced to the secret arts of poisoning. Bledsoe takes this paradox as metaphoric expression that the girls’ ultimate loyalty is not to their husbands but to the secret society leaders ‘who could command them to poison their husbands for serious transgressions against higher tribal authority’ (1980: 68).

The Bemba reveal similar metaphors linking women’s potential to contaminate with higher powers that may intervene between husband and wife. Because of a complex of beliefs around the magical influence of sex, blood and fire, every wife takes strenuous precautions to ensure her menstrual blood does not come into contact with the family fire (Richards 1956: 32-3). Otherwise, food cooked on such a fire would imperil her husband or child. It is precisely these exigencies that form the core of *chisungu* doctrine, which her future husband hopes and expects his bride to be taught. So, the secret ‘knowledge’ transmitted in these rites involves both linguistic formulae referring to the one-off event of an initiation ceremony and metaphors representing a system of taboos which regulate a woman’s life persistently thereafter. When ritually enacted, these taboos invoke a moral authority superseding any mere marital authority. On occasion, this higher moral authority demands and effects physical separation of marital partners.

### **8.3 The Venda school of *vhusha/domba* as a system of reciprocity**

The traditional education among the Venda of the Transvaal offered no technological or practical training, except in ‘techniques of human relationships’ (Blacking 1969b: 71). The effect of the puberty schools was to

form 'associations of young people of the same age, regardless of their rank, family and clan affiliations' (1969b: 71). In documenting Venda girls' initiation from the 1950s, Blacking writes: 'a woman who has not graduated is not "a member of the club": she has no real say in women's affairs, nor any guarantee of assistance from other women in times of crisis' (1969a: 4). The complex cycle of initiation schools, where girls would learn songs, dances and mimes, provided a framework for widespread reciprocity among Venda women.

Ideally the cycle commenced after menarche with *vhusha*, which was organised at the local village level. Application of ochre marked ritual relationships between the women involved and was the prerequisite for going on to the next stage of *domba* (Van Warmelo 1932: 40). On the first day, the girl was rubbed with 'dirty' red ochre by her *mmane*, the woman to whom she first announced her onset of menses, a sister or co-wife of her mother (Blacking 1969a: 13). The girl chose a ritual 'lover', actually a tiny boy whose mother had to supply the candidate with new clothes and red ochre with fat (Blacking 1969a: 17). During the next four days of seclusion, the girl was given over to the mercies of older girls as she attempted to learn complicated dance manoeuvres called *ndayo*. According to one mistress of initiation, '*Ndayo* are there to make the girls suffer and honour the old ones. They reinforce the pattern of seniority.' (Blacking 1969a: 19) On the final day, the candidate was taken for a ritual soaking in the river. The old ladies in charge inspected her virginity; then she was washed, covered in fat and red ochre, and dressed in a special goat-skin skirt with a bead necklace (Blacking 1969a: 18). Nobles had even more elaborate costume, including the *thahu*, a ritual, tail-like object plastered with red ochre (Blacking 1969a: 7, Stayt 1931: 109-10). The girl wore the ritual dress and red ochre for a week, adopting a ritually humble posture and exaggerated form of greeting for anyone she met. Women were supposed to give the girl a bangle when she greeted them (Blacking 1969: 18). Van Warmelo reports that even perfect strangers could challenge the girl to respond to *milayo*, formulaic utterances in a riddle-like question-answer format (1932: 49). These served as tests that she had indeed passed through the rite; if she did not know the answers, she would be ridiculed and harrassed until she did.

Here we can see costly ritual signals operating as scaffolding for valid use of secret language. While the girl still signalled her ritual graduate status, she was ruthlessly examined on her secret knowledge, so that later, when she no longer wore ritual apparel, she could prove her status using language alone.

*Domba*, ideally prelude to marriage, was held every three to five years in a chiefly capital. It drew together an entire age cohort of girls from surrounding districts for months or even years of practicing songs and coordinated dances, culminating in a final spectacular ceremonial dance called *domba* (Plate 8.1). Reproductive stages of menstruation, pregnancy and labour were mimed and mapped onto the landscape, renamed as parts of the female body, to effect a symbolic rebirth of the entire community – ‘a huge drawing breath of the whole countryside, achieved by the coordinated movements of human bodies in time and space’ (Blacking 1985: 82). Materially, the school brought benefits to the chief, who collected fees, and could utilise the girls as a labour pool, while their relatives provisioned them (van Warmelo 1932: 52). Girls themselves said ‘we go to *domba* because we want to learn the “laws” – *milayo*’ (Blacking 1969a: 4). This body of ‘esoteric knowledge’, as Blacking calls it, ‘refers primarily to a series of formulae in which certain familiar objects are given



**Plate 8.1** The *domba* dance, culmination of the tripartite initiation for Venda girls.



special names, rules of conduct and etiquette are reiterated, and the meaning of rites and symbolic objects is explained' (Blacking 1969b: 69). Each ritual school had its own set of *milayo*, formulaic phrases juxtaposing apparently unconnected phenomena (Blacking 1961: 6). Van Warmelo called these 'tests of belongingness' (see Blacking 1961: 7n.6), since the ability to recite them proves that a person has undergone the particular ritual. The *milayo* of the obsolete boys' puberty school tended to link objects of the domestic environment with the animal world, which Blacking suggests 'might be explained by their close association with the world of men, and with the former role of hunting in the Venda economy' (1969b: 74). The girls' *milayo* mapped familiar objects onto the human body and represented relationships between the sexes. Frequently these were so sexually explicit that van Warmelo deemed them 'obscenities': penises became door hinges, arrows or the path to the council hut; pubic hair was the grass on a river bank; buttocks were gourds. Yet, according to Blacking, very few initiated women 'understand or are concerned about their symbolism' (1969b: 71). The symbolic *milayo* involved a 'special classification of the world' (ibid.), utilising in particular a typical Bantu colour triad of red, white and black to divide the world into the social categories of menstruating women, men and non-menstruating women (see for example Blacking 1969b: 80, 99, van Warmelo 1932: 74). However, only a few male ritual experts, who teach *milayo* formally to the novices, showed interest in discussing this symbolism (Blacking 1969b: 71).

Obscure symbolism aside, as far as the candidates were concerned, the *milayo* functioned as shibboleths or passwords to certain privileges of association. Recitation of the proper *milayo* 'supported a woman's claim to the benefits of an inter-district, inter-tribal, pan-Venda mutual aid society' (Blacking 1969a: 5). Blacking noted one instructor warning the novices: 'If you don't listen to me carefully, you won't get any beer!' (1969b: 71). This referred to the specific privilege of drinking beer at feasts connected to initiation schools. By demonstrating her knowledge of *milayo*, a woman 'will be able to go anywhere in Vendaland and establish her right to participate in any feast that is held in honour of a novice, or drink beer which is paid as part of a novice's initiation fee' (Blacking 1969b: 71).

The *milayo*, then, countered freeriding at a direct and practical level. A girl could only learn them by attending the *vhusha/domba* schools, for which she paid fees and provided beer to the women celebrating her initiation.

Once graduated, she herself had rights in the beer provided by subsequent initiates. The recurrent cycle of female initiation schools formed the backbone of Venda women's support networks. Despite predominantly patrilineal and patrilocal descent and residence rules, women maintained considerable social influence through these institutionalised alliances which excluded men. Blacking contrasted the leverage and collectivity of pagan Venda women with the sorry situation of christianised women who had dropped out of the ritual network. Forsaking tradition, they had lost power and prestige, and especially 'the prop of moral and social support from other women' (1959: 158). Ironically, having subscribed to monogamous christian marriage, they became 'quite unable to control the arrogance of those men who feel themselves no longer bound by traditional Venda values.' Christian women, writes Blacking, 'have no say in political or religious affairs and little or no control over the amorous intrigues of their husbands' (ibid.).

Practice at learning *milayo* came for children of both sexes in the traditional Venda game of 'riddles'. Blacking held these to be secularised versions or 'a degeneration' of *milayo* (1961: 6). Children and youths won popularity and prestige by memorising stores of riddles. The games worked on a 'swapsie' basis, with one player posing the question part of his riddle, and then the other 'buying' the answer by responding with the question half of his riddle. So each player presented each riddle as a whole, rather than attempt to supply answers to one half. This went on until one or other ran out of riddles (Blacking 1961: 3). Like *milayo*, riddles had no technical or practical relevance. One either knew them off pat, or did not know them; there was no point in figuring them out (Blacking 1961: 5). The competition was a display of pure knowledge, which had purely social relevance. Status was granted to a child who knew many riddles, just as in adult life a ritual expert with a vast knowledge of *milayo* commanded respect. They were worth knowing as pure knowledge 'and therefore in a way magically strong, but more especially because they are the keys which unlock the doors that lead to acceptance in certain social groups recruited on the basis of association of age-mates rather than on kinship and rank.' (1961: 6)

#### **8.4 Bemba *chisungu*: Gossip, esoteric knowledge and ritual hierarchy**

Audrey Richards observed the *chisungu* ceremonies of the matrilineal and largely uxorilocal Bemba people (now in Zambia) in 1931, when economic change and the onset of migrant labour had undermined traditional

ritual life considerably. Rites that once lasted at least six months now took three weeks (Richards 1956: 133). However, the mistress of ceremonies (*nacimbusa*) took pride in showing Richards exactly how things should be done (1956: 61). A midwife and ritual specialist of chiefly or royal lineage, the *nacimbusa* was crucial to the success of *chisungu* (1956: 57). Like the Venda mistresses of initiation, and mirroring the symbolic sex-reversal of the masters of *domba* (see Chapter 6, sections 6.4.3.4/6), she had a distinctly male persona (Richards 1956: 96, 101). As in the Venda case, the education the candidate received was in social relationships; the girl was introduced into the women's network (1956: 131). For the Bemba, as the Venda, a system of reciprocity was generated via the series of initiation feasts. Endurance of the trials and humiliations of *chisungu* admitted a girl to the women's community; without it, she had no social personality, and was unmarriageable (1956: 120, 131).

As with *vhusha/domba*, red cosmetics were used recurrently to mark out ritual coalitions (Richards 1956: 124). Alternating with symbolic use of white clay, which required special terminology (1956: 81, 127), this highlighted key taboos of Bemba life and particularly the sexual etiquette around menstruation. The main body of esoteric lore – 'what women knew' – consisted of linguistic formulae, rhymes and songs associated with the *mbusa*, or sacred emblems (Richards 1956: 59-60, 187-212). These were either wall designs or pottery models representing animals, humans and domestic objects whose names, and meanings, were supposedly revealed only to initiated women (1956: 127). In the truncated Bemba rite there was far less opportunity for formal teaching than in the context of Venda *domba*. Girls would handle the particular object and supposedly learn its 'song' from the repeated chanting of the women gathered at her *chisungu* (Richards 1956: 101-106). Actually, the learning process was cumulative. After initiation, the girl would be attached for the next year to her *nacimbusa* as a helper at subsequent *chisungu* feasts (Richards 1956: 127-8), each time learning a little more. How much she concerned herself with the symbolism, at first allusive and unintelligible, and open to different levels of interpretation, was a product of her own intellectual curiosity and ambition (1956: 131). A girl who really tried to accumulate *mbusa* lore and delve into the symbolism was on the way to becoming one of the *nacimbusa*.

What *chisungu*, and the specific associations with each *mbusa*, taught was 'not the technical activities of the

wife, mother and housewife, but the socially approved attitude towards them' (Richards 1956: 128). Snatches of *mbusa* songs could be used as cautionary reminders to a young wife of her duties by an older woman (1956: 163). The constant principle determining rank in Bemba society was seniority, whether of clans or individuals, expressed metaphorically by the verse 'The arm-pit can never be higher than the shoulder' – precedence was unalterable (1956: 72-3). When any food was offered or object revealed during the *chisungu*, it would first be presented to the oldest woman, and then repeatedly all the way down the age-order to the candidate at the bottom of the pile (1956: 131). *Nacimbusa*, as one of the oldest women from a senior clan who had achieved her position through a combination of reputation, expertise, energy and charisma, occupied the central position in this ritual hierarchy. She also had a specific and important relationship to the candidates she initiated. As midwife, 'she attends the childbed of the girls she has "danced"' (1956: 132). This placed her in a position of real power. If there were any difficulty at the birth, it was assumed that the young mother had committed adultery, and *nacimbusa* would force a confession (ibid.). It then depended on her to conceal or reveal to the in-laws 'any real or supposed bad behaviour of the girl' (ibid.). Bledsoe reports a similar situation among the Kpelle where *sande* ritual leaders exercise a jealous monopoly on knowledge of midwifery (1980: 73-4). Women are fearful and respectful of the midwives who, in case of difficult labour, may tell a woman that 'she will die unless she confesses her lovers' names or any crimes she has committed' (Bledsoe 1980: 74). The midwife is then in a position literally to blackmail the mother, and does so. The midwives who are most patronised because they are believed to possess the most powerful medicines belong to landowning lineages and are recognised leaders in the *sande* secret society (ibid.).

