SOCIAL MIRRORS AND THE BRAIN

including a functional imaging study of role-play and verse

PhD Thesis

Charles Beresford Whitehead
Department of Anthropology
University College London

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Abstract

This thesis attempts to bridge the conceptual gulf dividing social from biological anthropology using three main lines of argument:

1. Enculturated human cooperation originated in expanded systems of kinship and reciprocity which require obfuscation of selfish bodies. Disembodied self perceptions characterize all human belief systems including the behavioural sciences. This prevents our fully appreciating that the most distinctive feature of human behaviour is a formidable armamentarium of social displays. ‘Social mirrors’ underpin human self-awareness, social intelligence, and innate altruism (the ability to identify with others).

2. Social displays engage multiple sensorimotor systems and probably account in part for our large brains. I present a study of role-play and verse, the first in a proposed programme aiming to map social mirroring functions in the brain. There were three main findings:

   1. Cortical areas that are most expanded in humans, and would be expected to show increased activity during role-play, were only apparent when ‘switching off’ role-play
   2. The subjectively ‘easy’ control tasks showed greater brain activity than the ‘difficult’ role-play tasks
   3. Verse and prose activations were indistinguishable

Since role-play activations were not apparent in role-minus-control conditions, role-play may be a continuous mental activity in awake human adults. Cognitive effort may be required to suppress social imagination during non-social tasks. The brief flash of increased activity in presumed role-play areas during the role-to-control switch may implicate dissociation. The findings are at least consistent with a ‘play and display’ hypothesis of hominid brain expansion.

3. A ‘play and display’ hypothesis, compared with cognocentric/logocentric hypotheses, makes better sense of the fossil and archaeological records of human evolution.
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Introduction

On an average evening, just by watching television, you can see a rich variety of human behaviour, little of which conforms in any obvious way to conventional biological predictions. Recently I especially noted:

* a cartoon movie in which animals behaved like humans, and much of the humour depended on our intuitive recognition that animals do not behave like humans;

* a news item in which an athlete received a biologically useless gold medal for throwing a javelin and not hitting anything edible such as an antelope;

* a Channel Five ‘documentary’ which showed a half-naked woman copulating with an invisible partner, before an audience of men who made no attempt to compete for the exclusive privilege of inseminating her.

There were also remarkable scenes of cooperation, where rescuers sacrificed their lives to save people unrelated to themselves and from whom they expected nothing in return, or soldiers died in someone else’s civil war because they believed Islam was under threat.

Social anthropologists commonly describe apparently unbiological human behaviour as ‘symbolic’. Biological anthropologists tell us that genes do not necessarily operate in the environment to which they are best adapted, or that ‘mental modules’ may be ‘closed’ or ‘open’. I am not sure that either is giving us anything very helpful if we want to understand what human culture is or how it works.
This essay is about universals of everyday human behaviour and the cognitive substrates of human culture. I will argue that much of what we call 'culture' is wholly-believed-in make-believe, and that human self/other-awareness depends on social play and display, including song, dance, art, and role-play.

My PhD research, a functional brain imaging study of role-play and verse, is presented in Chapter 5. The other six chapters contextualize and explore the implications of my research. My aim is to bridge the conceptual gulf currently dividing social from biological anthropology, using cognitive science, and to show what all three disciplines can gain from a better understanding of each other. I will also show that all three disciplines are hampered by disembodied perceptions of the self, and that these have curious parallels in animistic belief systems. Obfuscation of the body would seem to be a major mechanism of enculturation. Why else, for example, should we always wear clothes in public, even in the swimming pool?

There are three parts to my thesis:

1. Social mirrors and social order
The first part explores the nature of human culture and emergent order, the peculiar problems faced by enculturated scientists attempting to understand culture, the reasons why social anthropologists do not agree with biological anthropologists, and why we need a more anthropologically informed cognitive science (Chapters 1 and 2). Chapter 3 introduces social mirror theory as the potential bridge between social anthropology, biology, and cognitive science, and the basis of a more embodied understanding in the behavioural sciences.
2. Social mirrors and the brain

The second part examines some current blind spots in cognitive neuroscience, attempts a broader understanding of the social brain, and proposes a 'play and display' hypothesis of human brain expansion (Chapter 4). I then present my own research on role-play and verse, which appears to be at least consistent with the hypothesis (Chapter 5).

3. Evolution of social mirrors and the brain

The final part (Chapters 6 and 7) looks at human evolution and the emergence of modern culture in the context of a 'play and display' hypothesis.
PART 1

SOCIAL MIRRORS AND SOCIAL ORDER
Chapter 1. The Anthropological 'Other'

FIVE FEATURES OF CULTURAL DIFFERENCE

Social anthropologists study cultural diversity, though traditionally this has meant studying primarily non-industrial, non-western, and non-literate peoples - the anthropological 'other'. It is alterity - the strangeness of 'other' peoples - that intrigued the first anthropologists, and demanded special explanation or interpretation. Whilst it may not surprise anyone to learn that people around the world differ in their modes of subsistence, or even their mores and customs, what did surprise the first ethnologists were systems of kinship and economic exchange which violated all western expectations, and ritual practices and beliefs that seemed counter-intuitive, counter-experiential, and counter-factual.

So, for well over a hundred years, ethnographers have been reporting everything that struck them as interesting, relevant, and worthy of report, which of course includes everything strange, everything that is not so commonsensically taken-for-granted that it passes without notice. Consequently, we have amassed a great deal of data which violates our unspoken assumptions about 'human nature', and reveals them to be false. It follows that we cannot really claim to understand ourselves until we have understood others, and what prevents us from understanding others is the fact that we do not understand ourselves.

One of the strangest features of alterity is, perhaps, the belief in alterity itself. For this notion is not unique to anthropologists, but seems to be universal. It is not unusual to find human groups around the world who refer to themselves by names which, roughly translated, mean 'the human beings', and who refer to everyone else as
non-human. Few of us, I suspect, are immune to feelings of difference towards 'other' groups. This apparently universal experience of alterity would seem to imply that, in creating group identities, we are actively manufacturing our ignorance of ourselves.

So, to the four features of cultural difference which I have mentioned - (1) kinship, (2) economic exchange, (3) ritual, and (4) belief - we can now add (5) self/other perception. Universal self-ignorance is hardly an auspicious basis for anthropological understanding.

'Here be symbols'

You might think that after a hundred years of studying strangeness, it should not seem quite so strange any more. But 'other' people still say and do things which have the power to surprise or baffle ethnographers. When Dan Sperber (1975: 3) was told, by a Dorze informant in southern Ethiopia, that the local leopards were devout Christians, he suspected 'symbolism', and coined his own rule-of-thumb: "That's symbolic."

Why? Because it's false." Nigel Barley (1983: 10), who writes about anthropologists with much good humour, parodied this as "That looks crazy. It must be symbolism". The more acerbic Ernest Gellner (1992) tells us that, in anthropology, "if a native says something sensible, that's primitive technology; but if he says something really odd, that's symbolic."

'Symbolism', apparently, is a euphemism for everything that strikes the anthropologist as false, odd, mad, or inexplicable. The implication seems to be that anything which does not make sense to us must 'symbolize' something else that would make sense, if only we knew what it was. Just as medieval map makers circumscribed the known world with 'Here be dragons', so anthropologists cover the gaps in their
knowledge with ‘symbolism’ and ‘symbolic behaviour’. Our faith in symbols often
assumes that same unshakable air of factuality that we find in the beliefs of our
informants (Bourdieu, 1977), but, equally often, is professed with a passion which
betrays its ideological origin. I can do no better than quote a recent American view:

The symbol is ‘the origin and basis of human behaviour’, as White put it in the
title of a well known essay (1949: 22-39). In all its dimensions, including the
social and the material, human existence is symbolically constituted, which is to
say, culturally ordered. That is a position I was not then, nor have ever been
since, prepared to give away. White used to say that no ape could appreciate
the difference between holy water and distilled water - because there isn’t any,
chemically. How would an ape be able to apply, let alone devise, a marriage
rule that proscribes parallel cousins and enjoins unions with classificatory cross
cousins? (Sahlins, 1999)

What on earth (or in heaven) could holy water ‘symbolize’? ‘Holy’ derives from an
Anglo-Saxon term meaning whole, hale, or healthy, and holy water is water with
imagined (but not necessarily ineffective) healing or prophylactic properties. It does
not ‘symbolize’ some other substance which is not water or not holy. Neither does a
marriage rule ‘symbolize’ something which is not marital or not a rule. A rule is just a
rule. Qualifying it as ‘symbolic’ adds nothing to our understanding.

What makes the concept so pernicious is its apparent reasonableness. It sounds
perfectly logical to say that the word ‘cat’ symbolizes or refers to a quadrupedal
mammal which purrs and chases mice, or that a red light is a symbolic command to
stop. But this overt meaning of ‘symbolism’ is not its covert meaning. It is just
something we say in one context and forget in another. Why are the calls and gestures
of apes, which represent affective and intentional states, not ‘symbolic’? What about
the chemical languages which carry information from cell to cell, or the genetic code
itself? The covert answer, of course, is because such signals and codes are not uniquely human.

'Symbolism' is a rationalistic concept which shifts its meaning according to the data being examined; an anthropocentric article of faith, sustaining the imaginary opposition between 'nature' and 'culture', and preventing us from recognising the source of our own self-ignorance. Despite the slipperiness and opacity of the term, 'symbolism' remains a core concept throughout the social and cognitive sciences, and 'symbolic culture' is virtually definitive of the social anthropologist's field of study. As the term is delusory, so are the boundaries of the field.

**ONE HUNDRED YEARS OF ANTHROPOLOGICAL DENIALS**

Many anthropologists have assumed that, if others represent reality differently from the way we do, then their representation processes must be different. This is rather like explaining a photograph of a UFO by arguing that there must be something wrong with the camera. It is not the only, or even the most likely, possible explanation: unless the camera produces similar anomalies with some regularity, an origin in real-world experience, such as odd weather conditions, fraud, vested political interests, or even an extraterrestrial visitation, is at least worth considering.

In fact, all the likely and unlikely explanations, non-explanations, and frank denials, which anyone might come up with when confronted with a photograph of a UFO, have parallels in anthropological thought, and may be divided into three broad types with at least seven sub-types:
Theories that blame the camera:

1. Faulty camera theories
2. Normal camera theories

Theories that invoke real-world experience:

3. Political deception theories
4. Theatrical theories

Otherworld theories and non-theories:

5. The supernatural world
6. The Platonic world of meaning
7. Denial of any verifiable world at all

The point I am making here has nothing to do with the reality or unreality of UFOs. What I aim to show follows from the nature of human culture itself. Culture could not sustain its hold over us unless its workings were opaque, and the taken-for-granted 'naturalness' with which we invest our own culture makes others appear anomalous. When we confront an anomaly - something we are not intellectually or experientially equipped to understand - we are forced to fall back on generic confabulatory processes. This no doubt applies to all sciences, but empirical research usually leads to an accumulation of knowledge (whether in the Popperian or Kuhnian sense), whereas, with few exceptions, all we seem to get in social anthropology is an accumulation of ethnography, with little theoretical progress beyond the rationalist phase.
Theories that blame the camera

1. Faulty camera theories

Anthropologists such as Boas (1911), Lévy-Bruhl (1926), J.V. Taylor (1963), and Hallpike (1979) variously characterized the minds of non-literate peoples as primitive, childlike, pre-logical, mystical, and emotional, in contrast to those of ‘modern’ people which are rational, adult, objective, and ‘scientific’. Such authors, in postulating two types of people - ‘primitive’ and ‘modern’ - represent both in an ill-defined and one-sided manner, and neglect to wonder why ‘modern’ people read their children stories about talking animals, give them non-human toys which have personal names and are treated as persons, or tell them that Santa Claus lives at the North Pole.

Many of these ‘faulty camera’ views were influenced by the child-development theories of Freud or Piaget. Hallpike in particular has been accused of rushing in "where even Piaget feared to tread" (Schweder, 1982: in Morris, 1987: 311), daring to name the Piagetian stage of immaturity at which ‘primitive thought’ was held to be ‘arrested’. The assumption that our species evolved to produce ‘immature’ adults, in anticipation of a long historical and cultural process of ‘maturation’, would seem to demand too much foresight of the blind watchmaker.

Lévy-Bruhl (1926) explained animism as the consequence of participation mystique, a blurring or extension of ego boundaries, and a sense of continuity between self and universe. Individuals in non-literate societies seemed to live their lives immersed in a womb-like unity with their social and physical environment. Everything was ensouled, permeated with mind-stuff, awash in a soup of sentience. Animistic thinking ascribed souls to rocks, trees, weapons, domestic utensils, and trade goods. The idea closely parallels Freudian and Piagetian characterizations of mystical
experience - the ‘oceanic’ feeling of unity with the cosmos - and the theory of ‘projection’ (the attribution of one’s own internal states, or remembered persons from the past, to outside agents in the present) which Freud attributed to an infantile phase, when ego boundaries were not yet firmly drawn.

Although Lévy-Bruhl’s thesis remains at least thought-provoking, and is still occasionally invoked (e.g. in Tambiah, 1990), the division of humanity into two ideal types, ‘primitive’ and ‘modern’, has been widely challenged. Malinowski (1922, 1935) stressed the pragmatic, rational, and ‘scientific’ aspects of Trobriand life. Myths, for example, were not erroneous explanatory schemata, but ‘charters’ legitimating the social order. Evans-Pritchard, in his landmark study of the Azande (1937: 439), was much concerned to explore the relations between ‘ritual’ and ‘empirical’ behaviour, with an implied critique of Lévy-Bruhl (Morris 1987: 185). There has been increasing recognition that people with animistic beliefs, outside certain contexts of a ceremonial or sacred nature, think very much as ‘we’ do (Viveiros de Castro, 1998). So why do they not think like ‘us’ all of the time?

2. Normal camera theories

Nowadays political correctness and empirical research have impoverished our vocabulary for describing ‘otherness’. We can no longer refer to non-literate peoples as mad, primitive, barbaric, pre-logical, childlike, or ‘emotional’, and we are left with that ubiquitous euphemism ‘symbolic’. If we cannot have two kinds of people, but still insist on a cognitivist explanation, then we have to assume that all cameras produce photographs of UFOs. This was the position taken by the intellectualists in the nineteenth century, and the structuralists and cognitive anthropologists in the twentieth.
1. Intellectualism

The intellectualist tradition associated with Edward Tylor (1866), Herbert Spencer (1876), and James Frazer (1922) held that ‘primitive’ world views could be the result of rational hypothesizing in the absence of sufficient data. Animistic beliefs are theories just like those of modern science, and worthy ancestors of our own enlightened views. Ritual and magic, in this view, become rational technologies derived from rational theories.

The fundamental flaw in intellectualism is its assumption that spiritual and magical thinking can be explained in vacuo, without reference to more embodied aspects of ‘otherness’, such as classificatory kinship and gift exchange. As we shall see, the same error persisted throughout the twentieth century, in structuralist and cognitive anthropology. However, the intellectualists did acknowledge the potential importance of real-world experience. Tylor (1873) suggested that belief in spiritual beings could be inferred quite rationally from dreams, ritual trances, visions, and experiences of change such as disease and death. His suggestion that non-rational mental processes might play a part in generating religious ideas has a modern ring, and "up to a point, makes good horse sense" (Lewis, 1986: 15). There is now plenty of evidence that people with animistic world-views do regard trance and dream experiences as revelations of veridical other worlds; they frequently discuss their dreams, and base collective decisions on their interpretation; they actively seek visionary experiences and use them to determine their future life path, and so on (Bourguignon, 1973; Katz, 1982; Domhoff, 1985; Jennings, 1995; Schieffelin, n.d).

From the late nineteenth century to the present, a whole succession of studies and theories has focused on dreams, trances, ecstatic experiences, and the effects of
hallucinogens (reviews/anthologies include Lincoln, 1935; D’Andrade, 1961; Eggan, 1961; Bourguignon, 1972; Furst, 1972; O’Neill, 1976; Kennedy & Langness, 1981; Rudgley, 1993). The numinous and noetic qualities of ‘altered states’ (Otto, 1958; James, 1882; Ludwig, 1969), particularly when they occur in sacred or ritual contexts (Bourguignon, 1973), must surely commend them for consideration in any attempt to explain the origins or transmission of religious beliefs. Nevertheless, they are systematically ignored or dismissed by theorists of a structuralist or cognitivist bent.

2. Structuralism

Lévi-Strauss attempted to go beyond the rationalist supremacism that treated ‘primitive’ people as child-like, uneducated, or pre-logical. In The Savage Mind (1966) he argued that the ‘science of the concrete’ (i.e. magic and the like) is no less rational than western science, but that the preliterate thinker is, necessarily, a *bricoleur* cobbling ideas out of whatever comes to hand - basically, re-cycled images from moribund myths. So far, this looks like a real-world experiential explanation for ‘primitive’ representations of reality. The UFO, so to speak, is actually an odd-shaped piece of cumulonimbus. But then he argues that the ‘savage mind’ thinks in ‘images’ rather than ‘concepts’. Exactly what this means, how it is supposed to work, how the brain might have evolved to handle ‘images’ and ‘concepts’ whilst declining to employ the latter, or what inferential utility it might have, is not made clear. He seems to be saying that there is nothing wrong with the camera, but Polaroid and Kodak have not yet learned how to make proper film, and are selling everyone a load of junk instead.

This does not really explain anything, because it takes as given what it purports to explain: where do mythic ‘images’ come from in the first place? With no
experiential theory of their origins, he is forced back into a cognitivist stance. The U-turn occurs in *Mythologiques* (1969-1981). Recurring features of myths, he tells us, are determined by ‘binary oppositions’ wired into the human brain. His reason for reverting to a cognitive rather than experiential explanation would seem to be the curious prejudice which he developed against ritual. Myths, he asserted, are "good to think with" - the very stuff of culture - whereas rituals represent "the bastardization of thought", the antithesis of culture and unworthy of serious scientific attention (1981: 674-5). Thus he denied himself from the outset any possibility of deriving mythic cosmologies from ritual experience, despite numerous arguments that could be mustered to support this view (cf. Durkheim, 1912; Turner, 1982; Knight, 1991).

*Mythologiques* was a four-volume study of over eight hundred New World myths (Lévi-Strauss, 1970, 1973, 1978, 1981). Using his ingenious new method of ‘structuralism’ - which involved identifying the binary oppositions in myths and analyzing their relationships - Lévi-Strauss was able to show that all these myths were variants of "one myth only". This is an extraordinary claim, and it is remarkable that so little attention has been paid to it since. The Belgian structuralist, Luc de Heusch (1972), confirmed close parallels in Bantu myths and rituals, across much of sub-saharan Africa. De Heusch pointed out that the Bantu myths were homologues, even duplicates, of the New World ones identified by Lévi-Strauss. Related or identical ‘mythemes’ can also be found among non-Bantu Africans (Biesele, 1993), in Melanesia (Strathern, 1988), and in Australia, Asia, and Europe (Knight, 1987, 1991).

The discovery of structural unity in myths from six continents is, one might think, of major potential significance. Where *Mythologiques* failed, however, was in arriving at that significance. What was probably the last monumental work of
comparative and theoretical anthropology began, in the Overture to volume one, with a fanfare of triumphal optimism, extolling the power of Structuralism and promising at last a truly scientific anthropology. It was certainly a great venture, and attracted considerable attention - even "near religious enthusiasm" (Morris, 1987), and probably the only whiff of real anthropological excitement in the twentieth century. Contrast this with the deafening bathos of the Finale.

After the hubris of the Overture, the grand analysis of eight hundred myths, and the resounding claim of 'one myth only', Lévi-Strauss gives us his conclusion, quoting directly from Hamlet: "To be or not to be," that is the answer. In a meaningless world of death, disease, and human frailty, he suggests, we all need to cling to some sort of 'meaning', however fragile. Like Geertz a few years earlier, he resorts to the simplistic psychology of Malinowski, and could have spared himself (and us) four volumes of hard labour. Strangely enough, this soliloquy on human frailty slides seamlessly into a lament on the futility of science itself.

The structuralist project failed because of its disembodied cognocentrism (ideas come from brain structure not from experience) and logocentrism (culture as a kind of 'communication' with an abstract grammar-like structure). Binary oppositions - like wet and dry, or raw and cooked - whether they are wired into the brain or not, obviously depend on embodied experience for their meaning. Various experiential interpretations of binary schemes of classification have been made (Durkheim & Mauss, 1903; Hertz, 1909; Needham, 1961, 1967, 1973; Knight, Power & Watts, 1995). All suggest a performative rather than 'syntactic' origin for binary oppositions, and all can be derived from the duality of ritual and everyday experience. But Lévi-Strauss specifically rejected ritual experience as a potential basis for human culture -
even though this was the position taken by his acknowledged guru, Durkheim.

Too much enthusiasm at the outset led to premature despair over a simple error, the abandonment of a powerful and proven methodology, and the rise of a new kind of anti-science. To date, there has been no significant counter-blast to *Mythologiques*. Most of us prefer to leave it gathering dust, a skeleton in the anthropological cupboard. Though I only know of one other outright skull-of-Yorick soliloquy lamenting the futility of science - *The Gender of the Gift* (Strathern, 1988) - the relativising of all cultures, including ‘western scientific mythology’, is now endemic in social anthropology.

3. Cognitive anthropology

The traditional approach in cognitive anthropology has been to ignore the UFO and study all the ordinary photographs instead. Religious practice and belief is just too mysterious: we have no hope of understanding it until ‘ordinary’ cultural phenomena have been explained first. This makes the convenient assumption that ‘ordinary’ human behaviour is rational, explicable in its own terms, and discontinuous with ‘strange’ human behaviour. It is like losing your wallet in a dark alley, and looking for it in the high street.

As if this were not bad enough, ‘cognitive’ anthropologists traditionally ignored cognitive science as well, and derived their models from linguistics, using language metaphors to understand matters which could hardly be less language-like. They denied the source of their own inspiration, for the movement has its roots in the work of social psychologist George Herbert Mead (1934), who stressed the histrionic character of everyday life. Mead’s views were applied to ethnographic data by Irving Goffman
(1959) in his landmark work *The Presentation of Self in Everyday Life*, which established the importance of role-play in anthropology, but also introduced the unfortunate notion of *scripts*. Goffman pointed out that there are many routines in everyday life which conform to a template, not unlike a miniplay script. An example is ‘going to the doctor’, which prescribes a fairly standard sequence of events, and establishes the conventional roles played by ‘doctor’, ‘receptionist’, ‘patient’, and ‘pharmacist’. The script-like nature of everyday routines is an undeniable part of our experience, but the term ‘script’ is itself a misleading metaphor derived from a literary culture. Had Goffman used a term like ‘screen-play’, pointing out that movies, mime, and strip cartoons do not depend on words, he might have helped to avoid the subsequent leap into logocentrism.

Early cognitive anthropologists set themselves the task of understanding ‘cultural knowledge’, or cultural competence - what you need to know or believe in order to operate in a manner acceptable to your community (Goodenough, 1957: 32, in Boyer, 1993). A direct analogy was drawn with language competence - what you need to know in order to construct grammatical sentences. The goal was generally seen to be the construction of an ideal ‘cultural grammar’ underlying social behaviour (Boyer, 1993: 19). This is the same logocentric error - the notion of ‘culture as communication’ - that led to the collapse of structuralism and the confabulatory addiction to ‘symbols’ as conceived by Saussure and Pearce (*cf.* Douglas, 1970: Furst, 1972; Leach, 1976; Lewis, 1977; Foster & Brandes, 1980). The appeal of linguistics is obvious - a self-enclosed system with its own internal logic, a ‘social fact’ which can be analyzed without reference to lived realities, and the promise that anthropology, at last, could become an ‘exact science’, worthy of the same respect accorded to the
Actually, such self-enclosed logic is more like mathematics than science, but the real irony is that Saussurian linguistics is itself a product of *ex vacuo* rationalization, and cognitive anthropologists continued to dig themselves into the same pit at a time when linguists were recognising its inadequacy, and stressing the *performative* nature of language (Boyer, 1993).

The extraordinary development of the cognitive sciences in the 1970s did lead to a shift in emphasis, and a move away from ‘cultural grammars’ to ‘contextualized organizations of knowledge’ (Dougherty-Keller, 1985: 7: in Boyer, 1993). Basically, the notions of ‘schemata’ and ‘mental models’ were added to that of ‘scripts’, and became mainstays of most current cognitive anthropology (Boyer, 1993: 20). Disembodied logocentrism expanded its horizons slightly, and became disembodied cognocentrism.

The results were often interesting and useful. For example, Scott Atran (1990) has explored Fodor’s (1983) theory of domain-specific learning abilities, with a mass of cross-cultural data relating to the conceptualization and classification of knowledge. This is necessary and important work, though still in the tradition of ignoring the UFO. Others began to address the central enigma head on. With few exceptions (such as Hallpike, 1979), anthropologists no longer believed in two kinds of people, ‘primitive’ and ‘modern’. But the exciting idea that there might be *two kinds of thought* still seemed tenable. Unlike Lévi-Strauss (1966), who attributed ‘imagistic’ and ‘conceptual’ thought to two kinds of people, the new idea was two kinds of thought present in everyone (e.g. Hollis, 1970: 223; Southwold, 1979: 631ff). In other words, all cameras have two photographic processes: one takes pictures of real things,
and the other takes pictures of UFOs. Boyer (1993: 24) calls this the ‘domain
specificity fallacy’. Despite the obvious Darwinian problem (how does a real
environment select genes for an unreal adaptation?), the idea gained impetus from
Fodor’s ‘domain specific module’ thesis and, alas, from un-biological ideas fostered by
Darwinians themselves, such as ‘macromutations’ to explain human culture (e.g.
Mithen, 1996).

Dan Sperber (1975) recognised the absurdity of a domain specific module for
‘religious thinking’, but accepted the idea of a macromutation for ‘non-rational’
thought. The emergence of modern human culture, he suggests, depended on a hard-
wired ‘symbolic’ alternative to reasoning - a kind of Fodorian module that is data-
specific rather than domain-specific. The ‘symbolic mode’ clocks in by default
whenever the ‘rational mode’ fails to compute.

This repeats the intellectualist assumption that ‘primitive’ people develop
religious theories because they are somehow short of data, and is almost a re-run of
Lévi-Strauss’s theory of ‘imagistic thought’. Lévi-Strauss, however, began by thinking
in terms of cultural environments, and only later resorted to a brain-wiring argument,
whereas Sperber plumps for hardware from the start. The theory has numerous
precedents, including the Freudian notion of primary process thought and the symbolic
content of dreams, Jungian archetypes, and Gazzaniga’s (1988) more modern emphasis
on confabulation - the process of ‘filling in the gaps’ with fabricated data. What is
missing is some explanation of how ‘symbolic’ thought is supposed to differ from
‘rational’ thought, why it is adaptive, and why it should be less primitive despite its
primary-process functioning and universally erroneous conclusions. If the term
‘symbolic’ is to mean anything, then surely all thought is ‘symbolic’ (cf. Pinker,
Since we cannot cram real chairs, telephones, and mountains into our heads, our thoughts about such objects have to be metaphorical or representational in some sense. In his enthusiasm to prove that representational art is 'symbolic', Sperber (1994) even makes a similar point himself. The assumption that religious cosmologies are erroneous ‘theories’ intended to explain unknowns, confabulations without experiential origin or function, reflects the negative view of religion bequeathed to us by the Enlightenment (Jordanova, 1980). The decline in religious belief in post-industrial societies is assumed to reflect the increasing ‘rationality’ of the west.

This is no real advance on ‘the science of the concrete’, and assumes similar evolutionary and cognitive non sequiturs. Sperber specifically tells us that ‘symbolic thought’ generates a maximum of hypotheses from a minimum of data "without caring to put them to the test" (1975: 4). But what is not tested is not an adaptation, and makes no biological or social sense - an inexplicable epiphenomenon. Once again we find religion being denied its social function, and ascribed to a failure of reason.

Pascal Boyer (1993) continues to plough the same cognitive furrow. He accuses anthropologists in the past of ad hoc psychologising, pointing out that cognitive science has made vast strides forwards in recent decades, and suggesting it is high time we anthropologists took account of this, instead of continuing to reinvent psychology ex vacuo just to suit ourselves. This is a strong point, but then, true to type, he resorts to a linguistic parallel: just as there must be ‘cognitive constraints’ on what kinds of grammars are learnable, so there must be ‘cognitive constraints’ on what kinds of cultural representations are transmissible. This goes straight up a blind alley: in one stroke, he chops the legs off his own project by declaring that cognitive science can only explain what culture cannot be. He does not ask why human babies are born
positively hungry for enculturation; why, as Trevarthen (1995) puts it, children take such delight in cultural objects precisely because of their 'human-made unreality'.