These examples illustrate that it is the speaker's status within a ritually bounded in-group that determines the likely influence and credibility of gossip, not necessarily objective truth or falsity. Clearly, competition for resources and investment may drive the extent of mafia-type extortion in these situations. The Bemba, as a matrilineal people, make little issue over virginity (unlike the patrilineal Venda). But, the *nacimbusa* is ideally senior patrikin to the girl (Richards 1956: 57). Given preferential cross-cousin marriage (Richards 1950: 228), *nacimbusa* is probably a classificatory if not actual relative of the girl's husband, so she acts as a stern check on the girl. In the Kpelle case, *sande* leaders are strongly implicated in the vicious political jostling of landowning patrilineages (Bledsoe 1980: 78-9). Hence, the extreme pressure for 'Machiavellian' manipulation of

information about adultery and paternity is easy to understand. A view of such gossip as disinterested is patently absurd.

### **8.5 Kpe *liengu* cult: Across ethnic boundaries**

One of the best documented secret cult languages is associated with a 'kaleidoscope of beliefs' (E. Ardener 1975: 8) about *liengu* (pl. *maengu*), also called *jengu* in Duala; these were widespread among a number of tribal groups on the Cameroon coast. *Liengu* signifies a water spirit akin to a mermaid, seemingly at home in a sea-fishing environment (E. Ardener 1956: 93-4, 1975: 15n.4). The Kpe (also known as Bakweri), who live on the slopes of the Cameroon Mountain, have adopted and adapted the beliefs to their own rainforest habitat. According to Ittmann (1957, 1972), a notable feature of the cult language was its currency across ethnic and linguistic boundaries. Ardener is cautious about Ittmann's eclectic analysis of the variety of *liengu* beliefs (1975: 15n.4). Nevertheless, it appears that the *liengu* language, despite phonemic differences between groups, was used and recognised by several including the Duala, Kpe, Mboko and Wovea. Ardener describes it as a code with vocabulary derived from various sources (Ardener 1956: 38) while Ittmann elaborates a full grammar (1972). Despite the modern decline of the rites, scraps of the secret language remained common currency among Christian, urban, educated women until recently (E. Ardener 1975: 10).

Ardener describes the Kpe kinship system as one of double descent, with virilocal marriage and largely patrilineal inheritance (Ardener 1956: 53). But matrilineages retain emotional and religious significance, particularly in fertility rites. Men could participate in *liengu* and might succumb to the characteristic 'sickness' or possession in cases where no women were left in a man's extended family (E. Ardener 1975: 10). Ittmann (1972: 14) described the role of women as decisive since they alone can represent the water spirits. In the Kpe version, *liengu* ideology is intensively hostile to men (and to white culture) (E. Ardener 1975: 11-12). The rites involved medical curing, but were also rites of passage. While men stressed the aspect of healing troublesome sickness, Kpe women, according to Ardener (1975), had a very different view of what was going on.

*Liengu* rites were enacted 'as a response to a fit or seizure that comes mainly upon an adolescent girl but also upon older women' (E. Ardener 1975: 8). Generally, it was expected that all girls would suffer this attack by

the spirits; formerly, girls might go through the rites together as a prelude to marriage, staying inside one seclusion hut (Ardener 1956: 97, 99). Their experience compared with typical fattening seclusion rites of Nigerian groups (Ardener 1956: 94). While Kpe men understood the process as a curing of the affliction of the spirits, women instead saw that, to solve the problem, a girl had to become one of the *liengu*. During a long seclusion when she learned to speak the spirit language, the girl was immersed in the mermaid world with its peculiar anti-male, anti-European, indeed anti-‘cultural’ symbolism (E. Ardener 1975: 12).

Three different versions of the rites existed among the Kpe, two expensive ones (*liengu la ndiva*, *liengu la mongbango*) which lasted over a year, and one reduced version (*liengu la vefea*) (E. Ardener 1975: 8-10). The classic symptom occurred when the girl fainted over a fireplace and knocked one of the stones supporting the cooking pot out of place. Depending on which way she fell, the appropriate ritual treatment would be diagnosed (Ardener 1956: 98n.18). The *ndiva* rite (meaning ‘deep water’) kept the closest connection with the old water spirits. A woman would come to speak to the girl in the *liengu* language. If she showed signs of understanding, a *liengu* doctor (male or female) would be summoned who sacrificed a cock, sprinkling blood into the hole where the hearthstone had been. Clearly operative in this symbolism is opposition between blood and domestic fire, comparable to the Bemba beliefs (also echoed by the Venda). The girl in the grip of spiritual powers acts in a way directly antagonistic to domesticity and cooking.

During her months of seclusion, the girl was taught the spirit language and given a *liengu* name by a woman sponsor (E. Ardener 1975: 9). During this time, she dressed in purely natural products – bark, roots, leaves. Her hair had to grow uncontrolled and she was smeared with charcoal and oil, so that she was black, resembling the spirits (E. Ardener 1975: 11). She could only ‘talk’ to visitors by means of a rattle, which she used for reciting *liengu* formulae each night and morning. In the *mongbango* version, this rattle could be used to strike a man who molested the girl so that he became impotent. Far from contact with men, the girl treated rats in the house as if they were her ‘husbands’, burying and mourning any rat that was killed in the compound (E. Ardener 1975: 11). In a society with a (male) ideal of polygynous, virilocal marriage, the *liengu* rite celebrates the diametric opposite: a girl’s polyandrous marriage to animals.

At the end of seclusion in *ndiva*, the girl was carried to the river, ideally by men of her matrilineage, and

pushed into the deepest part of the stream, while women sang *liengu* songs. The company tried to catch a crab, which represented a water-spirit. After this, the girl was regarded as a familiar of the water spirits, and one of the *liengu* women (E. Ardener 1975: 9). In a final emergence, she was rubbed with the traditional red camwood. Following the coming out feast, she was at last supposed by men to be immune from further attack and fit for marriage, 'rescued from the wild' as Ardener puts it (1975: 12). But 'she still continues to bear a spirit name and converses with fellow-women in the mermaid language' (E. Ardener 1975: 12).

### **8.6 Factors leading to elaboration of mechanisms to counter freeriders**

Examples such as the Kpe *liengu* or the Kpelle *sande* illustrate vividly that puberty schools do not exist merely to turn out docile young women who are going to be meekly amenable to their husbands. Girls are being indoctrinated in obedience, but obedience to whom? These institutions embody intra-female coalitionary strategies, generating widespread and long-term reciprocal alliances. They establish a woman's credentials as a member of a watertight 'gossiping' community. Acquisition of secret language is tied into passage through arduous ritual tests of conduct. Secret language itself comprises kernel references to named ritual actions and objects, and to taboos which, once introduced at initiation, continue to govern the rest of a woman's reproductive career.

To control freeriding, it is above all important to secure reliability of in-group members, whether those are defined by clan, dialect or ethnic boundaries. This requires powerful sanctions to operate against any defector in circumstances where it is difficult for a defector to move to another group (cf. Nettle 1999). Out-group members may be assumed, as a default, to be unreliable. However, cases such as the *liengu* cults on the Cameroon coast indicate that it may be possible to forge ritual affiliations engendering goodwill across ethnic and dialect boundaries. Perhaps the most notable example of this 'international' potential of ritual is the *poro/sande* complex, the paired male and female schools belonging to numerous Mande-speaking groups in Guinea, Liberia and Sierra Leone (Bellman 1984). Despite local variations in ritual practice, neighbouring groups 'recognise a communality of membership' though this remains highly context-dependent (Bellman 1984: 19). Remarkably, among the ritual hierarchy which controls *poro/sande*, the Zo, kinship is recognised with patrilineages from which Zo are recruited, irrespective of dialect or ethnicity within a district. Beyond a

district, kinship may not be recognised with Zo patrilineages, even where dialect is shared (see Bellman 1984: 22). So ritual hierarchical ties combined with geographic proximity can override dialect markers in establishing group loyalties.

As discussed in Chapter 7, payoffs to freeriders are affected by size, mobility and dispersal of population. The three groups examined here have quite different profiles. The Bemba were a sparse and widely dispersed population of shifting hoe cultivators. Richards reports a population density of 3.67 per square mile (1956: 25), with villages of between 100 and 200 inhabitants (Murdock 1967) spaced up to 20 miles apart. There would be few places for freeriders to hide. Estimates for Venda population density prior to significant urbanisation are difficult to obtain (see Stayt 1931: 1), but given their intensive forms of agriculture this is certainly considerably greater than for the Bemba. Their villages were twice as large, up to 400 inhabitants (Murdock 1967). Ardener gives estimates of 122 Kpe per square mile in an overall population of 300 per square mile, indicating a degree of ethnic intermingling (1956: 15). Their villages were small, at less than 100, so much more patchily distributed relative to the highly clumped Venda, allowing for mobility of both persons and information.

Other key factors affecting tolerance of freeriding and development of counter-mechanisms involve kinship and its role in labour organisation. Under the matrilineal Bemba system, a woman is unlikely to stray far from her own natal village, except in special circumstances when she is visiting or married virilocally to a headman. She would expect to be working alongside closely related women. By contrast, the Venda and Kpe women move out to marital homes where they would be in cooperation with non-kin. The Venda puberty ritual *vhusha* stresses this aspect. A mother should be last to know of her own daughter's menarche; her co-wife acts as sponsor, mobilising the community for the ritual (Blacking 1969a: 9, 10, 13). Within the puberty school, the Venda have special practices for establishing 'fictitious kinship' (Blacking 1959). Here, it is possible to see ritual elaboration arising to forge alliances in the absence of real kinship. Freeriding by close kin is more tolerable since it is mitigated by inclusive fitness (Dunbar 1999). In documenting the *hxaro* gift-exchange system of the Ju/'hoansi, Wiessner shows that failure to reciprocate is tolerated between close kin, where it would not be between distant kin (1977: 124). In the case of distant kin 'where reciprocity is not a right of



kinship, the hxaro bond serves to secure it' (Wiessner 1977: 124).

Risks of social defection among Bemba women were reduced by the factor of population dispersal, and mitigated by kinship. While the Bemba retained some ritual for admission to the women's community, they had far less emphasis, relative to either the Venda or the Kpe, on formal instruction in linguistic mechanisms that established a woman's credentials as having paid her ritual dues. Relative to the complex cycles of the Venda and the Kpe, *chisungu* diminished rapidly once it had lost its economic purpose (that is, recruiting male labour as brideservice to the matrilineal village).

Special factors affected the Kpe owing to changes in the early part of this century. Formerly the staple crop had been male-cultivated plantains, but this was replaced by female-cultivated cocoyams, resulting in a labour pattern of women travelling far outside villages to collect firewood and work the farms, while men stayed at home with penned livestock (E. Ardener 1975: 7). Also appearing at this period were plantation workers, migrant labourers and strangers who contributed greatly to marital instability and divorce among the Kpe (E. Ardener 1956: 65, 1975: 13). Kpe women then were coming into increasing contact with strangers of both sexes, in an ethnically mixed community, as well as being particularly vulnerable to harassment by foreign males. It is easy to understand how these factors promoted the coalitionary strategies exemplified by the *liengu* cult, not least its capacity for crossing ethnic boundaries. Shirley Ardener describes the dramatic direct action taken by Bakweri (Kpe) women when one of them received specific forms of sexual insult:

'If such an insult has been uttered to a Bakweri woman before a witness, she is supposed immediately to call out all the other women of the village...the women then run and pluck vegetation from the surrounding bush, which they tie round their waists. Converging again upon the offender, they demand immediate recantation and a recompense. If their demands are not met they all proceed to the house of the village head. The culprit will be brought forward, and the charges laid. If the insult is proved to have been made, he will be fined a pig of a certain size for distribution to the group of women...The women then surround him and sing songs accompanied by obscene gestures. All the other men beat a hasty retreat, since it is expected they will be ashamed to stay and watch while their wives, sisters, sisters-in-law and old women join the dance. The culprit must stay, but he will try to hide his eyes. Finally the women retire victoriously to divide the pig among them' (S. Ardener 1975: 30)

Ardener recounts a further case occurring on one of the ethnically mixed plantations where women combined 'regardless of tribal origin' against the foreign offender. The particular category of insult triggering this had connotations of 'women's secrets' revealed, with implied connection to *liengu* (S. Ardener 1975: 33).