Three years later, in a paper entitled 'What makes anthropomorphism natural?', Boyer (1996) points out a paradox. In traditional anthropological thought, animism has been assumed to be natural or child-like; but cognitive psychologists have now shown that children have intuitive ontologies which preclude animism (reviewed cross-culturally by Atran, 1990). He is referring to domain-specific modules: the notion that we have little black boxes inside our brains which are specialized for learning specific domains of knowledge (Fodor, 1983). So children are pre-adapted from birth to acquire their own intuitive physics, intuitive biology, intuitive psychology, and so on. The point is that domain-specific intelligence is never applied to the wrong domain.

He proposes to resolve the paradox with his 'cognitive theory of cultural representations', which says that

Representations are likely to become stable and widespread if they have both salience and inferential potential

This is a kind of Darwinian selection theory, rather like Dawkins's memes, and we might expect a theory of random mutations to go with it. Sure enough, in the small print, he says religious representations must originate at random in 'arbitrary contingent fantasies' in individual minds. So a Rainbow Snake, for example, is an arbitrary fantasy, dreamed up by some hunter-gatherer in an idle moment, which achieved cultural dominance in Africa, America, and Australia, because of its superior utility or persuasive power - and despite being counter-experiential and counter-intuitive. These negative properties are even the reason for its success. He spells out
his theory like this:

Anthropomorphic projections have (1) *inferential potential* because they activate a powerful modular capacity for mentalistic accounts of behaviour. He is referring to the Theory of Mind Mechanism, or ToMM, and other domain-specific modules thought to underlie intuitive psychology (Baron-Cohen, 1995). ‘Theory of mind’ means the ability to interpret behaviour - our own as well as that of others - in terms of epistemological mental states (such as knowing, believing, guessing, imagining, dreaming, pretending, etc). Without ‘theory of mind’ the behaviour of others, and even of ourselves, remains a mystery to us.

Boyer is contradicting himself here. The reason domain-specific intelligence is not generally applied to the wrong domain is because, if it were, the inferential potential would be worse than zero. As Steven Mithen points out (Mithen & Boyer, 1996), any animal doing this would qualify for rapid extinction. What is the inferential value of applying intuitive psychology to a mountain, a tree, a ‘useless trade object’, or the roof beam of a house? So why should anyone do this?

The answer is, because it has (2) *salience*, because it’s counter-intuitive and so attention-grabbing. In other words, the more incredible something is, the more it will be believed. Boyer is telling us here, in effect, that animism is natural because it is not natural - there was nothing to explain in the first place, so here is a non-theory to not explain it with. All cameras take pictures of UFOs precisely because they are designed not to. According to Boyer, different representations of reality arise at random, are devoid of meaning, and require no explanation because they have no basis in the reality they claim to represent. Presumably this is equally true of big bangs, black holes, and Boyer’s cognitive theory as well.

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Boyer specifically dismisses the importance of ritual as liminal pantomime or make-believe play, and sweeps it under the carpet of asocial 'contingent fantasy' - as though fantasy is not make-believe - and so cannot begin to understand religious representations.

Theories that invoke real-world experience

'Camera-based' explanations, such as I have mentioned above, have never succeeded in dominating anthropological thought. A more common reaction has been to regard the UFO as something real, but not what it appears to be. It could be an obfuscatory misrepresentation of society for political ends (Marx & Engels, 1846); a true reflection of society projected onto the sky (Durkheim, 1912); or an 'anti-structural' inversion of society (Turner, 1969, 1982).

3. Political deception theories

The theory of historical materialism presents religion as part of an ideological superstructure, built upon an economic base. In this view, religions evolve as a secondary consequence of economic change. Ideology - 'false consciousness' - serves several Machiavellian functions: concealing inequities of distribution, legitimating authority, making social injustice appear inevitable and right, and providing imaginary solace to exploited lower orders of society (the 'opium of the people' thesis). Marx and Engels (1846) attributed religious beliefs to the 'forces and relations of production', firmly planting the roots of religion in real-world experience, and giving us a 'vested political interest' explanation of the UFO. They represent the 'school of suspicion', a term originally applied to Freud (Ricoeur, 1970: 32). There are close
parallels between Freud and Marx: ‘repression’ is an adaptation to parental approval just as ‘false consciousness’ is an adaptation to approval by the socially dominant. Freud saw social authority as modelled on the patriarchal family, whereas Marx and Engels saw the family as a miniature system of capitalist exploitation. Both views represent God as a patriarchal authority figure, and both are essentially political theories.

Marx and Engels also regarded human self-consciousness as an emergent property of economic processes: we become conscious by acting on the world. The idea originates with Hegel (1807), as does the notion of alienation, which follows from self-consciousness: in becoming aware of ourselves in contrast to the changes we make in the world, we become alienated from our own creation. For Hegel, the solution to alienation was ‘sublation’ - making our creations our own. He saw this as the task of philosophy, and his own work (1840) as the solution to all human ills, and the end of history, since once you have cracked the problem intellectually there is nothing left to achieve. Such idealistic naivety did not impress Marx, though he saw the theory as inspired, and derived his own theory by turning Hegel on his head: making ‘man’ the creator of ‘spirit’, and not the other way round. Alienation, in Marxist theory, results from the appropriation of the labour of others and the separation of labour from capital, whilst ‘sublation’ is replaced by ‘communism’ - restoring to labour that which is its own, and re-establishing a primordial freedom (primitive communism) in a more highly evolved form: "From each according to his ability; to each according to his need”.

There are powerful ideas in Marxist theory, but, perhaps because they became confused with the ideology of a ‘vulgar’ Marxism (which Marx himself repudiated),
they made little impact on anthropologists for some hundred years (Morris, 1987: 139), and seem to have again fallen out of favour. We should at least give Marx and Engels credit for hitting one important nail on the head. It should have been obvious, but wasn’t, and still isn’t for many of us, that even in the most egalitarian of human societies, there is usually someone who gets the dirty end of the stick. This is a truism for biologists, but not, apparently, for all social anthropologists, whose approach to religion tends to be "neutral and apologetic" (Morris, 1987: 140). And there is plenty of evidence that religious beliefs and cosmologies do reflect the socio-economic order, and are used in all the ways suggested by the theory of historical materialism (for example, the hierarchic cosmology of Hinduism reflects and justifies the caste system, whilst the principle of *karma* promises elevation to a higher caste, in a future incarnation, for those who fulfil the obligations of their present status).

I cannot review here all the anthropological attempts to make Marxist theory fit ethnographic data (see Keesing, 1981). Marx and Engels were profoundly affected by the western experience of industrialization, and the often appalling exploitation of those deprived of land by the propertied classes. From the Hegelian insight that we become conscious by ‘acting on the world’, they leapt to the conclusion that we become conscious through *labour*. However, we do not begin ‘acting on the world’ through work, but through childhood play.

4. *Theatrical theories*

The dramatic nature of ritual performance suggests another interpretation of the UFO - still a human artefact, but a theatrical creation: the stage-set for a culture-creating pantomime. Accounts which stress the ritual underpinnings of economic behaviour
challenge the traditional Marxist model of religious ‘superstructure’ built upon an economic ‘base’.

Performance theories attribute the origin and maintenance of religious cosmologies and economico-moral structures to collective performances and practices. Some authors, such as Turner (1982) and Bateson (1955, 1974), specifically consider the psychological implications of ritual practices; others, such as Knight (1991), allow them to remain implicit. Durkheim (1912), setting the precedent for a dominant attitude in social anthropology, denied the relevance of psychology entirely. In his view, social systems are emergent orders with their own sui generis logic and top-down causality, irreducible to lower levels of explanation in psychological or biological terms.

1. Collective representations

Emil Durkheim claimed that religion "is a system of ideas with which the individuals [collectively] represent to themselves the society of which they are members" (1912: 225). So religious action and mythological ideas do not represent what they overtly imply, i.e. relations between superhuman agencies, human beings, and the physical world. Rather, they are a mirror through which society can reflectively perceive and become conscious of itself. But where Marx and Engels infer 'false consciousness', Durkheim asserts that no religion is actually untrue. How could it be, he asks us; how could reasonable people persist so assiduously in practices and beliefs if they were evidentially futile or absurd? Religious beliefs and ritual practices reify a metaphorical system of social truths; they are ‘collective representations’ through which society mirrors and maintains itself.
Furthermore, both religious cosmology and language are derived from ritual practice (the opposite of what the intellectualists assumed). Language is syntactical, and syntax is only needed for displaced reference (i.e. reference to things imagined or imaginary, as opposed to direct observables in the here-and-now). Language therefore cannot begin to develop before imagined realities are made public by ritual pantomime. ‘Collective representations’ are necessary to solve what has been called "the problem of the first utterance" (Whiten, 1993): how can you encrypt an intangible unless it is already public? This Durkheimian argument has never been refuted, and is simply ignored by theorists who derive ritual from intellectualist ‘discourse’ (e.g. Boyer, 1996), put myth before ritual (e.g. Lévi-Strauss, 1981), or assume language could evolve by gradualistic genetic change (e.g. Pinker, 1994).

For Durkheim, then, the primordial form of ‘collective representation’ depends on preverbal performative abilities, especially pantomime or role-play. Public performances make visible and tangible such social abstractions as values and economico-moral obligations. In so doing, they make the invisible and intangible real, create the experience of immaterial forces which are genuinely ‘outside’ the minds of social members, and so establish a transcendent world of powers, spirits, ancestors, or gods, which mirrors and sanctifies the social order itself.

2. Anti-structure

In contrast to Durkheim’s view of collective representations as mirrors of society, there is a related line of theorising that emphasizes ritual process as an inverting or negative social mirror. Following an extensive study of rituals in India, Arnold van Gennep (1909) inferred that all rituals are rites of passage, since they accompany
phases of social transition. *Life-crisis* rites mark changes of state or station in the lives of individuals or groups: birth, initiation, marriage, illness, and death. *Calendrical* rites mark the passage of society as a whole, especially from season of plenty to season of lack, and back again. Van Gennep showed that rituals typically involve three phases:

1. separation from the mundane world
2. transition, which takes place in a kind of limbo, a betwixt-and-between world which he called 'liminal' (from the Latin *limen*, meaning margin)
3. incorporation, or return to the mundane world transformed

In the transitional or liminal phase, there is suspension or inversion of the normative social order. So, in many life-crisis rites, all signs of personal identity and status in the everyday world are erased. In calendrical rituals, on the other hand, there is often a Saturnalian inversion of everyday status, with the humble temporarily elevated to dominate the powerful (Turner, 1969, 1982). Or again, if cannibalism is regarded as abhorrent in the everyday world, it becomes mandatory in ritual - real cannibalism, as among the Avatip (Harrison, 1993), or make-believe cannibalism, as in Christian communion. Several authors (Huizinga, 1955; Winnicott, 1974; Bateson, 1955; Schechner, 1977; Turner, 1982; Jennings, 1995), have noted that the creation of a 'transitional space' and suspension of the rules or demands of everyday reality are typical also of childhood play, and essential to enculturation. Childhood itself might be regarded as a transitional space - an extended period of irresponsibility in which children, shielded from the demands of adult society and survival, are free to explore
and expand their powers of play and make-believe. What we appear to have in ritual is a formal institutionalization of human play, adapted to specific cultural ends.

Victor Turner (1969) coined the term 'anti-structure' to describe the transitional topsy-turveydom of the liminal phase of ritual - "a transformative self-immolation of order as presently constituted, even sometimes a voluntary sparagmos or self-dismemberment of order," whence the normative social world can emerge revitalized (1982: 83). Sleep, too, could be regarded as a 'self-immolation' of our normative waking state, with similar restorative effect.

Turner's views conflicted with those of the French structuralist, Claude Lévi-Strauss. Turner was trained in the British school of structural-functionalism, whose focus was the structure of the 'everyday' or 'non-ritual' world: roles, statuses, institutions, and the relations between them (Turner, 1982: 62). The Gallostructuralists, on the other hand, focused on liminal phenomena - rituals and myths - and saw structure where Turner saw anti-structure.

In fact the conflict between Turner and the structuralists was more imaginary than real. Lévi-Strauss (1981: 674-5) did indeed recognise the 'disorderly' aspects of ritual, to which he reacted with disgust. He even discussed, without recognising their significance, myths which expressly state that culture originated in the ritual dismembering of social order - he calls this "the return to a state of nature and animality" (1981: 679). To him, this was a self-evident contradiction of logic. In his aversion to ritual, Lévi-Strauss failed to notice that rituals (as dramas) and myths (as narratives) are dealing with very similar or the same material. Myths deal with the liminal world, or movement between the liminal and everyday worlds, and most plausibly originate in transformative ritual experience. The first-hand accounts, given
by shamans, of their own trance-journeys into other worlds, have myth-like features (Eliade, 1951). Shamanic initiation is also a ‘transformative self-immolation’ (Turner, 1982: 83-4) in which the shaman’s old body is killed and dismembered, and then reassembled in a new way, often with incorruptible organs made of rock crystal (Eliade, 1951). It is this new, magical body that enables him to fly at will between experiential worlds, conducting souls to the land of the dead, or bringing messages from the gods.

So the problem which led to conflict between Turner and the structuralists is this: on the one hand ritual, like childhood play, is transformative, since it moves persons and societies from one state to another; but on the other hand, and utterly unlike childhood play, ritual has structural features and recurrent themes that are remarkably consistent across seven continents. Ritual, it seemed, represented a form of institutionalized play whose transformative powers were directed into a social mould, and whose outcome tended towards conformity. Not every ritual gesture and scene was rigidly scripted, however (Turner, 1982: 81). No two performances can ever be the same, and performance is always more than rules and rubrics: process transcends its frame as a river transcends its banks (ibid: 79). Ludic elements were indeed present - such as sacred clowning, ritual jocularity and obscenity, carnival-like masking and animal disguise, Saturnalian inversions of status, and even obligatory episodes of spontaneity. And, whenever the normative social structure was threatened, ritual still had the potential to generate paradigms for change. But, under stable conditions, initiation rituals made ‘indelible marks’ on bodies and minds, whilst the status-reversals of calendrical rites served only to bring back the old political order with, if anything, renewed coercive vigour. Ritual, then, is a kind of crystallized play, using
the transformative power of play to create socially conforming roles and relations and a normative social order.

The term ‘anti-structure’ was borrowed by Brian Sutton-Smith (1972) for his research into order and disorder in children’s and adult games. He concluded that:

the ‘anti-structure’ represents the latent system...from which novelty will arise when contingencies in the normative system require it...It is the source of new culture (1972, p. 18-19).

This leaves open the question of whether ‘contingencies in the normative system’ are necessarily economic changes imposed by aristocratic, capitalist, or colonial force (the ‘base’ in Marxist theory), or whether the adaptive solution generated in liminal states is necessarily ‘false consciousness’. We know that religious beliefs and practices can and do undergo revolutionary change, often under the leadership of a charismatic prophet with visionary inspiration, when for whatever reason traditional faith and practice ceases to meet communal needs. ‘Cargo cults’ are a common response to colonialism (Lawrence, 1964; Worsley, 1970), and although they may begin by offering a false promise (that the cargo sent by the ancestors will eventually be redirected to its rightful recipients), by an empirical process of trial and error such cults can generate politically realistic strategies. Wallace (1956) subsumed cargo cults, and movements such as the North American Ghost Dance, within his concept of ‘revitalization movements’, and presented evidence that major world religions, including Christianity, originated as movements of this sort. They affirm human value in the face of injustice or inequity, seek to restore a lost sense of psychic and social integrity, and above all, move to eliminate ‘false consciousness’ in a system which has
lost its experiential vitality and transformative power. 'Goodwill to all humankind' would seem to have some universal appeal, reflects the holistic aim of all religious practice, and is in fact the goal of Marxist ideology itself (Turner, 1982; cf. James, 1902).

The theories we are looking at here do not come from the school of suspicion but regard religions as in some sense 'true'. But whereas Durkheim held religions to be true in so far as they were metaphoric reflections of the social order, theories of anti-structure find experiential 'truth' in the negation or inversion of social structure. Turner (1982) in particular addressed the apparent paradox that it is in ritual, childhood make-believe, and theatre - the world of artifice, pretence, collective deception, fantasy, the miming of animals and otherness, etc. - that many people, including mystics and artists, assert we have the only possibility of glimpsing 'truth', or of knowing who we really are. 'Everyday reality', in which we earn our daily bread, satisfy our needs, and face the problems of a contrary environment, is held to be the ultimate falsehood: a world of masks, customs, habits, static paradigms, and conventions; of fossilised pasts and intended futures rather than the immediacy of here-and-now reality. It is in the sparagmos, the sleep of culture, that we are held to be most conscious; and when culturally awake most truly asleep - seeing life through a glass darkly.

In Turner's view, social life alternates between the structural role-play of everyday life and the anti-structural role-play of ritual, theatre, and art; liminal make-believe has the power to expose the false make-believe of the everyday world, and to modify it when appropriate. Turner emphasized that, though art reflects life, life equally imitates art: "There was a lot of Perry Mason in Watergate" (1982: 90). His
mature work, *From Ritual to Theatre*, opens with an account of the ‘social drama’ (1982: 9) - of which Watergate was an example - which he saw as a universal dramatic process aimed at the resolution of social contradictions, and accounting for social change.

**Otherworld theories and non-theories**

5. *The supernatural world*

Perhaps the most obvious and popular response to the UFO is to accept it at face value as an extraterrestrial spacecraft, from a realm currently inaccessible to science. Maybe, through magico-ritual practices, human beings really do contact and influence some kind of alternative, transpersonal, paranormal, or spiritual reality. Anthropologists, like the people they study, do have beliefs, and some are religious. Most adopt a stance of ‘professional agnosticism’ towards their scientific work (Gell, 1992), eschewing *deus ex machina* explanations. However, this is not the case with neo-shamanic anthropologists, many of whom have taken Michael Harner’s course in ‘core shamanism’ and refer to themselves as ‘shamanic practitioners’ (Conton, 2000).

In America, more than twenty years ago, Marvin Harris (1978: in Ortner, 1985) complained that anthropology was being taken over by mystics, religious fanatics, and California cultists; that meetings were dominated by panels on shamanism, witchcraft, and ‘abnormal phenomena’; and that "scientific papers based on empirical studies" had been wilfully excluded from the programme. Apart from the exclusion of Harris’s ‘empirical studies’, the trend is still with us. Last year (2000) the spring meeting of the Society for the Anthropology of Consciousness (SAC) featured workshops on shamanic drumming and "participatory healing by prayer and shamanic
extraction" (Whitehead, 2000a).

The SAC owes its origins, at least in part, to the work of Carlos Castenada and the apparently traumatic blow this dealt to the collective psyche of the American anthropological establishment. Castenada’s writings, beginning with his 1968 PhD dissertation at UCLA, roused passionate debate, notably at meetings of the American Anthropological Association in Mexico City in 1974. Castenada claimed that no one could study or understand shamanism without becoming a shaman, and that shamans wield superhuman powers in a world that transcends time, space, and the mundane limitations of western technology. The resulting furore broke out between those who believed and disbelieved - with irreconcilable fervour - in Castenada’s claims (Schwartz, 2000).

How is it possible for western graduate scientists to reject the authority of their own science, and replace it with a world-view that is more typical of foraging societies? To explain this we have to consider an extreme relativism, deriving mainly from hermeneutic and postmodern anthropology. Social anthropologists have long regarded western science as a cultural institution like any other, and a fit subject for agnostic scrutiny. Many do not believe there is any such thing as a ‘fact’ (cf. also Kuhn, 1962). Jordanova (1980) explains the anti-theological stance of Enlightenment science as a ploy by one group of males (scientists) attempting to usurp the authority of another (the clergy), and to assert their right to dominate ‘nature’ (a category which includes women, children, non-scientists, and non-Europeans). Pierre Bourdieu (1972) has also pointed out the system of privilege on which scientific practice depends, and questioned the effect of this on scientific beliefs (cf. also Strathern, 1988). This questioning of western scientific thought may be part of a broader social trend.
The 'new age' has not been without its impact on anthropologists, and we may be seeing signs of a new Counter-Enlightenment, particularly in the field of 'consciousness studies' (Whitehead, 1998; Murinbata & Whitehead, 1998).

### 6. The Platonic world of meaning

The denial of explanation

At the end of the eighteenth century many of the essential premises of the Enlightenment were being challenged, and even the value of rationality and reason itself. The Counter-Enlightenment, at least in part, was fuelled by repugnance at the thought that human consciousness, moral responsibility, and free-will could be reduced to mechanism and determinism. In 1789 the French Revolution broke out, and in Germany, the writings of Goethe, Schelling, and Schiller launched the Age of Imagination, which eventually gave birth to the Romantic Movement. The reaction to mechanistic materialism, a kind of re-enchantment of science, was under way.

In 1781 Immanuel Kant published *The Critique of Pure Reason*. Kant made a fundamental distinction between 'scientific reason', which strives to explain the natural world through the categories of understanding - space, time, causality - and 'practical reason', which grasps ethical realities through intuition (Morris, 1987: 56). Kant also stressed the important distinction between ontology and epistemology: whatever is 'out there' and ontologically real is a *noumenon*, or 'thing in itself', and can never be grasped directly; all we can know is our concepts of reality, inferred from experience, which is itself a subjective response to the unknowable. The same idea is implicit in Thomas Kuhn's (1962) concept of the scientific paradigm, and his theory of scientific revolutions. In so subjectivizing knowledge, Kant helped prepare the ground for the
rise of postmodernism two hundred years later.

A more immediate consequence was the rise of the German idealist tradition towards the end of the nineteenth century, originating with the Heidelberg school, represented notably by the philosophers Windelbrand, Rickert, and Dilthey, and the sociologist Georg Simmel (Morris, 1987). Like Durkheim, the Heidelberg school asserted a radical discontinuity between society and the natural world on the grounds of the former's emergent character, but unlike Durkheim they denied that human societies can be explained at all. Essentially, they were reviving Kant's distinction between 'scientific' and 'practical' reason. They held that social institutions, practices, and beliefs are fundamentally determined by meanings, which are causally independent of natural phenomena. Whereas the physical sciences quite properly attempt explanations of facts and are essentially logical, the social sciences demand interpretations of meanings, which can only be intuitive. Interpretative science is called 'hermeneutic' (after Hermes, messenger of the Gods).

The Heidelberg school contributed two important ideas which influenced the 'anthropological tradition' beginning with Durkheim.

The first was Simmel's (1968) view of social institutions as sui generis systems with top-down causality. In a stock market, for example, the collective behaviour of investors assumes a life of its own, which drives market sentiment and constrains the behaviour of individuals. The structure of the market itself, like the Great Red Spot on Jupiter (Gleick, 1988), is a kind of spontaneous order emerging from and controlling the 'chaos' of individual acts.

The second was Wilhelm Dilthey's (1883-1911) theory that we become conscious through social display. Victor Turner, at one time excited by the views of
Marx (we become conscious through labour), turned to Dilthey in his analysis of ritual and childhood play (1982). ‘Social mirror theory’, first expressed by Dilthey, is the subject of Chapter 3.

The rejection of evolutionary approaches

The end of the nineteenth century also saw the birth of field research, based on first-hand observation and personal confrontation with the ‘anthropological other’. It is worth noting that Hegel, Marx, Dilthey, and Weber all stressed that analysis should begin with the empirical data of history, and this gave an evidential substance even to hermeneutic thinking. Field anthropologists, however, studied non-literate peoples without history, and made use of data gathered in the ‘ethnographic present’ - the brief period of years or months in which the anthropologist makes his observations - and largely from first-hand observation at one place at a time (the ‘ethnographic here-and-now’). In America, Franz Boas invited native informants to New York to be interviewed by him. The ‘ethnographic present’, in that case, shrank to a few hours of second-hand reportage. Further, the evolutionist assumptions of Spencer, Tylor, and Frazer came increasingly under suspicion, both in America and Britain, because of their ethnocentricity and the assumption that contemporary societies could be living fossils from an evolutionary past.

The founding fathers of American ‘cultural anthropology’ (Lewis Henry Morgan and Franz Boas) and British ‘social anthropology’ (Bronislaw Malinowski and A.R. Radcliffe-Brown), effectively outlawed historical and evolutionary approaches. As Radcliffe-Brown put it: "speculative history cannot give us results of any importance for the understanding of human life and culture" (1914: vii). Their
contribution to anthropology was the exact opposite of Darwin's to biology: they deprived their discipline of the only possible basis for cross-cultural scientific understanding, and created a gulf between biology and social anthropology which, like the fall of the Tower of Babel, has made most attempts at dialogue between the two disciplines unintelligible ever since.

Radcliffe-Brown, like Malinowski, advocated a synchronic approach (i.e. one more or less frozen in time). Social structures, myths, and ritual behaviour were to be understood in two respects: their 'meaning' and their 'function'. His notion of function is similar to that of Malinowski, and regards "culture as an adaptive mechanism by which a certain number of human beings are enabled to live a social life as an ordered community in a given environment" (ibid: ix). But in contrast to Malinowski, his notion of 'meaning' was not psychologistic, and he specifically rejected an origin for religious ideas in the fears and frustrations of individuals. Religious ideas, he pointed out, can just as well be argued to cause anxiety and frustration. Just as words have meanings, so do customary gestures, ritual actions and avoidances, symbolic objects, myths, etc. - they are 'expressive signs'. The meaning of a sign "is determined by its associations within a system of ideas, sentiments and mental attitudes" (ibid: viii). This very Durkheimian view anticipates the later development of French structuralism, and being based on a semiological model - the Platonic abstraction of a 'system' - helped to consolidate the anti-psychological bias in social anthropology, originating with Durkheim.

In America, Franz Boas, like Malinowski and Radcliffe-Brown, emphasized the difference between diachronic history and synchronic anthropology, the latter being a matter of studying social structures, which he too conceived of as empirically
Boas, however, saw ‘primitive thought’ as united by symbolic associations suffused with affect (1911: 135) - the ‘faulty camera’ theory - whereas the British structural-functionalists, who liked to call a spade a spade, regarded such fluffy notions of ‘culture’ as mere ivory-tower speculation (Leach, 1976), and treated ‘symbols’ as social rather than psychological phenomena. Hence the difference between ‘cultural’ and ‘social’ anthropology, and transatlantic debates about whether the American version should be consigned to the humanities, or the British to a mechanistic sociology (Sahlins, 1999). The British essentially followed Durkheim in treating social structure as a sui generis Platonic world that could be studied in isolation, and showed little curiosity about psychology or anything outside field anthropology that might illuminate the human condition - a British habit that persists to this day.

The denial of objectivity
Accumulating experience made anthropologists increasingly aware of the pitfalls of field research - the reliability and even honesty of informants, the prodigious difficulties of understanding and translation, the unwarranted presumption of scientific positivism, and the naiveties of the early ethnographers who thought that ‘empirical facts’ simply lay there waiting to be ‘known’.

The anthropologist goes into the field wearing cultural blinkers that lead him to interpret indigenous ideas and practices in terms of his own (Evans-Pritchard, 1965: 109; Turner, 1969: 2; Keesing, 1981). Turner, who was nurtured in the British structural-functionalist school in the late 1940s and early '50s, earned the opprobrium of his mentors by pointing out the built-in circularity in the method advocated by
Radcliffe-Brown. By setting out to apply the comparative method to individual studies, the data collection was conditioned by the hypotheses supposedly derived from it (Turner, 1982: 62-3). Lewis-Williams (1991) put it more bluntly: "There is no such thing as theory-free data."

During this soul-searching period of anthropological self-doubt, Evans-Pritchard and others also expressed dissatisfaction with the 'frozen-in-time' vision of society created by the synchronic approach of early Anglo-American ethnography. With the bathwater of speculative history "the functionalists have also thrown out the baby of valid history" (Evans-Pritchard, 1965: 21). Evans-Pritchard recognised that this kind of analysis, taken to extremes, could only lead to absolute relativism (Morris 1987: 189). He had little idea of the extremes to come.

The denial of psychology
In the late 1970s and '80s, in an attempt to go beyond the structuralist-functionalist paradigm, a new variant of hermeneutic anthropology developed, influenced by Dilthey and Weber, and the anti-psychologistic stance of Durkheim (Morris, 1987: 312). The influence of Weber (1904-5) is already present in Clifford Geertz's study of religion in Java (1960). Geertz saw religion as primarily a solution to the 'problem of meaning': explaining anomalous events and experiences (Tylor), solving the problem of theodicy (why a loving God should create a painful world: Weber), and assuaging human anxieties (Malinowski):

The existence of bafflement, pain, and moral paradox - of the Problem of Meaning - is one of the things that drives men toward belief in gods, devils, Spirits, totemic principles, or the spiritual efficacy of cannibalism (1975: 100-23).
To say that this is ‘one of the things’ that affects religion is something of a truism.

And to make religion the locus of ‘meaning’ in society, whether right or wrong, does not logically lead to the inference that anthropology should not attempt to explain it. Nevertheless, Geertz claims that anthropology should be

not an experimental science in search of law but an interpretive one in search of meaning (1975: 5).