In his overview of West African secret societies, Butt-Thompson described possession of 'an esoteric speech, known only to the members' as 'a sure sign of membership'. Such speech 'may approximate a language ...or be merely isolated phrases used in ritual and for passwords' (Butt-Thompson 1929: 150). The languages of the women's societies, Butt-Thompson claimed, 'have not so rich a vocabulary as those of the men, but they are even more jealously guarded' (1929: 154). Such a generalisation must be treated with skepticism in view of the terror associated with revelation of men's society secrets such as *poro* (Murphy 1980: 200, Bellman 1984: 53-4). But it holds in the cases under discussion. Women's major weapon for maintaining integrity of special songs and ritual utterances is less the threat of terror against outsiders than embarrassment. Many of the formulae are so explicitly sexual in nature that, when chanted by a large collective of women or girls, they work as a signal for men or boys to clear out of the way (cf. Krige 1968: 176-7, on Zulu girls' puberty songs).

In the cases of the Bemba, Venda and Kpe, the degree of elaboration of secret language associated with costly initiation corresponded to the risks of social defection faced by women in their respective socioeconomic contexts. Rituals where this knowledge of secret entities (like *mbusa* or *liengu*) was imparted functioned to bound communities within which social interactions were trustworthy, effectively underwriting generalised reciprocity.

### 8.7 Relevance, gossip and secret knowledge

Reciprocity need not imply egalitarianism, particularly where asymmetric exchange takes place between elders and youth. Arguments that secret societies function to solidarise tribal groups are simplistic. Bledsoe warns: 'too much emphasis on solidarity obscures important patterns of stratification in West African secret societies.' (1980: 68) The ways in which *sande* leaders, in particular, 'manipulate young women's labor and reproductive capacities dispel the notion that the Sande society is a united egalitarian organization of women joined in sisterhood to confront men.' (1980: 77). When profits are to be made, says Bledsoe, 'Sande leaders readily put aside women's solidarity in favor of more lucrative coalitions.' (ibid.) Their machinations intensify power differences between lineages, age groups and between the sexes. But the point here is that the threads of political and economic manipulation all run through the ritual and secret society network. The aristocratic lineages own land, but this economic hegemony would be politically ineffective in the absence of the ritual leadership. Ritual leaders wield a 'media tycoon' control of communications that effectively determines who can know what.

In his study of *poro*, the male counterpart to *sande*, Bellman analyses secrecy 'according to the ways concealed information is revealed' (1984: 5). This is what *poro* (or *sande*) teaches: how a secret can be kept, and the consequences of inappropriate exposure. *Poro* may structure the political élite, as in Liberia, operate illegally underground as in Guinea, or function as workers' unions, as in Sierra Leone. In all these changeable political climates, its members discuss and conspire 'under the security of the Poro's secrecy proscription' (Bellman 1984: 13-14). 'What must not be talked' varies according to context, but one overarching rule of secrecy, a boundary secret, secures all the subsidiary secret decisions made on a day to day basis. As Bellman puts it, 'the *contents* of the secrets are not as significant as the *doing* of the secrecy' (1984: 17). Boundary secrets may be illusory, fictional or even that there is no secret, but they are still a description or cipher of real social relations (cf. Murphy 1980: 203). Different cohorts of members, says Bellman, 'can be identified by their respective rights to know...social networks can be defined according to access to types of concealed knowledge. The very identification of whether some piece of information is or is not a secret is indirectly a matter of membership identification.' (1984: 7) Display of membership through the telling or keeping of secrets, 'is both a way of

establishing mutual interests and a way of advancing in rank and power' (ibid.). Commenting on use of secret language by Dogon youth, Calame-Griaule notes that it can operate in two ways: firstly, as a means of reinforcing bonds within a group, demarcating that group against outsiders; secondly, as a test within the group, a competitive display of 'the knowledge, intelligence and quick responses' of group members (1965: 394). Similarly, Venda children compete with each other in the adult game of displaying *milayo*, riddles with purely social relevance.

It is within this context of a group ritually bound to respect secrets that we should view competition for status awarded to individuals with 'relevant' information (cf. Dessalles 1998, 2000; Knight 1998). Ritual leaders such as *poro* and *sande* Zo may have practical and technical know-how that is highly relevant, for instance knowledge of the history of land rights, snake-bite medicine or midwifery. The Kpelle ethos, writes Murphy, is that 'whenever there is an important cultural skill, it is usually appropriated and controlled by a secret society.' (1980: 196) Ultimately, these subsidiary societies come under authority of *poro*. Hence, the claim to relevant knowledge is based on ritual status, expressed by control of secrets whose relevance is social. As fictions, the secrets are 'irrelevant' to the external, objective world. No more nor less fictional is the 'gossip' about land tenure and ownership propounded by *poro* historians, or about adultery and paternity by *sande* midwives. In the final analysis, it is ritual status that dictates relevance, not the other way round.

'Gossip' comprises manipulation of fictions in principle identical to 'secret' knowledge. Gluckman (1963a), drawing on work by Colson (1953), viewed gossip as a means of bounding social groups, generating cohesion. But the information being communicated through gossip, rather than derive from the actual content of what is spoken (which is highly politically motivated), derives from the social facts of who is entitled to gossip about whom, and in front of whom. It is information about membership and belonging (Gluckman 1963a: 313-4). As a mechanism of social bonding, gossip is by no means to be denigrated as 'small talk' (Renfrew 1998), somehow less impressive in its symbolic concomitants than full-blown symbolic language. Selection for abilities to exchange social information has tested and developed human 'machievellian' intelligence to the utmost. As Fernandez puts it:

'Who is to deny that our fictional powers are central to what we humans are and to what we have

become. For human creativity lies in our freedom for and engagement with fiction – the benign form of lying. But even in our power to create fiction, there lies the notion of the secretive – the notion of a profounder reality that our powers of prevarication, whether devious or benign, have concealed or can reveal. The notion of something concealed in experience is profoundly human and arises, it may be argued, from our capacity to lie.

It is obvious that such a profound and paradoxically ambivalent capacity deserves our closest attention. Indeed all human societies have had laboriously to develop ways of managing the power to prevaricate so that the center of things does not fall apart and so that people can hold to each other with some confidence that their mutual expectations will be realized. One of the most important institutions available to human groups for this purpose is ritual, with its particular power to sanctify and thus guarantee human relationships. The paradox is that rituals employ prevarication – benign perhaps – in order to save us from their detrimental consequences. Rituals, of course, are almost always associated with secrets known only to the initiated.’ (Fernandez 1984: vii-viii)

Gossip cannot be considered as some material item of trade with intrinsic value independent of context. Its value is purely social and politically determined within ritually generated communities. In this chapter, I have argued that preservation of that social value depends on a framework for concealing and revealing information. Costly signals in ritual ‘flesh and blood’ performance establish that framework by creating a boundary around the gossiping community. The fundamental body metaphor for such costly signals is the shedding of blood. I have drawn on examples from African ethnography to demonstrate that ritual surrounding the concealing and revealing of menstruating females forms the primary arena for establishing trust in gossip. These examples conform closely to predictions of the ‘sham menstruation’ model for establishing long-term reciprocity between cycling and non-cycling females.

Unlike gossip, menstrual blood has intrinsic material value: always and everywhere it indicates imminent fertility. Whoever can substantiate a claim to be ‘menstruating’ has corresponding value, hence credibility. Even men in schools of male circumcision – high-cost signals of genital bloodshed – borrow the metaphor of menstruation for other kinds of bloodshed. The secret language of the Dogon, *Sigui*, is the language of *Awa*, the sacred masks (Leiris 1948: 13). Epithets of *Awa* run in ritual concatenations:

‘Very strong, very very very red, very strong, very red’ (Leiris 1948: 60)

Taboos laid on men in respect of the masks directly parallel the menstrual taboos that structure women’s lives (Leiris 1948: 6-7). The red fibres of the masks are dyed with blood, or so women and the uninitiated believe – that is the secret (Leiris 1948: 80). The day when these fibres are dyed is named ‘the menstruation of men’ (Leiris 1948: 78).

### **8.8 Summary: secret language use at female initiation**

In this chapter, I examined puberty ceremonial as a means of introducing girls as reliable and trustworthy members of gossiping communities. In particular, I looked at ritual contexts of secret language, social fictions which constitute membership of alliances. In the case studies examined, degree of elaboration in secret language corresponded to risks of social defection. The secret knowledge imparted in initiation contexts is socially relevant, but quite irrelevant in the objective world. Only once a boundary of trust is established by such social fictions can status be accorded for relevant information, including social information or ‘gossip’. Status in the ritual hierarchy may dictate the relevance of gossip. This contrasts with the view that status is accorded for objectively relevant information.

## CHAPTER NINE

### CONCLUSION

This thesis is part of a wider collaborative project on the evolution of symbolic culture which has addressed questions about the social framework for symbolic communication (Knight 1991, Knight et al. 1995, Power and Aiello 1997, Watts 1998, Dunbar, Knight and Power 1999). The great challenge for evolutionary anthropology is to account for the emergence of symbolism. A Darwinian paradigm leads us to consider not only the evolutionary advantages of strategies, but also the costs. From the perspective of the 'selfish gene', the Durkheimian notion of symbolism as the glue of human social life appears problematic. Why would individuals expend time and energy in costly ritual or religious activities engaging with things that do not exist in the 'real' world? Symbolic communication in the form of language is less costly, but also therefore less intrinsically reliable, vulnerable to deception in the Machiavellian political world of evolving humans. By defining symbolic culture as a set of 'collective deceptions', Knight et al. (1995: 77) highlight a paradox: the capacity for displaced reference in primate life is exercised by individualistic 'tactical deception', while ritual as generator of 'collective representations' ensures moral unity (Durkheim 1947, Rappaport 1979). How can an evolutionary trajectory based in deception provide the foundation for moral authority?

Signal evolution theory, the appropriate branch of Darwinism to apply to the evolution of symbolism, elucidates this paradox. By focusing on the interaction between signaller and receiver, signal theory shows that costs incurred by one side or the other depend on degree of conflict of interest between the two. In situations of conflict where one party seeks to exploit the other, receivers will probe signals for honesty, requiring costly and reliable displays of signaller quality that are easy to read to overcome their 'sales resistance' (Krebs and Dawkins 1984). This leads to a dynamic of loud, redundant, multimedia signals. By contrast, where interests are shared, both signaller and receiver may cut their costs; if it pays them to receive the signals, individuals will strain their senses, and signallers have no need to increase signal costs. This yields a dynamic of 'conspiratorial whispering'. Knight et al. (1995: 83-4) argue that these two poles of exploitative and cooperative signalling are

found in human symbolic communication as ritual on the one hand, speech on the other. The low-cost, conventional design features of speech imply evolutionary origins in situations of cooperation, where listeners have needed to know and honesty was assumed. The loud, energetically expensive and stereotyped displays characteristic of ritual, by contrast, emerged in a dynamic of social conflict, where *coalitions of signallers* had to demonstrate quality to those who resisted the message (cf. Zahavi 1987). Ritual and speech coevolve as participation in high-cost ritual signalling creates a fixed coalition whose members trust each other in the low-cost conspiracies of speech (Knight 1998). In this view, following the Durkheimian tradition of Douglas (1973), Rappaport (1979, 1999) and Bourdieu (1991), it is not language that can be considered the prime mover in establishing symbolic culture, but ritual that forms the basis of the moral efficacy of language.

In human evolution, the situation in which *both* shared interests and competition were endemic (cf. Cullen 1995), leading to elaboration of both forms of signalling, occurred in contexts of sexual selection. Signalling experienced by outsiders to the coalition as negative, deceptive or exploitative, was, for coalitionary insiders, positive and, in Durkheim's sense, 'morally' unifying, generating within-group trust, establishing conspiracy. The medium of that conspiracy, a collective deception, formed the first symbolic construct. Two basic sex selection scenarios are possible, one of male ritual coalitions signalling quality to females (and male coalitionary rivals); the other of female ritual coalitions signalling quality to males (and female coalitionary rivals). Almost certainly, both these forms emerged in the course of evolution. But whereas the first type necessarily produced hard-to-fake, indexical signals, corresponding to perceptual reality – indicative of real numbers, real strength or weaponry, and so on – the second type in the form of female coalitionary action automatically required collective defiance of perceptual reality. Such construction of counter-reality became the medium for political mobilisation against dominance, the 'powers of the weak' mustered against would-be philanderers who attempted to single out and isolate the most reproductively valuable or imminently fertile females. Red cosmetics were adopted as the flag of political resistance as females scrambled the information available to males about which particular females were imminently fertile. Such cosmetic confusion was backed up by performance demonstrating that cosmeticised individuals were not in fact females at all, but males, and animals, nor individuals but a single indivisible body. These ritualized coalitionary displays summoned the first 'collective deceptions' as morally authoritative constructs to establish conditions of taboo



and ‘No access’ – the sacred domain.