This could have come straight from Dilthey. But there are also new features in Geertz’s thinking. First, there is a distinct sense that anthropology has failed. Geertz (1975) complains that no recent theoretical advances of major importance have occurred in the study of religion, and that anthropology is living off the conceptual capital of its founding ancestors. Morris (1987: 313) counters with the argument that biologists too are living off the conceptual capital of Darwin and Mendel, and do not seem too upset by this. There is, however, a profound difference between biology and social anthropology in this respect. The ‘founding ancestors’ of modern biology had rocked the world with an intellectual revelation of enormous explanatory power. Nothing like this ever happened in anthropology, and one could argue that the ancestors of social science bequeathed a series of denials, denunciations, and invocations to despair - the impossibility of explanation (Dilthey), the incurable discontents of civilization (Freud), the relentless advance of rationalisation and a ‘hard and cold’ future for industrial societies (Weber), the irrelevance of psychology (Durkheim), the futility of historic speculation (Malinowski, Radcliffe-Brown, Boas, etc), the rejection of evolutionism based on a cultural ‘comparative anatomy’ (ditto).

The second difference between the hermeneutic approach recommended by
Geertz and its nineteenth century ancestor is this: Whereas the neo-Kantian school believed that the interpretive method was appropriate also to psychology, and Dilthey specifically linked psychology with social behaviour, Geertz denies any place for psychology in anthropology:

"culture...is no more a psychological phenomenon...than the progressive form of the verb (1973: 13)."

Geertz’s analytical style achieved some popularity with anthropologists as ‘semantic anthropology’. Note the analogy Geertz and his disciples draw between culture and language. This is the familiar sign of logocentric thought, the insistence on treating culture as communication, and all communication as semiological. It is an error deriving from a very limited understanding of ‘meaning’, which assumes that anything ‘meaningful’ must be cryptological. Durkheim also denied the relevance of psychology, but not for this reason: he was one of the earliest theorists of *sui generis* emergent order. Radcliffe-Brown followed Durkheim, but was in any case a proto-behaviourist, and had rejected beforehand Geertz’s interpretation of religion, which, like that of Malinowski and the intellectualists, is based on individual needs. Dilthey and the Heidelberg school did not fall for this cryptological fallacy - they knew that all experience is meaningful, and does not come in coded form, like strings of digits in a computer.

Geertz assumes the same logocentric metaphor which led cognitive anthropologists to ignore cognitive science, and caused the premature crash of structuralism. The fundamental underlying error is that ‘meanings’, like formal logic or mathematics, and by analogy with language, exist in their own Platonic world of
abstraction and self-sufficient closure, as though words only live their lives inside a
dictionary.

7. Denial of any verifiable world at all

The 'cultural blinkers' problem, mentioned above, led to serious doubts about the
objective validity of western science. Many social anthropologists began to value
'emic' over 'etic' approaches to cultural otherness. 'Emic' and 'etic' are modelled on
the terms 'phonemic' (referring to sounds made within a specific language) and
'phonetic' (referring to all possible human speech sounds). An emic approach attempts
to understand a society from the viewpoint of its members, whereas an etic approach
attempts a more universal and comparative overview. The logistics of field research,
the narrowness of the ethnographic here-and-now, and the anthropologist's role as
uninvited intruder, does make etic approaches difficult. The methods which make
western science at least potentially a metacultural project - controlled experiment,
repeatable observations, and testable predictions - are difficult to apply in ethnographic
work. But over and above these pragmatic problems there is an ideological tendency to
think of emic approaches as less ethnocentric, more respectful towards others, and
'politically correct'. But, as Gellner (1974: 48) pointed out, tolerance of other people's
beliefs merely means that we cannot impose our own by force or pressure - it does not
imply that we must accord equal validity to all cosmological schemes, the extreme
position taken by postmodern anthropology (Clifford & Marcus, 1986; Clifford,
1988).

Evans-Pritchard's prophesy of absolute relativism has been more than fulfilled.
Not only has anthropology failed to produce a theory that can even half-convince half
of us, the very idea of a unifying theory is abhorrent to many anthropologists. The reason would seem to be in part the reflection of a general postmodern trend in western society, with scientists in many disciplines questioning their own epistemological assumptions, or an even more general trend that might be lumped under the rubric of ‘New Age’. But specific to postmodern anthropology is a more extreme subjectivization of knowledge, a relativisation of belief systems in which science becomes just one more mythological scheme. Theory is now so suspect that some postmodernists refuse to sort ‘data’ from ‘noise’, since that would imply a theory-based selection, and instead write ‘thick descriptions’ which supposedly contain everything that they observed. But the alleged goal of ‘thick description’ is impossible - something like describing the weather in terms of the dynamics of individual molecules - and cannot escape the problem that perception itself is theory-based and selective (Gregory, 1966). Simply writing a report involves assumptions of significance, which are themselves implicit theories. Others devote much of the text to laying bare their own souls so that we can judge how biassed they are, or argue that since symbols are intended to mean something to somebody, the anthropologist’s arbitrary response is as valid as any other. We are left spinning in a world of ‘revolving signposts’ (Gellner, 1974: 50), pointing everywhere and nowhere.

A ‘comparative anatomy’ approach, which achieved so much for biology, is not approved even by quite moderate social anthropologists. Cross cultural studies, such as Erika Bourguignon’s analysis of trance states in over 400 societies, and the Human Area Resource Files - a computerised ethnographic data base - are not widely credited with value, because they are thought to contain subjective selections of data, or because isolated ‘anatomical features’ are uniquely meaningful only within their
cultural contexts and cannot be compared cross-culturally. There is also a belief that you cannot 'really know' what goes on in a society unless you have done face-to-face fieldwork yourself. Add to this the bitter experience of general claims made in the past, only to be refuted by endless counter-examples, or demolished, like structuralism, by their own internal contradictions.

The intellectualists of the nineteenth century sifted vast swathes of cross-cultural data in order to arrive at general laws, and wrote very long books, which few anthropologists have time to read these days. During the twentieth century, the accumulation of ethnography, with no theoretical scheme to unify it, has become almost ungraspable. The confidence and ambition of those early days has gradually leached away, and people now write shorter books, with more modest goals, narrower focus, and increasingly local subject matter. The collapse of structuralism provided an edifying example: no one wants to write hefty tomes or propose grand theories any more, for the same reason that no one builds ships like the Titanic.

SUMMARY AND CONCLUSION

Perhaps I have been unduly negative in presenting more than a hundred years of anthropology as a series of denials. But my aim is to define an epistemological problem, and not to emphasize positive achievements.

At one extreme we have reductionist theories which tend to ignore or deny the relevance of real-world embodied experience. Both 'faulty' and 'normal camera' theories stress inexperience or lack of data, reducing history to a negative explanatory role or, as in the case of Boyer, a series of arbitrary contingent events resembling genetic mutations. However, Boyer's mutations are not selected by environmental
pressures, but by 'cognitive constraints', a distinctly circular epiphenomenon without social function. Society is denied along with the body.

'Normal camera' theories explain cultural difference on the grounds that we are all the same, without reference to real-world experience, history, and social behaviour. The reason why Boyer attempts the impossible is because the cognitivist paradigm itself is disembodied and asocial: based on a computer metaphor. It is not enough to simply import cognitive science into anthropology. We must first export anthropology into cognitive science, so that cognitive scientists will know what it is that we all need to explain. We need cross-fertilization between disciplines, not a one-way transfusion.

Overall, 'camera-based' theories ignore or deny the relevance of embodied experience, history, ritual, and society, (cause they variously adopt:

1. a disembodied view of 'culture as communication'
2. a disembodied linguistic notion of 'symbols'
3. a disembodied, individualistic computer metaphor

At the opposite pole we have anti-reductionist approaches, notably hermeneutic and postmodern anthropology. Unlike camera-based accounts, they do emphasize emergent phenomena, but share the same disembodied views of culture (1 and 2 above). Further, they add a whole series of denials, some of them deriving from the origins of anthropology, others from Counter-Enlightenment philosophy: they deny the relevance of evolution and psychology, and the possibility of explanation, objectivity, and knowledge. They void the body (and the world) of substance, because they adopt:
4. a disembodied Platonic view of meaning

But meanings are always grounded in real-world experience. A baby is learning what wet and dry mean every time it has its nappy changed. It does not need to read *Mythologiques* to know what binary oppositions are. We do not invent ‘symbols’ then look around for something to attach them to; meanings are there first, rooted in experiences that are real because they cause pleasure and pain. To counter the Kantian subjectivization of knowledge, and the problems of extreme relativism, we need to ground both knowledge and human meaning in embodied experience.

So, at one extreme we have cognitivist accounts which hardly address culture at all, and at the other we have absolute relativism and the ‘abandonment of reason’ (Gellner, 1974). These two camps reflect the two horns of the dilemma created by post-Enlightenment dualism and western individualism. At one pole, there is the tendency to reduce human behaviour to a mechanism with no explanatory role for consciousness, hence no place in science for embodied experience; at the other, there is the equally disembodied but opposite tendency to remove human behaviour from the realm of explanatory science entirely.

However, in contrast to other behavioural sciences (mainly favouring the reductionist pole), social anthropology has a ‘third horn’ or middle-road approach, which emphasizes embodied social experience, and allows both reductionist and expansionist accounts to coexist like two sides of one coin. But even here we have a similar polarization - the materialist ‘school of suspicion’ ignores the world of play (everything that makes us human), and the idealist ‘school of truth’ ignores the world of politics and economics (everything that makes us monsters). Victor Turner (1982)
tried to unify these two partially embodied views: structure is as necessary as anti-
structure, and the two worlds reflect and influence each other through 'the social
drama'. In contrast to Marx, who made religion part of the 'superstructure' resting on
an economic 'base', Turner proposed a chicken-and-egg relationship between the two.

A science of cultural difference has to be comparative and etic by definition.
To avoid absolute relativism, which precludes comparison, we need to overcome our
aversion to evolutionary approaches (which alienates social anthropology from the rest
of science), and we need a universal basis for etic assessments. An effective counter to
the disembodying trends in social anthropology would be an anthropologically-
informied cognitive science - one which takes account of real-world human behaviour.

Turner (1983) saw this need, and proposed an anthropological programme of brain
research. My present thesis builds especially on foundations laid by Victor Turner. It
is important to contrast this real-world approach with that of cognitive anthropology.
Those wedded to the computer metaphor are only interested in functional accounts of
'cognition', and 'cognitive constraints' on culture. They think they have to explain
how irrational and maladaptive ideas develop, and do not think of culture as enabling
and empowering. Since they are not interested in embodied behaviour, they are not
really interested in psychology; and since they are not interested in the body, they are
not interested in the brain either.

I hope I have made clear that the epistemological problem confronting social
anthropologists is not simply due to the logistical difficulties of field research, the lack
of historical data, and so on. And it is certainly not due to any intellectual deficit
peculiar to social anthropologists. Cognitive and biological scientists have fared no
better: they wear the same cultural blinkers, and come from disciplines which, for the
most part, happily ignore ethnographic data. So we are not just faced with the problem of rewriting social anthropology all the way back to its founding fathers, who did the exact opposite of what Darwin did - ruling out evolutionary perspectives. Disembodied and individualistic attitudes are endemic in western science and western societies. And, as I will show, the deepest problem of all is endemic in culture itself.

All the denials I have noted above reflect a common problem and require a common solution: we need to know the universal cognitive and biological underpinnings of enculturated behaviour. In the next chapter I will examine five features of cultural ‘otherness’ - kinship, economic exchange, ritual, belief, and self/other perception - in order to demonstrate what it is that the behavioural sciences need to explain. I will also show that the anthropological ‘other’ maintains a set of disembodied denials which parallel those we find in western science. Ethnographic data reveals that it is the job of culture to obfuscate the body, and this is the source of the disembodied beliefs associated with both animism and western anthropology. Western science is what you get when you rebel against an animistic/vitalistic world-view, but do not rebel against cultural obfuscation of the body. Why not the latter? Because social privilege, the one thing that Enlightenment scientists were loath to give up, can only be legitimized by obfuscating self/other-awareness.

There is a price to pay for this. We have rejected one kind of magical thinking - the kind that sustains transcendent levels of human cooperation - but not the other - the kind that legitimates social inequity, private property, and the armoured state.
Chapter 2. Behaviour and Belief

NATURE VERSUS CULTURE

Culture and selfish genes

There are occasional exchanges of polemic between biological and social anthropologists, who are divided not so much by their subject matter as by their beliefs. Biologists believe human behaviour is determined by (or functions in the service of) selfish genes, whereas social anthropologists believe behaviour is largely determined by (or functions in the service of) society. Biologists accuse social anthropologists of the naive theory that a human being at birth is a tabula rasa - a blank slate just waiting to have any kind of cultural belief or behaviour inscribed upon it (Tooby & Cosmides, 1992; cf. Boyer, 1993). Social anthropologists accuse biologists of an equally naive reductionism (Sahlins, 1977). Tooby and Cosmides complain of the way social anthropologists refer to cultural behaviour as ‘anti-biological’; Sahlins objects that biologists look at everything that is least interesting in human behaviour, then claim to have proved their point. For example, disco dancing might be ‘explained’ as competitive mating display, despite the fact that there are many kinds of dance serving many different functions (often sacred), and ignoring features specific to disco such as strobe lighting, deafening amplification, and the consumption of alcohol or ecstasy.

I think it is obvious that both sides have a point. Whether you emphasize ‘nature’ or ‘nurture’ may be almost a matter of personal taste, but you are also missing something if you ignore one or the other. Biologists know that genes cannot do anything on their own - they always function in an environment, not necessarily the one to which they are best adapted. And social anthropologists are surely aware that
you cannot enculturate a sack of potatoes. The missing link between the two views is the phenomenon of emergence. ‘Nature’ plus ‘nurture’ always gives you more than the sum of the parts.

In this chapter I will argue that human behaviour is indeed determined by selfish genes, but, in certain important respects, it is ‘anti-biological’ at the same time. You could almost propose a law of culture according to which selfish gene strategies, turned on their heads, predict cultural institutions.

**Rules, genitals, and bodies**

Selfish genes, by definition, ‘want’ to reproduce, and promote self-reproduction through the fitness of selfish bodies. So what do selfish cultures ‘want’?

Everywhere human societies control reproduction through sexual rules, reinforced by concealing or obfuscating the reproductive organs. Even where custom or climate dictate minimal clothing, genitals are usually hidden. Occasionally, the penis is exaggerated with a cod-piece or extension sheath, but the female organs are never emphasized in this way: at least, not by women. For example, in the Ida ceremony in New Guinea, though real vaginas are concealed, men wear artificial vaginas on their heads (Gell, 1975). Elsewhere ritual male wounds - such as subincision of the penis, ear piercing, or nose-bleeds - are regarded as vaginas and their bleeding as menstruation (Bettelheim, 1954; Griaule, 1965; Turner, 1967; Hogbin, 1970; Lindenbaum, 1976; Gregor, 1977; Gillison, 1980; Lewis, 1980; Godelier, 1986; Knight, 1991).