Only loud, redundant, costly signalling by ritual coalitions could impress and overcome ‘sales resistance’ of male outsiders. Conspiratorial whispers of speech would be no use at all in signalling to those outside the coalition who were probing for reliable signs of quality. But within the coalition, males as kin would be included as co-conspirators, participating in ritual display to create the symbolic domain. Males as outsiders, that is mates, motored the evolution of the ritually generated symbolic domain through sexual selection, by choosing cosmeticised female coalition members. The quality such females reliably demonstrated was the extent of their alliances, and the support available to their offspring; therefore males chose to invest in them.

The prototypical cosmetic ritual is here termed ‘sham menstruation’, encompassing deceptive sexual signalling that confuses reproductive and sexual status of ritual participants, both female and male, reversing perceptual reality and normal dominance relations in engendering the sacred domain. In this thesis, I have examined the ‘sham menstruation’ hypothesis for symbolic cultural origins.

In the first part of the thesis, I addressed the evolutionary background and processes leading to the strategy through evolutionary ecological modelling in the light of the fossil record. Costs of encephalization (the evolution of increasingly large brains) experienced by mothers resulted in selection in two main areas: i) for physiological changes to body size and life history variables that altered the ways females divided their somatic and reproductive efforts; ii) for social and behavioural changes involving allocare and increased support for females with large-brained offspring. Changes in the first category themselves were likely to alter the trade-offs for prospective allocarers or investors (either female kin or males as mates), leading to new behaviours in the second category. In Chapter 2, I investigated the energetics of encephalization, discussing possible selection pressures for large, expensive brains which may be linked to underlying climate change. Two critical periods of rapid increase in brain size occurred, the first associated with early *Homo* culminating in the emergence of *H. ergaster/erectus*, the first hominins with ‘modern’ body proportions and locomotion. The costs of the initial increase in brain size and body size could be supported through dietary change, permitting reduction in gut size (Aiello and Wheeler 1995, Milton 1999), and shifts in the direction of humanlike life-history variables (Foley and Lee 1991, O’Connell et al. 1999). Resulting from changes in foraging and social strategies, life history

parameters of high fertility rates, childhood (with continued support of juveniles after weaning), delayed sexual maturity and long postreproductive lifespans evolved. The first social division of labour probably entailed intergenerational cooperation of female kin, as longer-living senior females reduced the interbirth intervals of daughters by offering foraging support to weanlings, in contexts of reduced adult mortality. In the scavenging economy of the early Pleistocene, males may have made important contributions to nutritional welfare of children (not necessarily their own), through intermittent mating effort rather than persistent and reliable parental provisioning. These novel forms of social cooperation and allocare imply a tendency to female philopatry within larger social networks.

The second rapid stage of encephalization commenced in the Middle Pleistocene with *H. heidelbergensis*, culminating in ourselves and the Neanderthals. Associated with this phase (c. 500-100,000 BP) are further social and behavioural changes that enabled females to meet increased reproductive costs. In Chapter 3, I discussed and modelled specific female strategies for raising investment by males. Evolutionary ecological studies of modern foragers debate whether provisioning offered by men constitutes mating effort or paternal effort (Blurton Jones et al. 2000, Marlowe 1999). When modelling Middle Pleistocene strategies, it is conservative to assume mating effort as the main motivation for male care. Female mechanisms for improving male attentiveness are primarily sexual signals. Features of concealed ovulation and ‘continuous’ sexual receptivity function to reward males who mate-guard attentively rather than philanderers. However, once a female is clearly pregnant, nothing guarantees continued male support. Among modern foragers, pair-bond stability seems to be determined by mating opportunities for men rather than effect of desertion on offspring survival (Blurton Jones et al. 2000). One key parameter which affects mating opportunities for philanderers is degree of female reproductive synchrony, birth seasonality being the most likely to impact hominin mating systems (Turke 1984, Foley and Fitzgerald 1996, Power et al. 1997). I designed computer simulations to investigate the effect of birth seasonality on payoffs to philanderer and more faithful male strategies at varying levels of paternity confidence and infant mortality. Only in conditions of strong seasonality where male care significantly reduces infant mortality, and paternity confidence approaches modern human levels, are philanderer males likely to alter their strategies to offer longer periods of dedicated care to females and offspring. Where females show random birth patterns, philanderers do best to pursue roving male strategies.

Birth seasonality strong enough to affect philanderer payoffs is found among modern foragers, including the Ju/'hoansi (Wilmsen 1978), and could especially have promoted pair-bond stability among Eurasian archaic humans in the late Middle Pleistocene. However, this model assumed risk to child survival affected male strategies, whereas evidence from modern foragers suggests it may not. This in turn suggests that late archaic to modern human females gained more male investment by motivating more persistent and productive mating effort. Possible strategies include 'partible paternity', seen in contemporary Amazonian communities, where women share the chances of paternity among and extract investment from several men; in particular, female coalitionary strategies could force philanderers to 'showoff' by engaging in competitive hunting of large game.

Such coalitionary strategies are predicted to take the form of 'sham menstruation', described fully in Chapter 4, resulting in proto-symbolic ritual cosmetic display. Male philanderers are most interested in locating cycling females, hence menstruation, as the key signal of imminent fertility, has a directly translatable economic value in motivating male mating effort. Menstrual, cycling females potentially threaten to divert investment away from non-cycling females. But, by appropriating menstrual signals cosmetically, pregnant and lactating females, who need the extra energy most, may attract increased investment to the entire coalition. Red cosmetics advertise the presence of menstrual females, amplifying the signal, and confusing male attempts to single out specific cycling females. Collective female resistance to would-be philanderers generates 'collective deceptions' as cosmeticised women, with male kin support, signal non-availability by performing '*Wrong species/sex*', establishing taboos on access to 'menstrual' women. Such signals are necessarily ritualized, loud, repetitive and stereotyped, to overcome the resistance of philanderers, persuading them to collude by going hunting. The strategy is well designed for reciprocal altruism among a coalition of females, whether related or not. No female qualifies for benefits of extra provisioning when she is pregnant/lactating, unless she proves her loyalty when cycling. All fertile females alternate between being cycling (and attractive) and non-cycling (and less attractive).

In Chapter 4, I related the 'sham menstruation' model to the other major Darwinian models for the evolution of language, social cooperation, art and the sexual division of labour. I argued that 'sham menstruation' was not only compatible with, but necessarily integral to these models of social and sexual change leading to the

emergence of behaviourally modern humans. This is particularly true of two Machiavellian intelligence models, Dunbar's 'vocal grooming and gossip' hypothesis (1996) and Erdal and Whiten's 'counter-dominance' hypothesis (1996). Sham menstruation also provides the precise mechanism for generating intrasexual and intersexual cooperation in Key's game theory model for the evolution of cooperation as female reproductive costs rise relative to male costs (1998). Key's model works if females develop strategies to 'punish' males who fail to cooperate unconditionally. Sham menstruation shows how they can do this, forcing philanderers to compete in the arena of 'showoff' hunting of big game (Hawkes 1991, 1999) – costly and extravagant behaviour for males, that may be highly productive for groups of females and offspring. Rather than assume cooperative parenting, when services between the sexes are so asymmetrical, the evolution of the sexual division of labour is best seen, as Bird puts it, 'as an outcome of conflicts rather than similarities in reproductive goals' (1999: 72). As such, it can be framed in terms of 'sexual dialectics' (Gowaty 1997), where change in mating systems is driven through co-evolution of male abilities to control access to female fertility, with female abilities to resist such control. The sham menstruation strategy, engendering symbolism, results from female resistance to male control via brokering of high-energy resources. That is, philanderers may attempt to trade meat for access to specific cycling females on an individual basis; the female coalitionary strategy restricts such access except on production of large game for the whole coalition.

The second part of the thesis focuses on testing the main predictions of 'sham menstruation' outlined in Chapter 4, section 4.2. These range over several fields, from the archaeological and palaeontological records to recent ethnography of cosmetics use and magico-religious symbolism. Chapter 5 comprises a review of the geographic and temporal record of ochre use, summarising the main findings of Watts (1998). This answers the key prediction (1) that the earliest ritual tradition will be evidenced by a red cosmetics industry. Watts found evidence for the onset of sporadic red ochre use from c.300,000 BP by *H. heidelbergensis* in both Eurasia and Africa. From 200,000 BP, Eurasia shows significant discontinuity in the record, while Africa provides some evidence for continuity through to the end of the Middle Pleistocene. From the Middle Stone Age (MSA) 2b in southern Africa, we see an 'explosion' in ochre use, with strong bias for 'redness' and 'brilliance' in the choice of materials. In his review of ethnohistoric pigment exploitation in southern Africa, Watts found the same selective criteria among the Khoisan, with bright red and brilliant materials – haematite and specularite – most

favoured. Women had the central role in the costly business of procurement and processing these pigments, which were used overwhelmingly in ritual contexts, and were invariably present in menarcheal rites. While menarcheal ritual provides a template for other rites of transition in Khoisan cosmology, Watts concludes that 'Khoisan menarcheal rituals probably provide us with the *single* most useful source of ethnographic information about the role of red pigments in the MSA' (1998: 262). Predictions 2 and 3 state that evidence for a ritual cosmetic tradition should correlate with the onset of modern behaviours in respect of hunting, a symbolically structured sexual division of labour, and investment in homebases. At the MSA2a/2b boundary, where ochre use becomes regular, we find 'the first appearance of bladelet technology, the generalisation of grindstones, the differential use of shelters, the indications of increased logistical organisation' as well as long procurement distances of possible 'prestige' goods (Watts 1999: 120). Predictions 4-6 address the fossil record. Since sham menstruation is motored by female experience of reproductive stress associated with encephalization, it should not appear before brain sizes start to increase in the Middle Pleistocene but should appear before cranial capacities reach maximum. This is supported by the lack of evidence for pigment use by *H. erectus*, and the initial sporadic ochre record associated with *H. heidelbergensis*. Discrepancies in the subsequent Eurasian and African records suggest different strategies between Neanderthals and the African ancestors of moderns. Regular sham menstrual ritual underpinning a sexual division of labour is also expected to correlate with reduced robusticity, first in females and offspring, while cosmetic signalling should associate with speciation of modern humans. At a gross level this is supported by fossil evidence of reduced robusticity in moderns, but more data are needed to compare gracilisation between the sexes. The sparse but continuous record of ochre use stretching back some 200,000 years in Central Africa also appears compatible with molecular genetic evidence on coalescence dates for modern human ancestors. I ended this chapter by discussing possible reasons for differences between Neanderthal and modern human strategies, suggesting that marked birth seasonality enhanced pair-bond stability among Neanderthals, while African foremothers of moderns, with inherently less stable pair-bonds, were forced to use ritual traditions to mobilise male hunting as mating effort. A 'seasonality thermostat' model leads us to expect that where birth seasonality breaks down, as a result of sudden shifts from cold/dry to warmer climates, 'sham menstrual' ritual should arise. This fits fairly well with the visible record of ochre use worldwide. The Châtelperronian offers limited evidence that the Neanderthals could and did use cosmetics.

Chapters 6 and 7 focused on predictions and premises derived from the sham menstruation hypothesis that can be tested in recent historic ethnography, the first chapter concerning magico-religious symbolism, the second developing a behavioural ecology of cosmetics use and costly ritual signalling. A ‘vulgar’ Darwinian analysis of cosmetics usage, focused entirely on individualistic competitive sexual display, fails to notice the importance of ‘beauty magic’ – deployment of the ornamented body to invoke ‘other-worldly’ powers. Cosmetics establish cosmology, locating the ritual performer within the enduring social cosmos. Cosmetic signals have performative force, mobilising the ‘accumulated symbolic capital of the group’ (Bourdieu 1991: 111). But such magico-religious functions do not form a separate level of analysis from Darwinian sexual selection; the expensive religious packaging is intrinsic to the attraction. Cosmetics constitute performers as members of bounded and enduring ritual coalitions; this is the quality individuals must display in coalitionary contexts before they become attractive as individuals. Through such ‘magical’ means, cosmetics attract not only mates, but also work by those mates. Sham menstruation is a simple Darwinian account of the evolutionary role of cosmetics in ‘magically’ motivating male productive labour. It describes (prediction 7) the archaic signature of ritual power – red pigments mimicking menstruation together with ‘wrong’ signals reversing the normal species mate recognition system – and expects (prediction 10) a time-resistant syntax deriving from that archaic signal. These signals of ritual potency should prove highly conservative, and should therefore be detectable in recent historic ethnography of initiation. I collected data on use of cosmetics and associated magico-religious symbolism at initiation, both female and male, from a sample of 21 sub-Saharan African cultures. Red cosmetics were found most frequently, in over 70 % of cases, used equally by males as females. This compared with use of white cosmetics in 45 % of cases. Cosmetic forms of bloodshed were found in half of the female rituals, and over 80 % of the male, the majority of male cases comprising circumcision, supporting the notion that red cosmetics mimic menstruation. This is confirmed by the presence of ‘wrong sex’ signals in over 70 % of cases (including cultures where no initiation was recorded), and almost 80 % of recorded initiation rites. Of the 21 cultures, 19 provided evidence for some form of ‘wrong sex’ signalling. Overt ‘wrong sex’ signals were seen most frequently in male ritual. Red cosmetics and/or amplified bloodshed were directly associated with ‘wrong sex’ signals in over half the sampled cases, and 60 % of recorded rituals, whereas white or black cosmetics rarely associate with ‘wrong sex’ independently of red and/or bloodshed. A clear majority of cases meets the prediction by the strictest criteria. ‘Crude’ or ‘vulgar’ Darwinian accounts of puberty ritual might

expect individuals to advertise sexual maturity through costly cosmetic display, but would not predict initiates signalling 'I am a member of the opposite sex' at this time. The prevalence of these 'wrong' signals conforms to expectations of Boyer's (1994, 1996, 2000) theory on cultural transmission of religious ideas. Sham menstruation explains why early modern humans should have expended time and energy in creating such 'wrong' or 'deceptive' entities, persisting even to this day in African initiation, and why those 'gods' should be linked to taboos on food and sex, as well as lunar/menstrual ideology. The current study was performed on a sub-Saharan sample, but could be replicated using ethnography from Amazonia, New Guinea or other regions.

Sham menstruation offers a guiding framework for evolutionary ecological analysis of cosmetics. Possible applications of its basic premises were explored in Chapter 7. A brief review of ethnographic evidence supported the fundamental assumption (Premise 1) that men are interested in tracking women's menstrual signals. Case studies (Strassmann 1992, 1996c, 1997b) suggest that the degree of male control over female menstrual signalling is a variable outcome of 'sexual dialectics'. This is an area for much further work where complex religious ideology may be related to socioecological features of mating systems. I conducted a small-scale pilot test using 18 sub-Saharan cultures that supported Premise 2 – degree of ornamentation in one sex correlates with levels of parental investment in the other. This needs further investigation through in-depth field studies looking at individual variation within a homogenous cultural setting, preferably in cultures where confounding factors of rank and stratification are minimised. The main body of the chapter developed Premise 3 – that cosmetics function as sexually selected signals demonstrating coalitionary alliances – by exploring models for variability in costly cosmetic signalling at initiation. In the simple sham menstruation model, ritual cosmetic display takes off as a sex selected trait because it demonstrates quality of the ritual signallers – specifically the extent of their alliances – to interested outsiders. Within the ritually bounded coalition, costly signals secure generalised reciprocity and cooperation. Both components – demonstration of quality, conforming to Zahavi's handicap model (Zahavi and Zahavi 1997), and establishing reciprocity, conforming to Trivers' generalised reciprocity model (1971) – are present in the early evolution of ritual signals. Which model best accounts for the evolution of increasingly costly signals at initiation? Zahavi's model predicts that initiation ritual should elaborate as sexual competition intensifies, forcing ritual signallers to bear higher costs in order to demonstrate quality; by contrast, Trivers' model predicts that costs rise to counteract increased risk

of freeriding on reciprocal alliances. Using a sample of 22 sub-Saharan cultures, I attempted to correlate costs of initiation for either sex with indices of freerider risk and sexual competition. Data were of extremely variable quality, and assessment of freerider risk was especially problematic. No clear correlations were obtained. But with the present sample there was some indication of difference between the sexes, with male ritual becoming more costly in more polygynous societies (Zahavi model), and female ritual cost increasing with freerider risk (Trivers model). The result probably reflects the bias of the sample to patrilineal/patrilocal bridewealth groups. A future study comparing female ritual costs in a divided sample of brideservice and bridewealth societies could reveal a stronger 'handicap' component in groups with brideservice, as well as a direct relationship between female ritual costs and male labour. This preliminary study also suggests that ritual costs of both sexes can be viewed as an outcome of sexual dialectics, the coevolutionary arms race of male efforts to control female reproduction and female efforts to resist that control.

In Chapter 8, I looked at case studies of another mechanism of alliance formation used in initiation. This was secret 'language' operating in Bantu female puberty schools, where the cosmetics applied within ritual coalitions closely matched expectations of sham menstruation. The secret language, rhymes or formulae generated 'wrong' or 'deceptive' entities which were implicated in periodic taboos on sexual access, and bounded the ritual community. This illustrated how sham menstruation, in complex culturally evolved forms, can act to secure gossiping communities on a basis of trust. Again, in these cases, degree of elaboration of secret language corresponded to levels of freerider risk. I also questioned the relationship between status and relevance in human communication (cf. Dessalles 1998, 2000). Secret language constitutes 'information' with purely social relevance, highly irrelevant to the external world. But only through its use can an individual gain a place within the ritual community that awards status for relevance. Even then, in the Machiavellian political world, position in the ritual hierarchy is more likely to dictate relevance of information exchanged, than objective relevance of information to dictate status (cf. Bloch 1975).

According to Tooby and DeVore (1987), a scientific model of human evolution should be framed within a coherent body of theory, should relate fields of data previously unrelated and generate testable predictions. Framed wholly within Darwinian signal evolution theory, sham menstruation enables us to relate data from the



archaeological and fossil records, as well as the ethnographic record. It remains the only Darwinian account of why early modern humans expended time and energy procuring and processing red pigments, showing the same behaviour in the Middle East, Australia and Europe. No account of symbolism can be satisfying unless testable against data on symbolic systems. Sham menstruation is quite compatible with Boyer's model for the cultural transmission of religious concepts, but also goes beyond Boyer in offering a functional account for the costly production of those concepts through the medium of ritual. The time-resistant syntax of ritual power generated by the sham menstruation/sex strike model permits fine-grained analysis of specific cosmologies. Here, rather than work in-depth on any one culture, I have used cross-cultural samples to show the universal applicability of the theory. The samples used are small, uniformly viable data are difficult to obtain and tests performed here are far from conclusive. But they indicate the potential for further work. In particular, the model offers the prospect of applying principles of behavioural ecology in material cost-benefit analyses of magic, art and ornament. Veblen (1992/1899) foreshadowed Zahavi's handicap principle, illustrating how wasteful display in the form of conspicuous consumption influenced human cultural practice and class relations. Zahavi reformulated those ideas in terms of signal selection, providing a currency for analysis – the 'selfish' gene. Sham menstruation models a simple relationship between cosmetics, 'magic' or 'ritual power' and economic effort, giving an account of gender relations among early modern humans. In principle, any coalition able to demonstrate quality by appropriating the conservative signals of ritual power can command the labour of outsiders.

Finally, sham menstruation accounts for the pervasive theme of reversal, characteristic of the sacred domain, which has preoccupied symbolic anthropologists from the inception of the discipline. The theory validates Victor Turner's insight that sacredness inheres in the combination of liminality and *communitas* – corresponding to counter-reality and counter-dominance. The novice Ndembu chief at installation must undergo ritual reviling; only once subject to the whole community could he then represent the undifferentiated *communitas* (1974: 82). Representation of unity necessarily entails paradox, contradiction, logical antitheses. So, ritual potency contains both sexes at once, a 'gender of power'.

In his account of 'rituals of rebellion', Gluckman (1963b) argued that such performances were counter-

revolutionary, functioning to shore up powers that be. Unable to explain why role reversal is necessarily implicated in *sacred power*, he suggested that real political acts of revolt disengaged from such ritual forms. But this is manifestly contradicted by a whole history of African women's political movements invoking ritual powers, through enactment of the liminal and anti-structural (cf. van Allen 1972, S. Ardener 1975, Ifeka-Moller 1975).

In the Igbo Women's War of 1929, when tens of thousands of Igbo and Ibibio women were mobilised in protest against the threat of taxes on women, resulting in widespread anti-colonialist revolt, mass demonstrations were conducted in ritual mode. Daubing themselves with charcoal and vegetable dyes, wreathing their heads with wild ferns, and presenting their bodies defiantly naked to the waist, women carried sticks said to invoke the power of female ancestors. Ifeka-Moller saw the women's 'war-dress' or ritualized dress of rebellion as expressing 'the importance of obtaining female solidarity' (1975: 132). Ibibio women – who faced British machine guns with unsurpassed courage – were organised through their *ebere* secret societies as 'women of the land' (1975: 139). Through symbolic use of wild ferns, they identified themselves with 'the wild', equating the reproductive powers of nature with their own reproductive, and productive, powers, which they feared losing (1975: 142). Another ritualized expression of inviolability, used especially by Ibibio women, was the wearing of tails of grass, by which they declared themselves to be vultures. An Ibibio woman gave this evidence:

'I was surprised to see the soldiers fire as we were women we call ourselves vultures we did not think soldiers would fire at us. Vultures go to market and eat food there and nobody molests them nobody will kill vultures even in the market even if it kills fowl' (Perham 1937: 209).

Vultures, symbolic of death, messengers from the other world, signifying the presence of ancestors, eaters of raw flesh, stand absolutely on the side of blood taboo and inviolability. Ifeka-Moller assumes women adopted their 'War' rituals from male-controlled cults, but here women's collective defiance was signalled by gender ambiguity in typical ritualized rebellion. In militant mood, Igbo and Ibibio women displayed themselves in 'male' aggressive postures, offering sexual insults and flinging sand in the faces of chiefs. They took on the gender of power, signalling 'wrong sex and species':

‘Receivers of sacrificial offerings and messengers of the gods, these female vultures went to war as did warriors of old’ (Ifeka-Moller 1975: 143).

Demarcating their ritually bounded coalitions with cosmetics, and establishing inviolability through reversal of species and sexual characteristics, these African women revisited the Human Symbolic Revolution of over 100,000 years ago.

## APPENDIX A

### REFERENCES ON PIGMENT USE AT INITIATION

Groups are ordered by linguistic grouping, and then geographic contiguity:-

#### a) *Ju/'hoansi (Northern Khoisan)*

Female initiation:- Red, Black.

This was formally similar to the marriage rite which could take place before menarcheal rite (Marshall 1959). In both cases powdered red stone mixed with fat was used by the mother to paint a design on the girl's face (Marshall 1959: 355, 365; 1976: 276). Lewis-Williams argues that the marks on her forehead and cheeks represent the eland's red tufted forehead (1981: 70). The menarcheal girl is also rubbed with eland fat. Metzger (1950: 73) records a black, oily ointment made of roasted kernels being used by an older woman to paint marks on a girl's face.

Women's general ceremonial use of powdered red earth recorded by Marshall (1961: 248), while all girls were scarified from age seven or eight (1965: 266), and charcoal and fat rubbed into the cuts (1976: 34-5). Marks accumulated on the thighs and buttocks up to the waist as the girl grew older, producing 'stripes..made only for beauty..in imitation of gemsbok – big, stately, gray antelopes with spectacular black markings' (1965: 267).

Male initiation:- Black.

Staying in the veld after he had shot the eland, a boy lit a fire and used ash to draw a mark on his forehead and down his nose, representing the eland's tuft (Lewis-Williams 1981: 58). After the eland has been brought back to camp, the boy was scarified and charred meat and fat rubbed into the vertical cuts on his face, arms, back and chest 'to give him the will to hunt, good sight and accurate aim...to prevent him from being seen by the animal' (Marshall 1959: 351). He is also anointed with eland fat (Lewis-Williams 1981: 62).

On emergence from menarcheal seclusion, the girl applied red pigment to adolescent boys, by whipping them playfully with a specially decorated wand coated with ochre as they filed past (Lewis-Williams 1981: 51). This was supposed to protect them while hunting.

In respect of the group male initiation camps called *choma*, probably adopted from the Tswana via other Central Kalahari groups, black was again the main colouring used. Ash or charcoal would be applied to cicatrizations specific to *choma* (England 1995: 246).

#### b) *Nama (Central Khoisan)*

Female initiation:- Red, White.

During her seclusion, a girl was visited by older girlfriends, who bring sweet-smelling powders (*sāp*), and make *!naop*, 'a face paint made by grinding a soft red stone to powder and mixing it with fat..used by the girls to paint patterns on their faces' (Hoernlé 1985: 63). At the end of seclusion, after she had been cleansed with dung and *!naop*, and the fire, which was *!nau*, or contaminant, had been relit, she came out in splendour, decorated with presents of beads and earrings from relatives. In Hoernlé's account:

'She is scented all over with the *sāp* which she and her girlfriends have ground. Her face is painted in curious patterns with *!naop* and *!quasob* ("ground white stone"), and her body is loaded with presents.' (1985: 65)

Her first act is to receive all the youths (and formerly men) in her hut, treating them by dabbing their testicles with a powder puff of *sāp* (ibid.). Without this treatment, the boys could not eat the meat killed for her feast.