In all human societies, the ‘selfish’ body is obscured and socialised by means of clothes, tattoos, ornaments, body paint, cicatrization, or mutilation (Gell, 1993).
Bodily functions and substances are credited with supernatural powers, and surrounded by taboos and ritual precautions. As I will explain below, even the physical reality of bodies is ideologically denied or obfuscated.

Biologists sometimes acknowledge the 'anti-biological' character of enculturated behaviour, but infer from this that human culture must be genetically suicidal. Richard Dawkins (1989) thinks that certain beliefs and practices are so self-evidently maladaptive that they must be 'parasitic memes', flourishing at the genetic expense of their human hosts. What did not occur to Dawkins is that an unselfish belief, such as 'goodwill to all humankind', might confer genetic fitness precisely because it transcends selfish-gene constraints. Dawkins dismisses the very basis of human morality and cooperation, without which we could hardly develop the tactics and technologies that adapt us to so many diverse habitats.

**Kinship and reciprocity**

Evolutionary genetic theory holds that only two kinds of within-species cooperation can evolve by natural selection: kin-based altruism (Hamilton, 1967) and reciprocal altruism (Trivers, 1971). A third kind, mutualism, applies to symbiosis between species (Maynard Smith, 1989: 301) and is not germane to my argument. So it should be no surprise to learn that human societies are universally structured by two types of system, which 'explode' kinship (lineage clan, religious affiliation, nation state, etc.) and reciprocity (marital, economic, and other forms of exchange). As we shall see, these two fundamental types of institution bring other consequences in their train, distorting our views of ourselves and the world, inverting universal human intuitions of reality, and scrambling our Plio-Pleistocene cognitive heritage.
The 'anti-biological' character of human culture is, in fact, entirely in accord with biological prediction. John Maynard Smith and Eörs Szathmáry (1995) point out that 'major transitions' in evolution are few and far between, because they depend on cooperation, which is only advantageous in the long run. The short-sighted strategies of selfish individuals have to be overturned or subverted to allow the emergence of long-sighted cooperation. 'Major transitions' include the emergence of modern cells, sexual reproduction, multicellular organisms, animal societies, and modern human culture. In other words, 'major transition' is their term for a sui generis order of emergent complexity, exactly as understood by social anthropologists.

So it is quite consistent to maintain that nature and culture are both continuous (since emergence is universal and does not violate causal continuity) and discontinuous (since emergence transforms lower-order patterns of determination). Social and biological anthropologists can have their cake and eat it, which ought to (but probably won't) reconcile even the most militant hermeneutic and sociobiological thinkers.

**FIVE BASES OF HUMAN COOPERATION**

In the previous chapter I mentioned five features of 'otherness' - aspects of cultural difference which surprised or intrigued early ethnographers:

1. Kinship
2. Exchange
3. Ritual
4. Belief
5. Self-perception and other-perception
All five exemplify the cultural 'law' outlined above; all five imply and require each other; all five are logically necessary to the emergence of human cooperation, which transcends the constraints of selfish-gene altruism. I will briefly describe each in the context of segmental societies (the anthropological 'other'), and mention some of the ways they vary in urban, western, or post-industrial contexts. I will discuss ritual last because ritual anti-structure seems to be the key to understanding all the 'anti-biological' features of human culture.

1. Kinship

Lewis Henry Morgan (1871) tells us that he always assumed kinship was a simple biological fact of life - until he met the Iroquois. Iroquois kinship is based on the 'matrilineal clan': a social segment allegedly descended from a common ancestress, and owning everything - even children - in common.

So began the study of classificatory kinship. The simplest type, the dual moiety system, divides whole communities - even the entire human race - into two, one half being defined as 'kin', with whom all sexual contact is deemed incestuous, the other as 'affines' or in-laws, the only permitted source of marital or sexual partners (Lévi-Strauss, 1949). Communities with more than one segmental division, such as the Avatip in New Guinea (Harrison, 1993), often conceive of their clan boundaries as radiating like the spokes of a wheel to the imagined ends of the earth. The Avatip believe that British and Japanese people belong to the same clans as themselves, but are too antisocial to admit it. In the Australian case, the entire continent is conceived of as a checkerboard of kin and affines (Radcliffe-Brown, 1931), and even visiting ethnographers must belong to one or the other.
In effect, segmental kinship systems conceal the ‘private’ bonds of uterine consanguinity, and replace them with collective ones: every child has multiple ‘fathers’ and ‘mothers’, all of whose sons and daughters collectively regard themselves as siblings. Such systems cross-cut every conceivable in-group/out-group boundary - including those of family, residence, territory, language group, and ethnicity - substituting invented boundaries which divide biologically ‘natural’ groups from within, and unite them from without. They also commonly abolish the boundaries between biological individuals, making all classificatory siblings conceptually identical, such that their "social personalities are almost exactly the same" (Radcliffe-Brown, 1931: 97). The logic of such obfuscatory relatedness can lead to the layer-cake structure of ‘Hawaiian’ or ‘generational’ kinship as described by Geertz (1973: 372), in which each age-grade within a clan is made up of virtually interchangeable and indistinguishable ‘brothers’ and ‘sisters’, assumed to have collective social and moral agency.

A common arrangement, as among the Ashanti in West Africa, makes a mother’s sisters your ‘mothers’, and her brothers your ‘uncles’. Likewise your father’s brothers are ‘fathers’, and his sisters your ‘aunts’. In such societies, cross-cousins (classificatory non-siblings) may be preferred or mandatory marriage partners; whereas parallel cousins (classificatory siblings) are forbidden by the incest tabu and rule of exogamy (Lévi-Strauss, 1949). This is not sufficiently explained by Westermarck’s (1894) theory that incest rules are based on an innate sexual non-interest in familiar individuals, nor with Freud’s (1913) theory that classificatory kinship is an extreme precaution against Oedipal transgression - because it takes two sets of equally related/non-related ‘cousins’, prescribing marriage to one and proscribing it to the
other.

Classificatory kinship is so widespread that it seems reasonable to assume that, where it is absent, the creation of new kinds of collective identity have rendered it obsolete. Likely factors include land-owning aristocracies, urbanization, and the rise of city and nation States. It may be significant that the so-called ‘higher religions’, all of which originated along the Old World civilization belt (defined by the valleys of the Nile, Tigris, Euphrates, Ganges, Indus, and Yellow River: Parkinson, 1963), teach ego surrender in one form or another, extending metaphorical kinship to large communities of believers, to the entire human race, or to all life. Post-industrial societies also sustain fictive notions of ethnicity which can cross-cut residential communities, as happened recently in the Bosnian war, and which, as in segmental societies, attribute collective blame for the acts of individuals.

There is no reason to regard the western nuclear family as more ‘biological’ than classificatory kinship. Strictly exclusive households, fenced off properties, and marriages sanctioned by God and Government, suggest a politically motivated atomization of society. A community holding property in common, and not regarding land as property at all, could hardly sustain a feudal aristocracy or a nation State.

2. Exchange

Money was allegedly invented to obviate the ‘double coincidence’ necessary for barter (Encyclopedia Britannica 15th edition, 1974-1995). But in non-monetary economies worldwide there is no possibility of barter; rather, there is the endless exchange of ‘gifts’. Often the gifts exchanged have to be similar or identical (but must never be the same item), in which case there is no possibility of profit either. Marcel Mauss, in his
classic book The Gift (1925), points out that gift exchange, ancestor of all economic systems, masquerades as 'generous' and 'disinterested', but is in fact calculating and interested. He draws an important distinction between equal and competitive gift exchange. In the former, gifts of identical value and even identical appearance are exchanged; in the latter, usurious rates of interest, deception, double-dealing, and excesses of 'generosity' designed to ruin and humiliate one's rivals, create marked differences of rank, status, and social opportunity.

Gift exchange imposes three obligations: the obligation to give, the obligation to accept, and the obligation to reciprocate, after a nicely judged delay. Not to give at all (obligation one) amounts to social and spiritual suicide. To respond too soon would amount to a highly insulting rejection of the gift (obligation two); to delay too long would provoke hostility and possible violence (obligation three). These obligations are imposed, not only by moral and political pressure, but also by spiritual sanction. The hua of the gift (the Maori term for its spiritual force) causes those who offend to sicken or to die.

The function of classificatory kinship can only be understood in the context of formalised reciprocity. Lineage clans and symmetrical moieties engage each other in "uneasy relations of cooperation and competition", expressed through obligatory gift and marital exchange (Lévi-Strauss, 1949). Between kin, resources are simply shared: exchange would be analogous to incest. Marriage is commonly associated with bride-service or bride-payment, which amongst simple foragers is likely to mean that brides are exchanged for meat (Biesele, 1993). Lévi-Strauss inferred that economic systems depend on the incest tabu and exogamous marriage rules, to which Knight (1991) adds the hunter's own-kill rule - the tabu which, by supernatural force of sanction, prevents
a hunter from eating the produce of his own hunting, and forces him to surrender it to
others for distribution and exchange. The primary function of simple moiety systems,
other than the extension of kin-based cooperation beyond the uterine family, would
seem to be to secure provision for child care through marriage and paternal
investment. Even though a bride’s father may come to appropriate the wealth paid for
his daughter, these systems would appear to serve women’s needs, and for this reason
Knight (1991) inferred that they must have been originally imposed by women.

The creation of in- and out-groups leads to potential group competitiveness.
Where periodic gluts (for example, whale-hunting and the salmon harvest in northwest
coastal America) promote food storage and a sedentary lifestyle, it becomes possible to
hoard and accumulate both food and ‘wealth’: substantial housing, monumental art,
and ‘sumptuary goods’ (Mauss, 1925; Hayden, 1993). The latent competitiveness of
egalitarian moiety systems can now manifest in overtly competitive gift-exchange. The
classic examples are \textit{kula} trade within the d’Entrecasteaux Archipelago, just southeast
of New Guinea, and \textit{potlatch} ceremonies in Canada and north-west coastal America.

Mauss called \textit{potlatch} ‘the monster child of gift exchange’. Potlatch is so
aggressive that, when the Hudson Bay Company refused to trade with warring groups,
native Canadians agreed to use potlatch ceremonies as a substitute for war (Feest,
1980). Whereas in competitive gift exchange, devastating acts of ‘generosity’ may be
designed to humiliate and ruin one’s opponents, in potlatch, wealth is not necessarily
given at all. Rather, the intended victims are invited to a feast, and forced to witness
the wholesale ‘killing’ of wealth. Stacks of potlatch coppers, mountains of blankets,
and human slaves, may be ‘killed’ in orgies of conspicuous non-consumption. The
‘killing’ is taken quite literally: sumptuary blankets and coppers have personal names
and are regarded as living persons just as surely as slaves. The ‘guests’ are then obliged, at some later date, to respond with an even more lavish destruction of wealth, or suffer eternal loss of face and social standing. ‘Loss of face’, like the ‘killing’ of wealth, is another reified metaphor - a chief who failed to stage appropriate feasts would be expected to have his face literally scarred by spiritual agency.

More typical of competitive gift-exchange is kula, in which ‘useless trade goods’ circulate endlessly around a ring of islands. Mwali - white armshells made from spiral trochus shells - are traded from island to island in a counterclockwise direction, in exchange for soulava - long necklaces of disks made primarily from pink spondylus shell - which circle in a clockwise direction. This circular exchange much impressed early western observers. The armshells or necklaces are seldom worn; they may be taken out occasionally to be admired and gloated over, but cannot be kept long before they must be returned to the exchange cycle. What possible function could this endless circulation serve, and in what sense could it constitute an ‘economic system’?

Other people’s ideas of wealth illuminate the fundamental nature of economic relations, and challenge the assumed rationality of our own. Basically, the value of a kula gift depends not just on its intrinsic quality, but increases with each prestigious transaction through which it passes. Each of the best armshells and necklaces has its own personal name, and carries its own history with it, like the pedigree of a prized racehorse. Each is well known around the kula ring, and its appearance in a given district always creates a sensation. The man who possesses such an item likewise achieves renown, and will be much courted by his exchange partners from overseas or within the district, who may present offerings and solicitory gifts hoping to secure the coveted item for themselves (Malinowski, 1922: 100).
A man seeks to build a reputation as a generous kula partner, and does so in proportion to the numbers and importance of the valuables passing through his hands. A successful trader gains esteem and social standing - what Bourdieu (1977) calls 'cultural capital'. This gives him increased leverage in all his affairs, makes others want to give him gifts, and provides superior social and marital opportunities.

Within western societies, the giving of presents at Christmas, exchanges of hospitality, business 'entertainment', and the British custom of buying rounds of drinks in a bar, have been regarded as vestigial survivals or parallels to gift exchange. Mauss notes that European tales such as Sleeping Beauty reflect a former age of obligatory hospitality, which accounts for the wrath of the uninvited fairy. The rise of the 'gift shop' testifies to our use of sumptuary (i.e. 'useless') goods.

Belief in the value of otherwise useless objects is probably one of the most deeply held items of faith in human societies, including our own. What could be more intrinsically 'useless' than money - an intangible promise printed on a paper note, or stamped into a nickel token? We accept its face value because of our faith that others will do the same, and if anything should threaten that faith, as happened to the German mark after World War I, the crash may be swift and catastrophic. To take a less obviously 'economic' example, what is the value of kicking a ball into a net? Yet a football goal can stir the emotions of millions, though it hardly delivers the enemy into your hands.

The single function that unites all kinds of economic exchange, including those not recognised by professional economists - crime, rape, murder, war, sporting contests, marriage, gift giving, etc. - is the creation of roles and relationships, and the creation and destruction of social persons (Mauss, 1925). Crime is the curse of the
uninvited fairy, and rape is the hua of hospitality denied. Property and land are inflations of self-image, and nations wage war over fantasies. All that seems maddest in human affairs comes from imagined personhood, from invented histories and fictions of identity. A poet and dramatist, four hundred years ago, saw this clearly: We are such stuff as dreams are made on.