Red pigment was used predominantly by Nama women, and its use associated with menstruation (Schinz 1891, Vedder 1928). Hahn recorded historic reports of Khoekhoe women painting themselves with and making offerings of red ochre in their 'worship' of the Moon and of *Haitsi-aibib*, when they made offerings at his so-called 'graves' (1881: 37-8, 124, 140). Nama women also used soot and charcoal as black make-up (Rudner 1982: 101 and refs.).

Male initiation:- Red?, Black.

In Schapera's review of the historic accounts of boys' puberty rites among the Khoekhoe, black colouring –

soot and ash – are most frequently cited (1930: 280, 282). Olpp (1888), who gives the most detail on the Nama rite, also mentions ochre. Once secluded in a hut with an old man to look after him, the boy first cleaned himself ‘washing off all the ochre with which he was previously smeared’ (Schapera 1930: 281, citing Olpp 1888). The old man killed one of the cattle provided for slaughter by the boy’s father, cooked and shared the meal with the boy. The fat of this animal was tied round the boy’s neck and had to be worn till it rots (Schapera 1930: 281, citing Campbell 1822). The old man scarified the boy on his breast, rubbing several horizontal cuts with ashes from the burnt remains of one of the slaughtered animals to leave a ‘blue scar’ (Schapera 1930: 282), but there is some discrepancy between Olpp and Campbell as to whether this occurred at the beginning or the end of the seclusion period. Campbell, who had it at the beginning of a shorter seclusion (8 days rather than 1-2 months), recorded that the dried entrails of the animal first killed were powdered, mixed with water and rubbed all over the boy who was then ‘in the presence of the whole kraal declared to be a man’ (Schapera 1930: 283, citing Campbell 1822).

Nama men certainly used red pigments on occasion, if not so much as the women (see Rudner 1982: 95 for refs.). In his close account of the Korana, Engelbrecht describes the boy as covered in fat and red ochre throughout his seclusion (1936: 158).

### c) Mbuti

Female initiation:- Red, Black, White.

Use of various pigments is mentioned in Turnbull’s accounts of the *elima*, or girl’s puberty festival, held on the occasion of one or more girls starting to menstruate. Of these, daubing with white clay, or with a mix of palm oil and red *nkula* paste to redden the skin, may have been adopted in imitation of the villagers’ *nkumbi* male initiation (Turnbull 1957: 208). Also used is *kangay*, a black dye made from gardenia juice as face or bodypaint (1960a: 190). Apparently, cosmetics used in the festival were labile, with considerable freedom of expression for the girls, depending on materials to hand. The most interesting feature of the 1958 *elima* at Epulu was the rumpus caused when the girls started mimicking the designs and costumes of the *nkumbi* initiates, bringing down on themselves the wrath of the Bira and Ndaka chiefs, and the *nkumbi* doctors (1960a: 186). Perhaps more characteristic of Mbuti *elima* were the vine necklaces the girls wore when they went out into the forest to chase the boys (1960a: 183-4). After their experiments with the white paint, the girls washed themselves and emerged on the final day ‘oiled... from head to toe, wearing oiled bark cloths decorated with beads, and had dyed decorative patterns with black gardenia juice on their faces’ (1960a: 190). For the next three or four days, Turnbull reports, the girls oiled themselves each morning.

Both *kangay* and *nkula* were used in dying bark cloth (Turnbull 1984: 120-1). Turnbull describes a bride dressed with palm oil and red camwood, in this case the unwilling Yambabo, who covered herself with ashes (1984: 190-1). Schebesta recorded practices of cicatrization, teeth-filing, lip and ear-piercing as adopted from villagers, who performed these beauty treatments for the Mbuti (1933: 101-2), practices still seen by Turnbull (1984: 68).

Male initiation:- Red?, Black, White.

In *nkumbi*, Turnbull records use of black paste and white clay paint at the time of the operation (1957: 194), application of white clay each day of the camp (1957: 196), and oil mixed with *nkula* to redden their skin after washing at the end (1957: 205). The *nkumbi* officials wore spectacular white designs (the ones the girls copied) with raffia arm-bands and skirts, and skin masks, representing the *ngosa* bird-spirit during the opening dances (1957: 193). While in the camp, boys had to wear circlets of vine (1957: 196). In the final coming out they had special dancing skirts made of *ndolo* vine and plumed raffia hats (1957: 204). On the last day, the boys washed, and the skirts were hung high in the trees. Rubbed with the oil and *nkula*, they had new bark-cloths, beaded belts and necklaces (1957: 205). They received a final cutting under the arm, rubbed with a stinging black paste, also given to their mothers (ibid.). The camp remains out of bounds to women until the skirts have rotted (1957: 206).

As far as *molimo* is concerned, there was little in the way of formal initiation, beyond a cutting of ‘sets of three vertical slits on the forehead’ (1957: 207). Flesh was gouged out, and black paste rubbed in, to leave black

streaks under the skin. Even this was not necessary. During *molimo*, designs in white clay were used (see diagram in Turnbull 1960b: 318).

*d) Venda (Central Bantu)*

Female initiation:- Red.

Red ochre was the predominant cosmetic at all stages of the complex tripartite initiation cycle for girls – *vhusha*, at first menstruation (Blacking 1969a: 6, 7, 13, 17, 18; Stayt 1931: 109-10; Van Warmelo 1932: 40); *tshikanda* (Stayt 1931: 112), forming the preliminary to the main *domba* school, where ochre marked the final coming out (Stayt 1931: 123). Everywhere in these rites, redness referred to menstruation; the songs and *milayo*, or sayings, of *domba* were preoccupied with etiquette and taboos surrounding menstruation. Coloured materials of red, white and black (and sometimes yellow) were used to symbolise a social division of the world into women who menstruate (red), men (white) and (older?) women who do not menstruate (black), plus old men (Blacking 1969b: 80, 99, 1969c: 158, 161; Stayt 1931: 117; Van Warmelo 1932: 74). Van Warmelo describes the use of black beads in the hair to mark girls who had failed the regular virginity inspections (1932: 43, 76). There are occasional mentions of white clay and ash: Blacking records a *vhusha* chorus of ‘we are smearing ash,...smearing on the zebra’s stripes’, but did not see it (1969a: 12). In Van Warmelo’s account the girl is marked with ochre while the others sing ‘We are marking the zebra’ (1932: 40). A zebra model with red and white stripes, connoting menstrual blood and semen, could be shown (Blacking 1969a: 17).

In the *sungwi* circumcision school, probably originating from Sotho influence, red ochre is again applied at coming out (Stayt 1931: 141; Van Warmelo 1932: 103).

Male initiation:- Red, White.

No cosmetics are mentioned for *vhutuka*, the boys’ equivalent of *vhusha*. In *murundu*, the boys’ circumcision lodge equivalent to *sungwi*, which owes to Thonga, Pedi and Sotho influence, Stayt records regular application of white clay during the period of the lodge (1931: 132), with a final washing and smearing with red ochre (1931: 135).

*e) Ila (Central Bantu)*

Female initiation:-

Anointing with fat and butter, but no pigment use recorded by Smith and Dale (1920, II: 20, 25) during initiation. Ochre would be used by girls in hairdressing (1920 I: 70), while other forms of decoration included knocking out teeth, and cicatrization (1920 I: 94-6), but not associated with initiation.

Male initiation:-

Again, no pigment directly involved. White paint and ash were favoured for warpaint (1920 I: 106). Boys had teeth knocked out and tribal cicatrizations (1920 I: 94) besides spectacular hairdressing. Many of the same ornaments would be worn by men as by women (1920 I: 101-2).

*f) Bemba (Central Bantu)*

Female initiation:- Red, White.

The flag of *chisungu* was red, a mix of camwood powder (*nkula*) and oil that made a crimson paint (Richards 1956: 96). This marked vital stages of the event. On the first day, the company was painted after the girls had passed a ‘first test’ of jumping over branches (1956: 66); on the seventh day, red marked the appearance of the ‘mock bridegrooms’ (1956: 73-4). On the fourteenth, a wash of white clay was used as part of the so-called ‘whitening magic’ associated with songs celebrating the end of menstruation, when the girls would emerge beautiful and ‘white like egrets’ – yet red dye was also applied (1956: 89-90, 124). Finally, after another trial by jumping, on the seventeenth day the girls and their entourage returned to the village in triumph as ‘lion-killers’ with a log as the ‘dead lion’, the entire company smeared with red paint ‘so that we must have had an uncouth and eerie appearance’ (1956: 96).

*g) Ndembu (Central Bantu)*

Female initiation:- Red, Black, White.

Although *nkang'a* is described as a 'white', not a 'red' ritual (V. Turner 1981: 200), happening when the girl's breasts start to develop, and before she first menstruates (1981: 199), nevertheless, the main cosmetic application is of red clay (*ngula*) (V. Turner 1981: 253, 255; E. Turner 1987: 76). The girl comes out to dance, gleaming with oil and red earth highlighting her cicatrizations. Discussing this apparent contradiction of suppression of red symbolism in the exegesis, Victor Turner recorded informants' denials that the red earth represented menstrual blood, but did not believe it, speculating that once *nkang'a* may have been danced at first menses (1981: 255-6, and see 87). This seemed borne out by the way the girl's skirt was passed between her legs, as if a menstrual cloth. White symbolism, paramount in the *mudyi* tree where the girl is laid at the beginning, is found in the beads which are hidden in the girl's hair, under a red mud pack (1981: 253, E. Turner 1987: 76-7), and in some white clay facepaint given to her and her handmaid just before the dance (V. Turner 1981: 256). When she was cicatrized earlier in her seclusion, black wood ash was applied to leave black scars (1981: 248).

Male initiation:- Red, Black, White.

The boys come out finally 'disguised' with white clay (*mpemba*) designs head to foot, with skirts (V. Turner 1967: 253, and see photo 10, opp. p.274). But *mukanda* was by no means a 'white' ritual. Red symbolism is found in the circumcisers' costume, with red lourie feather (1967: 190), and in the *mukula* tree, on which the boys sit just after the operation (1967: 213-8, 1962: 160-1). In one of the final acts of the lodge, boys are sworn to secrecy on a stick of *mukula* (1967: 258). *Nfundu*, the medicine made from burnt remains of previous lodges, and dominant symbol of the rite, was black (1967: 193-203), while black also appears on the *makishi* masked dancers (1967: 72, 244-5, and see photo 7, opp. p.243).

#### *h) Yombe (Central Bantu)*

Female initiation:- Red, White.

The nubility rite consisted of a period of seclusion for the girl in *Nzo a kumbi*, a 'red house', which formerly lasted up to year, lately just a month (Jacobson-Widding 1979: 159-60). The house was painted red with *tukula*, coral wood, as was the girl, all over her body and clothes (1979: 160). She had to stay inside the house, becoming fat and beautiful. Young girls of the village and neighbouring villages could come and sleep in the house, and could be joined by youths, but the girl's fiancé had to stay outside. All girls and boys inside the *kumbi* house rubbed their bodies red (ibid.).

Initiation to the *kimba* sect (see below) used white clay (Jacobson-Widding 1979: 192-3, 196, citing Bittremieux 1936, Laman 1962).

Male initiation:- White.

In Doutreloux's brief account of the circumcision rite, no mention of colour is made (1967: 69-71). He considers this less important than initiation into *kimba* (1967: 73). White figured in the rites for entry into the *kimba* sect, sometimes called a 'secret society', but open to both sexes. This involved a period of seclusion, teaching in a secret language and examination, after which the initiates appear at a feast painted white (Jacobson-Widding 1979: 193, citing Bittremieux 1936). White alone seems to have been used despite the tutelary spirit, identified with *Mbumba* the rainbow, being a red *nkisi* (Jacobson-Widding 1979: 60, 238), this possibly being due to Christian hegemony and influence.

#### *i) Ganda (Central Bantu)*

No initiation was recorded by Roscoe for the pre-colonial Ganda kingdom, other than a low-key, domestic seclusion for a girl at first menstruation (1911: 80). Menstruation was linked idiomatically to dark or new moon (Roscoe 1901: 121); although a woman was supposed to be careful not to contaminate her husband's weapons with menstrual blood, a man departing for war had to cut his wife, making her bleed for his protection, if she were not menstruating (ibid., 1911: 80). Roscoe in several places stressed the Ganda, or specifically royal, aversion to scarification (1911: 7); no scarified girl would be chosen as a wife for the King (1901: 121), and mothers would scarify daughters to protect them from being taken (1911: 81). Warriors and chiefs wore ochre

warpaint, while the *Kabaka* had his face died bright red (Stanley 1871: 306-7).

j) *Kikuyu (Central Bantu)*

Female and male initiation:- Red, White.

Although there was differentiation of ornaments for girls and boys, who were initiated in the same *irua* ceremonies, cosmetic treatment of both sexes was essentially the same. At the start of the proceedings, before the great dance (*matuumo*), girls and boys were marked by the 'father' of initiates with *ira* – white chalk supposed to be the snow of Mount Kenya – and anointed by the 'mother' of initiates with oil (Kenyatta 1938: 137; Leakey 1977: 617-8, 636, Routledge 1910: 138, and see opp. p.156, Pls.CIV, CVIa, CIX for boys' zigzag white designs). Leakey also records use of red ochre before *matuumo*, but most accounts agree that the major application of red ochre for both sexes occurred at the final coming out or purification ceremony (*gothiga*) which completed admission to adult status (Kenyatta 1938: 152, Lambert 1956: 53, Leakey 1977: 692). Routledge describes red ochre cosmetics on the dress of women, mothers and relatives of initiates, at the celebration of the 'great dance' (1910: 158), while Kenyatta records 'red and white ochre' paint (*therega na moonyo*) on mothers, relatives and friends attending the bathing of the candidates just before their operation (1938: 144). The female operator, who performed a sunna-type clitoridectomy on the girls, wore black and white 'ochre' (Kenyatta 1938: 146).

Each sex wore a specific and elaborate set of ornaments at *matuumo* (Leakey 1977: 607, and illustrations in Routledge 1910: Pls.CIX, CXI) comprising much fur, feather and skin for the boys, beads and shells for the girls. Beads used were either ostrich eggshell or coloured blue.

Use of red ochre was strictly vetted according to status. After using ochre at *gothiga*, when he became a junior warrior, a youth could not wear ochre again until he had paid a fee to senior warriors for their permission (Leakey 1977: 692, although there are stories of cheating on this, e.g. 1977: 24). Girls who had graduated in the new initiation *riika* or age-set were then entitled to anoint themselves with ochre 'without the payment of any special fee' (Leakey 1977: 737), but had to pay the senior girls for the right to perform certain dances, to engage in ritual greetings between girls and to practice sex with warriors (1977: 738). These payments involved a feast among the girls that could not be witnessed by any male.

The major concern surrounding a girl's initiation was that it should occur before she menstruated; if she menstruated first, the girl would be kept hidden by her mother in the hope no one would find out (Leakey 1977: 582-3). Stringent ritual precautions surrounded any girl who menstruated during the novice period (1977: 664-5, 689-90, 816-7). The other person who absolutely should not menstruate at this time was the initiation 'mother', the woman who hosted the initiates in seclusion on her homestead; the ceremony would be timed to ensure this did not happen (1977: 604), which also related to the phase of the moon (1977: 408, 598, and see Kenyatta 1938: 171; dates given by Routledge (1910: 156) for the start of ceremonies all fall into the waxing, first quarter period).

Fundamentally, a girl was not permitted to advertise her menstruation, or to use red ochre, until she had been initiated with her age-set. Red ochre features strongly in medicine for treatment of failure to menstruate (Leakey 1977: 1166, 1171).

k) *Chagga (Central Bantu)*

Female initiation:- Red, White.

At the end of her seclusion period following the clitoridectomy operation (in some places with excision, see Moore and Puritt 1977: 61), the girl paraded in the market with face painted red and white, her body smeared with red ochre and fat (Dundas 1924: 214). At the beginning of *shiga* school, the second phase of initiation traditionally required before marriage, girls were marked on the forehead with a peculiar mixture of ochre and water mixed with a man's faeces – this referring to the 'secret' of male supremacy (Raum 1940: 350; Moore and Puritt 1977: 49). This was done by the teacher, an older woman who understood men's secret (see text).

As with the Kikuyu, there was concern that a girl should be circumcised before first menstruation (Dundas 1924: 211; Raum 1940: 313n.1, citing Gutmann 1926).



Male initiation:- Red?

Little attention is paid to pigment use in the ethnographies. Each morning of seclusion, initiates rubbed themselves with 'urine-wet mud' (Moore 1976: 359). Dundas records smearing with 'red earth' at the final camp of the boys' *ngosi* school, again the preliminary to marriage. This was done by the new initiates to younger boys who were about to be enrolled (Dundas 1924: 221). The *ngosi* graduates then washed for the first time, before appearing bedecked with beads and anointed (1924: 222).

For both sexes, ear-piercing and incisor-extraction formed part of the progress towards circumcision operations – 'developmental rites' as Raum refers to them (1940: 298-302; Moore and Puritt 1977: 57). Ornamentation marking circumcision was elaborate (Raum 1940: 285n.1). Girls would be 'decked with all the ornaments she and her parents can collect' (Dundas 1924: 212), including ornaments from her fiancé (Dundas 1924: 230; Raum 1940: 307); after seclusion she would go gallivanting with circumcised friends, specially decorated, with bells and flutes (Moore and Puritt 1977: 61; Dundas 1924: 213; Raum 1940: 307).

*l) Fang (North West Bantu)*

Female initiation:- Red.

*Mevungu*, a 'secret' society of married women, was the effective equivalent of the male *so* (Alexandre et Binet 1958: 96; Laburthe-Tolra 1985b: 234). Following a nine-day seclusion, the candidate – called *mvón*, the same word used for the *so* candidate – was presented, hair dressed, ornamented, painted with *bâ* (Laburthe-Tolra 1985b: 235; Bochet de Thé 1985: 248). A red powder made from the bark of the padouk tree, this was the primary cosmetic for the Fang and related peoples, used for both magical and aesthetic reasons (Alexandre et Binet 1958: 88) though nowadays supplanted by European lipsticks.

Male initiation:- Red, Black, White.

Quantities of red padouk powder featured throughout the *so* rituals. At the final coming out, this red paint was interspersed with use of white clay (Alexandre et Binet 1958: 100). Black features in the ashes applied to the special tattoo of *So* (Laburthe-Tolra 1985a: 256), meant to resemble the markings of the *so* antelope (Alexandre et Binet 1958: 99, Stoll 1955: 159).

Women, mothers of initiates, laboured to collect and process the red pigment needed for the rituals, sometimes having to travel upwards of thirty kilometres to find padouk trees (narration of Hubert Onana in Laburthe-Tolra 1985a: 242). This was used as bodypaint during the opening exhibition of the candidates when boys went completely naked (*ibid.*), and to dye the *obom*, a bark cache-sexe (1985a: 242, 247). Mothers covered their sons (1985a: 243). During the intermediate period when candidates performed various trials and symbolic 'hunts' in the forest, they were not supposed to see their mothers, but if they should do so, for just twenty minutes, they had to be covered in *bâ*, to hide traces of ill-treatment (1985a: 262). Virtually the entire time spent in the village after forest activities was taken up with plastering extra coats of paint on the body and the *obom*, for which purpose basins of *bâ* were placed here and there (1985a: 263). In his ethnography of Ewondo *so*, Laburthe-Tolra analyses the alternation of use of white clay and red *bâ* during the coming out phase of the rites (1985a: 294-301). White clay would be used as a protection when the *mvón* were in the lodge, mostly out of sight, but progressively they painted with *bâ* to celebrate emergence from the bush, when receiving attention from women in public (1985a: 269). In the middle phase, when the initiates start to go on supervised outings, they donned ornaments including a penis sheath, and raphia finery which recalled that used by women, except that in the case of the *so* initiates it was dazzling white (1985a: 295). The last phase of normalisation could last several months, and was marked off by the authorisation to use red padouk, with the implication of return to sexual activity (1985a: 294).

*m) Tiv (Non-Bantu Bantoid)*

Female initiation:- Black.

Although Bohannan considered there was a lack of formal initiation among the Tiv, circumcision marked accession to adult status for boys, and in northern parts of Tivland, girls' stomach scarifications could be referred to as the 'circumcision of women' (Bohannan and Bohannan 1969: 65). However, not all women

would necessarily undergo it (Bohannan 1965: 531). The favoured catfish design punned with the word for lust, and the tail of the fish was supposed to finish with a clitoris; charcoal was rubbed into the scars (Bohannan 1956: 120-1). Camwood might be applied in subsequent washings, as medicine rather than decor (Akiga 1939: 43).

Body-painting in both sexes, with designs on face and arms, used red camwood (Bohannan and Bohannan 1969: 68), which was important both for cosmetic and ritual purposes (Bohannan 1956: 117-8). Abraham describes the common sight of 'persons who have made themselves scarlet from head to foot' (1933: 218), yellow ochre being 'a humble substitute' (1933: 219). Camwood with ashes and certain leaves made up the material symbol of *swem*, the most powerful sacred force of Tiv culture (Bohannan and Bohannan 1969: 92). 'To make such a *swem*' write the Bohannans, 'is to "dress" (*wuha*, used for dressing and decorating the body) it' (ibid.).

The extensive scarification practices for which the Tiv were renowned, again in both sexes, could reflect regional and generational styles, be used simply for beauty, or mark life events and crises, rather than specific rites of passage (Bohannan 1956).

Male initiation:- Red.

Circumcision was necessary for a boy to gain adult status, to have sex and to marry, and to perform ceremonies (Bohannan 1954: 2). Boys could be operated on at various ages, which would not correlate with age-sets (Bohannan and Bohannan 1969: 64). Formerly, no one was circumcised until puberty; then, a recently circumcised youth would display himself in the market rubbed with red camwood (Bohannan 1954: 5).

#### *n) Kpelle (Mande)*

Female initiation:- White.

Like *poro* school candidates, *sande* initiates spent much of the time after their operations to coming out smeared with white chalk (see photo in Bledsoe 1980: 76). Accompanying clitoridectomy and labiadectomy was the traditional scarification, on the waist for girls, meant to represent teethmarks of the *poro* devil's 'sister' (Bledsoe 1980: 66, Bellman 1984: 33), sometimes referred to as his wife.

Male initiation:- White.

White chalk or clay was used both to rub on boys' wounds when they entered the bush community (Bellman 1984: 81), and especially on coming out when the boys wear special gowns and hats (1984: 10, 97, 124). Discussing the meaning of the chalk, Bellman's informant told him: '[it] is to distinguish them from us...They are the newly born. Like when you born a new baby you put powder on the person' (1984: 84). In relation to Mende ritual, Mendelson describes the clay as the 'color of spirits' (1967: 27, photo p.29). Individuals could be circumcised privately prior to *poro* initiation (Gibbs 1965: 222), when they received scars on their necks, chests and backs (Bellman 1984: 80), the teeth of the 'devil' providing the mark of membership (1984: 92).

#### *o) Dogon (North Central Niger-Congo)*

Female initiation:- Red.

Red, with its connotations of impurity, was the colour most strongly associated with initiates of both sexes (Calame-Griaule 1986: 270-1, 1965: 249). Red *baná* clay was used to draw graphic representations of 'speech of excision', which appeared in the house of the old woman excisor (Calame-Griaule 1986: 238-9, Fig.21,p.240, 1965: 216-8), as well as in the menstruation hut (1986: 211, 1965: 185).

A wife would perform ritual ablutions with *sá* oil after menstruation, before returning home to her husband (Calame-Griaule 1986: 346-7, 1965: 295-6). Shortly after initiation, girls received zig-zag stomach scarifications (Marti 1957: 29) which reproduced the original designs of the androgynous Nummo twins, as did other female ornaments (Griaule 1965: 80-1). Also symbolically significant were the rings used in lip and ear-piercing, added progressively throughout a girl's childhood, as a means of guarding her 'speech' and the speech she heard (Calame-Griaule 1986: 307-10, 1965: 265-9, see photos in Fisher 1996: 116, 118-9). A girl had her nose pierced once sexually mature, before marriage (Calame-Griaule 1986: 358, 1965: 307). Her teeth would be filed after marriage 'in order to "weave" speech better' (Calame-Griaule 1986: 309, 1965: 267).

Male initiation:- Red.

The designs for boys' circumcision were drawn on the occasion in red *baná* at the operation site (Calame-Griaule 1986: 237-8, 1965: 216-7). Clay was used in situations concerned with blood and impurity, whereas red sorrel dye would be used for paintings of masks, and masks themselves (1986: 270, 284n.94, 1965: 249, 218n.1).

Men wore one single tiny copper earring, received just before marriage to guard against 'bad speech' of the wife (Calame-Griaule 1986: 310, 357-8, 1965: 268, 307); this had strongly androgynous connotations (see text).

p) *Azande (Adamawa-Ubangian)*

No female initiation recorded.