3. Belief

*Animism*

In segmental societies, kinship and exchange are inseparably intertwined with animistic beliefs. In both, individual human identities are conflated and inflated: siblings are conceptually interchangeable, as are individual members and their groups (Mauss, 1925). Collectivities are continuous with their dead ancestors, culture heroes, and as yet unborn children. Social persons (individual or collective) are identified with their gifts, and inanimate objects become sentient agents. Exchanges are accompanied by complex ceremonial and magical preparations (Gell 1992; Mauss 1925). The valuables themselves not only have personal names, but are believed to be sentient and articulate beings, frequently with magical powers of their own (Mauss, 1925). It is virtually impossible, in gift exchange societies, to draw any dividing line between ‘religion’ on the one hand, and ‘economic life’ on the other (Firth, 1996); and as Mauss pointed out, sacrifice and prayer assume economico-moral reciprocities, making spiritual beings part of the exchange system. All explode the boundaries that define ‘biological’ entities, and create boundaries which fragment them. Animism fills the universe with personalized forces, immaterial kinship, and supernatural exchange relationships.
Perspectivism

Eduardo Viveiros de Castro (1998) recently reviewed a great deal of ethnography on native American animism - covering much of the territory between the Canadian Arctic and Tierra del Fuego. Many ethnographers report a regular association between animism and 'perspectivism'. That is, non-human agents not only have human attributes (animism), but also see themselves and the world from a human perspective (perspectivism). So, in a typical world-view of this type, where humans would see a beaver living in a lodge, the beaver sees itself as a human living in an enculturated human village. Similarly, a jaguar lapping the blood of its prey sees itself as a human drinking manioc beer - fermented, enculturated drink; and a vulture sees maggots in rotting meat as grilled fish - cooked, domesticated food.

Non-human beings also see their social orders as human, with chiefs, shamans, exogamous moieties, ritual ceremonies, and so on. They see their bodily attributes - fur, feathers, beaks, or claws - as human tools, cultural artifacts, or ritual adornments. And, just as they see themselves as human, they see us as non-human, according to the perspectival relationship between them and us. Beings which eat humans - carnivores and spirits - see us as prey animals; animals that we eat see us as carnivores or spirits. What is more, these human-centred perspectives are not simply appearances in conflict with reality. They are reality. Multiple beings live in multiple parallel universes, all of which are equally real. Realities are epiphenomena of perspectival relationships - mainly carnivorous or cannibalistic.

What is most revealing is that animal bodies are often conceived to be a kind of costume: a jaguar is a human wearing a jaguar suit, a beaver is a human wearing a beaver suit. But this is not a matter of appearance versus reality "as understood in the
west" (Viveiros de Castro’s phrase). Masquerade, make-believe, or role-play, is thought of as creating a real animal body. Equally, human ceremonial disguise reveals a reality rather than concealing one. A man wearing an animal mask or costume is that animal: masking, paradoxically, is unmasking. Lévi-Strauss (1982) gives numerous examples of the same inversion of appearance and reality.

As Viveiros de Castro points out, all of these ideas are by no means restricted to the Americas. The power of the mask has a logical continuity with other beliefs equating surface appearance with identity, such as the notion of ‘skin’ as person in New Guinea (e.g. O’Hanlon on the Whagi, 1983, 1989) and the creation of personhood through tattooing in Polynesia (Gell, 1993). As Victor Turner observed (1969), initiation ceremonies "leave indelible marks on minds and bodies", converting biological individuals into social persons. Eliade, reviewing the global prevalence of beliefs relating to the ritual use of masks and costumes, notes

a ‘law’ well known to the history of religions: one becomes what one displays (1951: 179, italics original).

It is evident, from Viveiros de Castro’s evidence, that as appearance and reality are conflated, and imagination reified, reality itself becomes divided. Parallel worlds are a fundamental feature of all religious cosmologies. Among the Kaluli of New Guinea, for example, there is a through-the-looking-glass Otherworld, coextensive with this one: men and women in this world are pigs and cassowaries in the other, and vice versa (Schieffelin, 1976). So hunting and eating in one world are homicidal and cannibalistic in the other.

Perspectival otherworlds are to be found also in the pre-scientific west. In The
Voyage of Bran, the sea-god Manannán tells Bran that, to him, the sea is the flowery plain of the Happy Otherworld; the seaweed under Bran’s prow is a beautiful orchard, and the fish are birds flitting among the branches (Rees & Rees, 1961: 314-5). This tale is mirrored by medieval legends of drowned lands under the sea, and ships in the sky: typically, in the latter type of tale, a ship is seen among the clouds, whose anchor gets caught on the altar rails of a church, and the sailor who descends to free it almost drowns because our air is water to him (Ross, 1998). The underworld of the Sidh (one of several Irish otherworlds) is equally perspectival. Nothing there is what it seems to us: fairy gold is only leaves and mud, time is all awry, and the hero returns to find his grandchildren long since buried - or crumbles to dust, a lifetime passed in an instant. Tir na n-Og, ‘land of eternal youth’, has similar temporal distortions.

In our post-industrial world, animistic notions survive in the magical tales and anthropomorphic toys we hand on to our children, and continue to influence adult behaviour. For example, species credited with personhood and social value by animal rights activists hardly differ from the cuddly creatures sold in toy shops. Magical and perspectival ideas are picked up again and again by modern authors. Novelists, screenplay writers, and the creators of comic strip heroes, quarry the world’s myths, often quite self-consciously (according to Hollywood script-writing guru, Bob McKee), and recycle ancient cosmological themes, which have not yet lost their power to fascinate.

*Inversions of intuitive ontology*

What is shouting out of all this data? Pascal Boyer (1996) argued that, in animistic thinking, intuitive human psychology - or ‘theory of mind’ - is being misapplied to non-human agents. But the phenomenon is broader than this: intuitive perceptions of
reality are being inverted *en bloc*. There are several counter-intuitive inversions in the above material:

1. The observer creates the observed, and seeing something as real makes it real
2. The essentialism of living kinds is denied, and appearance and reality transposed
3. Culture is conceived to be prior to nature - masquerade or ritual create a state of *nature and animality* rather than culture and humanity

This entire complex of inversions follows from Eliade’s ‘law’ of religious history: *you become what you represent*, or you are what you pretend you are. To put this another way, perspectivism and animism imply that

4. The distinction between make-believe and reality, as intuitively understood by children the world over, has been inverted or abolished

Viveiros de Castro adopts an *emic* approach to his data. He refuses to privilege his own ‘western’ perspective over an animistic one. This is valid and necessary in principle, but it is important to distinguish between a western construction of individuality, which is culturally aberrant, and the intuitive distinction between appearance and reality, which is not. There is now enough cross-cultural data (reviewed by Atran, 1990) to show that children around the world develop similar ontological insights at similar ages. By the age of three or four years, in all societies where suitable research has been conducted, children know the difference between:
1. Appearance and reality
2. Representation and reality
3. Make-believe and reality
4. Dreams and reality
5. Ontological domains such as persons, living kinds, artifacts, and natural objects

There is nothing culturally constructed about the idea that an apple, however well painted to resemble an orange, remains an apple, and if bitten into, will taste like an apple with orange paint on it. This is a matter of universal experience. By the age of four years, children from various cultural backgrounds know the difference between appearance and reality (Flavell et al., 1983; Gopnik & Astington, 1988). They know that you cannot turn a lion into a tiger by shaving off its mane and painting it with stripes. Even three-year-olds tend not to accept a costume change, such as dressing a horse in a zebra outfit, as a change of identity (Keil, 1988), so why should anyone accept that a human in a jaguar costume becomes a jaguar? The realist bias of children may even prevent them from ‘seeing’ a cultural overlay applied to a familiar object: when shown a candle, for example, shaped and coloured to resemble an apple, most four-year-olds will say that it is a candle and that it looks like a candle (Flavell et al., 1986: cited in Lillard, 1998).

Knowing the difference between pretend play and reality is a survival imperative. If a child pretends that stones are sweets, she had better not swallow the stones, thinking they are sweets. Even animals know the difference between reality and play: if an ape mistook a play fight for a real fight, social mayhem would ensue (it sometimes does anyway - de Waal, 1982).
Children also learn that dreams are private and so subjective, whereas waking perceptions are public, and so objective. Animists in the New World frequently invert this distinction as well. Hadfield (1954: 3) cites the case of a native American who, having dreamed that a missionary stole his pumpkins, demanded compensation from the missionary, despite the fact that the pumpkins were still in his plantation and the missionary was two hundred miles away at the time. Such is the ontological force of reified representation.

Intuitive notions of biological kinds have been shown, in American (Keil, 1986) and Yoruba (Jeyifous, 1985) children, to have an essentialist character: a tiger without legs is still a tiger. It has perhaps lost ‘its’ legs, or failed to develop them, but it is nevertheless conceived of as having legs by nature. This sort of thinking applies to living kinds but not to artifacts, such as a table without legs, or a wheelchair which was never intended to have legs in the first place (Atran, 1990: 59).

Even without the cross-cultural data, we could infer that native American children must make similar distinctions to those of Euro- and Afro-American children. Since animism attributes human thoughts and beliefs to non-human agents, it follows that animists must have ‘theory of mind’ in order to misapply it. Preconditions for theory of mind include pretend play (Baron-Cohen et al, 1996), and hence the ability to distinguish make-believe from reality. And since the ability to understand false beliefs is the litmus test for ‘theory of mind’ (Baron-Cohen, 1995), native Americans must also know the difference between appearance and reality. Animism would be impossible without the intuitive distinctions which it inverts.

The catalogue of deceptions in the world-wide corpus of Trickster myths (Evans-Pritchard, 1967; Pelton, 1980; Johnson, 1990; Owomoyela, 1990; Welsch,
1990; Sherman, 1990; Biesele, 1993) provides a cross-cultural litmus test for belief-desire psychology, and suggests a universal preoccupation with the manipulation of beliefs and desires in our species. There is no shortage of Trickster myths in the New World (Benedict, 1933; Radin, 1956; Toelken, 1990), and it seems difficult to avoid the conclusion that native Americans are not exempt from universals of intuitive ontology. Viveiros de Castro himself notes that perspectivism only applies to ‘culturally significant beings’. All other species are perceived by native Americans much as we perceive them: outside specific cultural contexts, they think the same way we do.

All of this has significance for theoretical anthropology. The case for absolute cultural relativism and exclusively emic approaches cannot be maintained if there are universals of intuitive ontology, acquired by children at similar ages everywhere. Regardless of whether they are ‘true’ or not, universal intuitions of reality provide an absolute base from which etic assessments of cultural difference can be undertaken.

4. Self/other-perception

The pronoun theory

Viveiros de Castro’s analysis resolves one apparent paradox of animistic beliefs: how is it that people who regard animals as human also regard other humans as animals? The perspectival view represents all agents as human and animal, according to whether the perspective is their own or another’s:

<table>
<thead>
<tr>
<th>Self</th>
<th>=</th>
<th>Human</th>
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<tbody>
<tr>
<td>Other</td>
<td>=</td>
<td>Animal</td>
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He calls this ‘cosmological deixis’ and attempts to explain it in terms of ‘pronominalism’. That is, he suggests a meaningful parallel between perspectival beliefs and the perspectival nature of pronouns, viz:

\[
\begin{align*}
\text{Self} & = \text{Human} = \text{I/Us etc.} \\
\text{Other} & = \text{Animal} = \text{He/She/Them etc.}
\end{align*}
\]

His examination of the second-person relationship \(<I : You>\) is particularly intriguing. He tells us that a most common type of supernatural encounter in native American lore involves a lone human and a non-human in human form, i.e. without its usual animal costume. The ontological danger in such a meeting lies in unwittingly accepting the animal as human. If the animal speaks and the human replies, in accepting the animal’s ‘you’ the human also accepts its ‘me’, and becomes one species with it. This consequence of identification with the other is logically consistent with perspectival beliefs, and the whole complex suggests a profound instability of self-perception. Any inversion of ontological intuitions (such as appearance/reality and make-believe/reality) must alter self-perceptions: the essentialist ‘biological’ self is replaced by an outside-in \textit{persona}, which you can change as easily as your hat.

Despite the interest of Viveiros de Castro’s thesis, it seems to assume that language is the basis and prerequisite for human culture. Logocentric thinking tends to attribute cosmologies and other social constructs to ‘dialogue’ and ‘discourse’ (as opposed to being sung, danced, or \textit{mimed} into existence), and to credit language with causal priority over experience (another inversion of representation and reality). Pronouns are deictic because all self-other distinctions are deictic. This does not explain
why the other should be *animal*.

**Inflated selves**

There have been other pronominalist arguments in anthropology, though they have not usually assumed a causal role for language. Sahlins (1981: 13), for example, reports a Fijian elder who narrated the doings of his ancestors over several generations using the first person singular pronoun throughout. He cites J. Prytz Johansen (1954: 36) who observes that Maori chiefs also use the first-person ‘I’ when speaking of their ancestors, mythic heros, or the collectivities they represent. Sahlins calls this the ‘heroic I’. He notes its use also in Tonga and amongst the Yoruba (Nigeria) and Luapala (Northern Rhodesia), and implies it is (or was) even more widespread. Rumsey (2000) adds parallel examples from Melanesia. Mauss (1925) also reports, in the context of gift exchange, that collectivities are widely regarded as ‘social persons’ and chiefs identified with the groups they represent. Sahlins uses the ‘heroic I’ as evidence for an expanded or inclusive sense of self, and a phenomenon known as ‘encompassment’. That is, the chief is not simply the leader or head of his group, he *is* the group; other members are its parts, and so *parts of him*.

Dumont (1980) has argued that all ‘holistic hierarchies’ (such as that of the Roman Catholic church) are characterized by notions of encompassment. In the Hindu caste system, the Brahmans and Kshatriyas (priests and warrior aristocrats) represent ‘the whole’ of society, whereas the lower castes - the Vaishyas, Shudras, and Untouchables - represent ‘the parts’. Dumont regards hierarchy as innate in our species (‘*Homo hierarchicus*’) and necessary for healthy human functioning. In the case of caste, it would seem rather that encompassment legitimates inequity, presenting
exploitation as 'cooperation' and subjection as 'fair exchange' - making it seem natural and inevitable that 'the parts' should serve 'the whole', in return for spiritual and political 'protection'. From internal evidence in the *Rig Veda*, cited by Dumont himself (1980: 69), it would seem likely that the caste system resulted from a succession of armed conquests, with the lower castes representing the more recently subjugated populations.

*Fragmented selves*

The notion of encompassment brings us to another paradox of ethnography: the inflationary sense of self noted by Sahlins and Johansen is associated with fragmented or discontinuous self-perceptions (Rumsey, 2000) or 'partible persons' (Strathern, 1988). It should be apparent that the inversion of appearance and reality voids the body of essence and content. Bodies become mutable surfaces that vary with perspectival relationships, determined from the outside in. Leenhardt (1949: 164), an early analyst of Melanesian personhood, reports the following exchange between himself and an elderly New Caledonian sculptor, Boesoou:

"In short, we introduced the notion of spirit to your way of thinking?"
"Spirit? Bah! You didn't bring us the spirit. We already knew the spirit existed. What you've brought us is the body."