Red and black cosmetics were favoured in general use by both sexes. Red pigment applied to skin and hair came from the juice of *nzura* berries, or red powder ground from *kpuruku* wood (Larken 1926: 31); Schweinfurth likewise noted staining of bodies with 'red wood' (1873 II: 19). Fine black designs were traced with juice from *mbiango* fruit, mixed with powdered charcoal (Larken 1926: 31). Cicatrization of the body and teeth-filing were used by both sexes (Larken 1926: 31-2). Hair-dressing was especially elaborate. Schweinfurth described the 'almost incredible' amount of trouble taken by men, while women were 'unpretending' (1873 II: 7). By contrast, Larken recorded: 'Ten years ago, women made most elaborate coiffures' (1926: 33). Hats plumed with feathers were seen in both sexes, but especially worn by men as markers of status (Larken 1926: 36). Women wore necklaces and waistcords of *areke* beads with no differentiation between married and unmarried, and brass wire coils for the forearm (Larken 1926: 36, 38).

Male initiation:- Red.

Coming out after the circumcision camp, a boy had red powder put in his hair, and was anointed with oil (Larken 1926: 30).

*Benge*, a red powder made from a forest creeper containing strychnine, was the substance used in the Zande traditions of oracular divination, called by that name (Seligman and Seligman 1932: 527; Evans-Pritchard 1976: 228). *Benge* powder was difficult to obtain, traded over long distances (Seligman and Seligman 1932: 528). Taboos on sex attached to its use, while a menstruating woman was supposed to destroy its potency (Evans-Pritchard 1976: 171-2).

q) *Nuba (Kordofanian)*

Female initiation:- Red/yellow.

From age six, when first betrothed, until pregnancy, girls wore either red or yellow ochre according to their patrilineal section colour, covering themselves all over with oil and ochre daily (Faris 1972a: 32). Their fiancé was meant to provide them with these materials (Faris 1972b: 12). Once pregnant, and until weaning, a woman wore oil and ochre on her head and shoulders of the colour of her infant's patrilineal (1972a: 30). This clear-cut signalling took place in the context of a complex duolineal descent system (Faris 1969).

Initiation comprised progressive scarification from early puberty to weaning of the first child. A first set of scars from navel to breast was cut when a girl's breasts started to appear (1972a: 32-4, Fig. 3a). At menarche, dressed with ochre and beads, she received more extensive scarification all over the torso (Faris 1972a: 15, Plate 4, 32-4, Fig. 3b). The traumatic operation could take two days, after which the girl was isolated and treated as in a state of blood pollution (1972a: 33). In isolation, she did not use oil and ochre as decor, but possibly as a treatment for wounds (1972a: 34). Once the scars healed, in four to five days, she resumed oil and colour. The final set, over a woman's neck, back, arms, buttocks and thighs, was given to a young mother after weaning her first child, signalling her return to sexual availability after long post-partum taboos (1972a: 35-6, Plate 28). Her husband was supposed to pay the considerable expense for this, but if he did not, a lover might do so, and take the woman, wife theft being prevalent at this stage of a woman's career (1972a: 34-6).

Male initiation:- Black, White.

Formal initiation was a ritual introduction to the sport of bracelet and stick fighting (*timbr*\_) which marked

accession to and characterised the *kad\_nd\_r* age grade (Faris 1972b: 10). Boys of the junior grade, *l\_er*, from 8 years up, were permitted to use simple red ochre decoration, with a tufted hairstyle and skull cap (1972a: 38). As preparation for recruitment into *kad\_nd\_r*, around 17 years, a youth could begin to use rich yellows as background (1972a: 40). Only once he had passed through initiation was shiny black background, the colour used by bracelet and stick fighters, available to him (ibid.). Initiation began with a period of isolation for up to two weeks, most of the time in caves on the mountainside (1972b: 16). Youths covered themselves every day with sacred mud (*k\_*) and ash, to strengthen them for the coming fight and as protection against the evil eye (ibid.). They were richly fed. The initiate approached his first fight, using bracelets only, less conspicuously than older fighters, for they did not yet wear the deep shiny black, which protected against the evil eye (1972b: 17), and made the fighter look bigger (1972a: 40). If the initiate did well in his first fight, he would begin to collect money and materials to pay the drummers' society to compose a praise-song cycle for his fight (ibid.). Only once this was paid could he use the rich black background for body design, and begin the stick-fighting in *timbr\_*. Then, initiation into *kad\_nd\_r* was complete (1972b: 18, and see 1972a, Colour Plate 23.).

Within the complex constraints of rules on colour use by specific age grades, Nuba boys and men created elaborate and highly individualised designs on face and body. These showed off youth, beauty, strength, and must be seen as a prime example of cultural ornament driven by sexual selection.

#### *r) Maasai (Nilotic)*

Female initiation:- Red, White.

Cosmetics treatment surrounding the circumcision ceremonies for individuals of both sexes showed marked similarity (cf. Spencer 1988: 59-60, Hurskainen 1980: 183). On the evening before the operation, a girl would be dressed as other uninitiated girls (Hurskainen 1980: 184). During the ordeal itself, she wore no decoration, but could be given the special *isurutia* earring to hang under her left ear (1980: 185). She could be smeared with fat, and striped with milk (1980: 187). To avert people's 'eyes', initiates drew white rings of chalk around their eyes (Spencer 1988: 60). During the period of healing following clitoridectomy (when she could eat no roasted meat), the girl wore such an intricate white pattern round the eyes with coloured bead or cowrie shell headdresses (illustrated in Fisher 1996: 30, Beckwith and Fisher 1999: 91). Her dress was dark, with head wreaths of palm or grass (Hollis 1905: 299, Huntingford 1953: 116). At the end of seclusion, after a final ritual washing, she emerged in women's decorations of disc necklace, earrings, wire armcoils and leather belt, with ochre on head and neck (Hurskainen 1980: 192, cf. Hollis 1905: 282-3, and see opp.p.120, Plate V, opp.p.177, Plate IX).

Male initiation:- Red, White.

Spencer lists the privileges jealously guarded by the *moran*, or warriors, and denied to uninitiated boys (1988: 68), among them dancing with girls, hunting lions, defending against cattle raids, and wearing red ochre or *moran* hairstyles. Boys' minor infringements of these rules, like smudging with ochre at some ceremony, might be overlooked if not seen as a direct challenge (Spencer 1988: 68-9). When a new cohort sought circumcision as the first step towards moranhood, the boys began to gather in bands, displaying their strength. Hollis describes the boys painting their bodies with white chalk at this time (1905: 296). At the *enk-ipa'ata* festival, boys danced and the firestick patrons, elders, kindled the fire to bring a new age-set to life, lifting the ban on circumcisions (Spencer 1988: 69-70). In the face of the alliance of boys with elders, the current *moran* had to concede privileges gracefully, lending ornaments to boys for the dances such as headdresses, capes and thigh-bells, while the boys used red ochre and brought out lionskin trophies they had hunted illicitly and hidden (1988: 70). After a dry summer herding cattle, circumcisions would begin (1988: 71). Both Spencer and Hurskainen note the lunar scheduling of rituals, at waxing moon (Spencer 1988: 71, Hurskainen 1980: 136, 342n.8). Boys could be anointed with sheep fat and ochre on a ceremonial tour of the kraal, at sunset two days before the operation, but by the day before this red colour was lost, the boy's dress was dark (Hurskainen 1980: 145, 148). Warriors gathered, shrieking outside the kraal, wearing red (1980: 150). The circumcisor himself (a 'Dorobo') applied protective white chalk to the side of the boy's and his own eyes (Spencer 1988: 73, seen in Beckwith and Fisher 1999: 84-5). Once the youth was taken away for recovery in his mother's hut, his father

became the focus, sitting in ceremonial regalia in his kraal (Spencer 1988: 59) and decorated by the mother with beads (Hurskainen 1980: 167). During his seclusion, as *o-sipoloi*, the boy wore no red colour of *ilmurran*, but a dingy cloak, with ostrich plumes in his headdress, and white chalk (Hollis 1905: 298; Huntingford 1953: 116; Hurskainen 1980: 169-70). One, two or three moons after the operation, at new or waxing moon, the youth, his father and mother were all shaved (Hurskainen 1980: 171, 288). The father's blue bead decorations were discarded; the boy bathed, and thenceforth became *moran* (1980: 172). From this point, he began to decorate as a warrior, first using red ochre, then dancing with the uninitiated girls, and growing long hair (1980: 173). He would revert to the white/dark decor at times of *olpul* meat feasts (1980: 179).

At *eunoto*, the culminating ceremonial of warriorhood when a ritual leader of the age-set was chosen, red and white colour schemes again dominated (see photographic sequence in Beckwith and Fisher 1999: 124-53). The first day opened with a 'Red Dance' where *moran* massed covered with ochre and red cloaks, surrounded by their ochred, uncircumcised young girlfriends. On the second, warriors collected white chalk for elaborate body designs, which could be combined with ochre in the case of warriors who had killed an enemy or a lion. The *moran* again wore red ochre for the final ritual of headshaving by their mothers.

*s) Sara (West Central Sudanic)*

Female initiation:- Red.

In the course of the past century and a half, a sunna-type clitoridectomy spread into various Sara groups, and was incorporated into the traditional female initiation involving scarification (Leonard 1996: 255-8). This occurrence of female circumcision without male is very unusual. During a month's seclusion outside the village, initiation comprised the death of *koy*, the child-like self, and the emergence of the mature woman. After the circumcision, girls who had shown little fear were painted with red kaolin – a symbol of courage for the Sara (Leonard 1996: 259). A few days later, the girl received facial scars, identifying her as non-*koy*, and as belonging to a particular ethnic group (Leonard 1996: 258-9). The main caretaker and educator in the ceremony was the *kóondo*, 'mother of the initiation', a patrilineal female relative with whom the initiate maintained a lifelong relationship of obligation (1996: 258). At the end of the healing period, girls were given new names, *ri ndo*, by their mothers or *kóondos*. They came out in elaborate costume highly similar to the boys. After a bath and headshaving, their skins were reddened with kaolin and karité oil. They wore bright bead necklaces, iron belts and copper bracelets and anklets, with a mask of beads covering their faces (1996: 259). In the course of a gradual reintegration, initiates could remove their masks, allowing relatives to see their new faces (ibid.).

Male initiation:- Red, Black.

Cosmetic treatment was highly similar for boys, who used many of the same ornaments coming out. Fortier describes initiates with heads gleaming with red ochre and oil, wearing red and blue bead necklaces, and metal ornaments, their masks being made of palm fronds (1982: 228, and see figure opp.p.215). Throughout seclusion, a number of sacred objects, including batons and stakes, were smeared with ochre, this being the means to sacralise them for contact with the ancestors (*Badaga*) (Fortier 1982: 221, 225, 226). Otherwise, powdered charcoal was applied to the tribal scarifications (Jaulin 1967: 97, Fig.8).

*t) Ga'anda (Biu-Mandara Chadic)*

Female initiation:- Red, White.

Starting from age five or six, girls accumulated elaborate scarifications, (*hleeta*), in six biennial stages, culminating at puberty when the body was almost completely covered (Berns 1988: 58, 59, 61; Boyle 1916b: opp.p.366). The girls who had completed *hleeta* celebrated an annual coming out, *Yowo* (Berns 1988: 63), when they displayed and enhanced their newly scarified skin with oil and *mesaktariya*, haematite, found locally from deposits on the side of stagnant pools (Boyle 1916b: 365; Berns 1988: 63). They wore only a contrastive white pubic apron (1988: 64), and jewellery including metal ornaments, and red and white glass bead necklaces (1988: 65). Application of haematite, Berns notes, 'draws special attention to the interface between secular and sacred realities' (1988: 64). A blood substitute symbolically linked to menstruating women, haematite applied

to bows and arrows granted hunters protection of tutelary powers (1988: 64-5).

Male initiation:- Red, White.

The male initiatory ordeal, *sapta*, traditionally took place every seven years (Berns 1988: 58; Boyle 1916a: 244). At *Yoxiiwa*, following *sapta*, the initiates were ritually washed and rubbed with haematite (Berns 1988: 63). Like the girls, they wore a white cache-sexe, with similar ornaments (Berns 1988: 634; Boyle 1916a: 251).

*u) Hausa (West Chadic)*

Female and male initiation:- Red.

Girls when very young (at naming) might be subjected to clitoridectomy (Smith 1954: 142, Smith 1965: 145) but this was not universal (Hassan and Shuaibu 1952: 60). Boys, muslim and pagan, would be circumcised around age seven, individually with little formal ceremony (Greenberg 1946: 23; Hassan and Shuaibu 1952: 60; Rattray 1913 II: 192-8). The main *rites de passage* comprised the Islamic ceremonies preceding first marriage for bride and groom (cf. Smith 1965: 145). Seven days before marriage, the bride was captured by kinswomen and, after much resistance, stained with henna for a ritual seclusion (Smith 1954: 88; Rattray 1913 II: 160-2). The groom received the same treatment from his kinswomen for his first marriage (Smith 1954: 90; Rattray 1913 II: 170; Hassan and Shuaibu 1952: 55).

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