Leenhardt was interested in the 'exploded' two-dimensional character of Melanesian art. This 'cubist' style (which has parallels in Africa and North America, and was briefly imitated by Picasso and Braque) represents bodies as fragmented planes showing multiple viewpoints simultaneously. Leenhardt links this art style to (1) the
equally disarticulated sense of body revealed by Melanesian language, but ascribes it to a childlike and primitive lack of depth perception. The two views are incongruous. It is difficult to imagine how any primate could survive with a disarticulated body-image, or how a culturally variable perceptual deficit could be 'primitive'. Such culture-specific traits must be induced by sophisticated means. We do not see exploded objects in the earliest European, South African, or Australian rock art; children do not spontaneously draw such objects, and there is every reason to believe that depth perception is innate (human babies, for example, will not crawl over a 'visual cliff': Walk & Gibson, 1961).

Paul Radin (1956), in his interpretation of the Winnebago Trickster cycle, also draws a parallel between cultural evolution and maturation. And yet the alleged integration of the Winnebago hero in no way resembles maturation as conceived in psychological paradigms at the time Radin wrote. In the Freudian view (accepted by Piaget) ego development was supposed to proceed from 'primal omnipotence' (complete absence of ego boundaries) to an increasingly realistic discrimination between 'me' and 'not me'. By contrast, the Winnebago trickster suffers from a surfeit of boundaries, an almost total fragmentation of the ego. His left hand fights his right hand; his genitals are detachable and carried in a box, or his penis wrapped around his waist; he sets his anus to guard the cooking whilst he sleeps; he subsequently 'punishes' his anus with a firebrand, and eats his intestines mistaking them for sausages (for comparable Ju/'hoan trickster tales see Bieseie, 1993). Without wishing to overlook the conscious absurdity and scatological humour here, we must still ask why trickster tales are regarded as sacred, why a cosmic catastrophe is feared should they be told by the wrong person or at the wrong time (Welsch, 1990), or what their
experiential basis might be.

There is no lack of evidence for fragmented self-perceptions in gift-exchange societies. Melanesian art might be interpreted as a systematic assault on the boundaries of bodies, and Leenhardt is on firmer ground when he observes that Melanesians appear to lack any intrinsic ‘ego’; rather, their sense of self is multiple, defined by multiple exchange relationships, as the hub of a wheel is defined by its spokes. Battaglia (1992), in the context of mortuary exchange, has shown that Sabari funeral ceremonial is less concerned with mourning than with substituting piles of exchange goods for the deceased body, and so patching the torn fabric of exchange relationships.

Leenhardt also hints that ego boundaries are erased in ritual: "when the time of the living being mingles with the time of the ancestor" (1949: 157). Is this not a likelier source for Sahlins’s ‘heroic I’? Turner (1969) describes such an experience of mystical union in Ndembu ritual, which he calls ‘communitas’, and Eliade defines ritual intention as the ‘abolition of history’ (fusion of the present with the mythic time of origins: 1949). This is all reminiscent of Lévy-Bruhl’s ‘participation mystique’ (continuity between universe and ego: 1926), and the ‘oceanic experience’ of mysticism described by Freud and Piaget.

Strathern (1988) has explored the role of gift-exchange in creating selfhood in Melanesia. Following Mauss (1925), who gives prolific examples of reified metaphor associated with gift exchange, and Marx - who argued that we create ourselves through processes of production and exchange - she argues that the equation of persons with things and things with persons leads to partible personhood and dissociable gender. Some anthropologists have considered that Sahlins’s ‘heroic I’ is incompatible with Strathern’s ‘partible person’ (refs. in Rumsey, 2000). However, if the ‘heroic I’
represents a collectivity it is plainly divisible, for individual members can move to
other groups or die; and the chief's gifts, being equally continuous with himself, are
parted from him when given.

Rumsey notes these points but, like Viveiros de Castro, attempts a
pronominalist explanation. He too points out that pronouns are deictic, but also that
they may be 'direct' or 'anaphoric' in their reference. That is, first and second person
pronouns are usually 'direct' - speech acts themselves determine that 'I' refers to
speaker, and 'you' to person addressed. Third person pronouns, on the other hand, are
always 'anaphoric'; they cannot be understood without referring to some other
expression or gesture. However, first person pronouns may also be anaphoric. For
example, in reported speech the 'I' refers, not to the present speaker, but to the
speaker who is being reported. Rumsey argues that the 'heroic I' can be understood in
this anaphoric sense: speaking on behalf of others. In that case, why not use the plural
'we'?

Rumsey concludes that Strathern's partible person and Sahlins's 'heroic I'
reflect "the condition of man in language". But his own argument suggests a better
answer. He tells us that, in reported speech, we assume the role of the other. He also
invokes Erving Goffman (1959), who stressed the theatrical nature of everyday life;
and Urban (1989: 43), who divides the 'I of discourse' into various types: (1) the
'dequotative I', as in stretches of dialogue in "vivid story-telling"; (2) the 'theatrical I'
where there is "a more thorough-going assumption of the protagonists' personae"; (3)
the 'projective I', as used in possession states; and so on.

Now, it should be evident that all these 'I's discerned (or invented) by Urban
are equally theatrical. All the above phenomena of expanded or fragmented
personhood, including the resulting linguistic expressions, imply role-play, viz:
assuming a social role (as in ceremonial gift exchange) or representing others (as a
chief identified with his community). And role-play is the primary phenomenon - you
can have drama without speech, but you cannot have the 'I of discourse' without
drama.

What we might question is the extent to which such role-play is wholly-
believed-in. Is the 'heroic I' just a conventional metaphor, an ornamental figure of
speech? It is certainly taken very seriously: "The chief's marriages are intertribal
alliances; his ceremonial exchanges trade; injuries to himself are cause for war"
(Sahlins 1985: 35-6). Mauss (1925) has explained how the hua of the gift - its spiritual
force which must be honoured - is genuinely feared among the Maori; how metaphors
such as 'loss of face' or 'loss of weight' are believed literally to threaten disfigurement
or emaciation; and how trade objects and other artifacts - such as a warrior's weapons
or the carved beams of aristocratic houses - are believed to be living and articulate
beings. There is a great deal of wholly-believed-in make-believe in gift-exchange
societies, and the inflated and fragmented self-perceptions apparent in Melanesia,
Polynesia, and elsewhere, would seem to be as fully believed-in as (and logically
implied by) the ontological inversions noted in perspectivism.

Mutable selves
Expanded notions of selfhood, and the equation of persons with collectivities, are
recurring themes in the literature on kinship (beginning with Morgan, 1871). What
Sahlins (1985) calls the 'heroic I', Johansen (1954) refers to as 'the kinship I', and
this seems to be a more insightful term. Viveiros de Castro notes that the animal is the
prototype of all otherness, including *affinal clans*. Kinship and affinal terms are just as perspectival as pronouns. Depending on their relationship to me, my (British) kin will see me as son, brother, father, uncle, cousin, or nephew, and my affines as husband, son-in-law, brother-in-law, or father-in-law. My own persona will shift accordingly: I adopt different roles towards my children, my parents, and so on, just as the Melanesians noted by Leenhardt have multiple selves determined by their exchange relationships.

The kinship parallel is much more potentially illuminating than the pronoun parallel (Viveiros de Castro explores this in a later paper: 1999). Classificatory kinship and exchange are like two sides of a single coin, and it would seem impossible to account for one without explaining the other. Social anthropologists have acquired a deep distrust of ‘grand theories’, especially those claiming to explain cultural origins: but despite their scepticism, I think many would agree that there must be a causal link between classificatory kinship and animism. Otherwise, why the equation:

\[
\text{Kin} \quad = \quad \text{Human} \\
\text{Affine} \quad = \quad \text{Animal}
\]

Why should two intuitively distinct domains become conflated in the context of social segmentation?

Essentialist intuitions concerning living kinds, as Atran and others have shown, lead even three-year-olds to deny that an animal can change its identity through disguise, surgery, or any other means. Yet tales of shape-shifting or ‘skin change’ abound: the confections of perspectivism, discussed above, would even lead us to
expect them. In Europe we find tales of werewolves and vampires, and 16th and 17th
century witches had similar powers of metamorphosis (Thomas, 1971: 529 n29).
Amongst the !Kung of South Africa, it is believed that powerful but malevolent healers
can turn into lions to devour their victims (Katz, 1982), and there are similar beliefs
on other continents. Bushman healing trance is modelled on the dying eland, and
entranced shamans are associated with dying game animals in South African and
Central American rock art - and apparently in the shaft scene at Lascaux (Lewis-
Williams, 1981, 1991). The shamanic trance-experience of skeletalization is linked to
the belief that game animals are resurrected from their bones (Eliade, 1951). That
ubiquitous culture-hero, the Trickster, is regularly described in ambivalent terms as
somehow animal and human at the same time (Welsch, 1990). Animality itself is
equally ambivalent, and by no means always portrayed as sinister. Animal disguise is
common to much sacred ritual, and as we have seen, in animistic belief, such disguise
reveals an authentic animal identity.

Viveiros de Castro (1998) has much to tell us in this regard. He mentions the
world-wide provenance of myths that turn Darwinism on its head, asserting that
animals - sometimes even plants - were originally human beings. Some decisive event
at the end of mythic time, often a primordial act of treachery (Eliade, 1956), caused
them to change their apparent form. Joanna Overing (1985: 267) describes how, in
Venezuela, Piaroa wizards conjure human beings from beneath the earth and turn them
into animals so that the people may eat. Schieffelin (1976) recounts a Kaluli myth
(Highland New Guinea) in which the world at the beginning was filled with people:
there could be no social life because there was nothing to exchange, until some people
agreed to become food animals and plants. Here the primeval event is not so much
presented as a 'fall' but as a salvation - the beginning of economico-moral exchange. Biesele (1993) retells a Ju/'hoan myth (South Africa) of how different 'people' received their spots and stripes at the fire of creation, to become the animals that fill the world today. Knight (1987: 342-4) cites a Murinbata myth (Central Australia), in which the children of Kunmanggur, in grief when Tjiniman the trickster kills their 'father' (Kunmanggur, the Rainbow Snake, has highly ambivalent gender), turn into birds and flying foxes (from Stanner, 1966: 96-100). Other references are given by Viveiros de Castro (1998).

Consequently, all eating is cannibalism, and the eater in danger of being eaten by the vengeful spirit of his prey. Shamans may find daily employment countering such postprandial dangers. As one Iglulik informant explained to Rasmusson (1976: 55-6; cf. Birket-Smith, 1959):

The greatest peril of life lies in the fact that human food consists entirely of souls. All the creatures that we have to kill and eat, all those that we have to strike down and destroy to make clothes for ourselves, have souls, souls that do not perish with the body and which must therefore be [pacified] lest they should revenge themselves on us for taking away their bodies.

Myths of the human origin of animals are associated with what Viveiros de Castro calls the 'venatic ideology' (Latin venere = to hunt) characteristic of foraging communities around the world (even those which do not depend primarily on meat or hunting). Venatic ideology, and the associated origins myths, reflect the grand equations between women and meat on the one hand, and incest and cannibalism on the other (Overing, 1986; Knight, 1987, 1991; Biesele, 1993).

Leach (1964: 42-7) develops this theme in the context of English animal
categories: he points out a set of correspondences between relations to women and to meat based on proximity to self, and hence degrees of incestuous or cannibal prohibition, for which he claims a wide validity:

\[
\text{Self} \rightarrow \text{Sisters} \rightarrow \text{Cousins} \rightarrow \text{Strangers} \\
\text{Self} \rightarrow \text{Pets} \rightarrow \text{Farmyard} \rightarrow \text{Game}
\]

Sahlins (1976: 170-6) proposes a similar scale affecting attitudes to meat in the USA:

\[
\text{Self} \rightarrow \text{Dog} \rightarrow \text{Horse} \rightarrow \text{Pork} \rightarrow \text{Steak}
\]

Sahlins argues that dogs, as family members, are inedible, and horses, as family servants, are eaten only with reluctance. Pigs, as farmyard animals, are more edible than horses, but less edible than cattle which are kept outside the farmyard. By imaginative association with the wide-open prairie - the least domesticated of domains - steak is the pinnacle of gustatory relish for white Americans. So Sahlins claims that edibility is inversely related to humanity, and, following Leach, suggests that our disgust for cannibalism is related and equivalent to our disgust for incest.

These equations depend on a root metaphor identifying eating with sex, and reflect the essential unity of marital and economic exchange as a distinctly human means of creating social alliance. Lévi-Strauss (1949) also alludes to such issues, citing, for example, from Arapesh aphorisms collected by Margaret Mead (1935: 83):
Your own mother,
Your own sister,
Your own pigs,
Your own yams that you have piled up,
You may not eat.

Other people’s mothers,
Other people’s sisters,
Other people’s pigs,
Other people’s yams that they have piled up,
You may eat.

Yams, however, generally achieve their social significance only when 'piled up' for exchange purposes. In the Trobriands, yams for ceremonial exchange are grown in magical gardens, unlike those grown for domestic consumption, and in fact are never consumed, but displayed in purpose-built ‘yam houses’ until they rot (Malinowski, 1935).

But it is meat rather than vegetable foods (or fish) that is more universally beset by sanctity and pollution, ritual obligations and prohibitions. Knight (1993) has pointed out the formal equivalence, in hunter-gatherer societies, between the incest tabu and the hunter’s own-kill rule, expressed in the metaphor of ‘blood relations’. The own-kill rule, in its (hypothetically) primordial form, proscribes proprietary rights to meat you have killed yourself. It must be handed over to your wife or in-laws for cooking and distribution. In contemporary societies, the rule is often moderated or circumvented by
various expedients: restricting it to a clan’s ‘totem animal’ only, to first kills only, to kills made by young men only, or to certain parts of the animal. Elsewhere, hunters may use another man’s arrow to make the kill, ‘sacrifice’ unwanted parts of the animal to spiritual beings, apologize to the animal itself in propitiatory rites, and so on. The Hadza use the amusing tactic of handing meat over to their women folk, and telling them that ‘God’ ate the choicest parts. The metaphorical parallel between the two tabus is striking: sexual intercourse is widely equated with eating, and kinship with ‘blood’, so both incest and eating your own kill are ‘eating your own blood’. Clearly, as far as simple foragers are concerned, if everyone ‘ate their own blood’ in this double sense, there would be nothing to exchange, neither meat nor partners in marriage, and the primary bases of social order would be demolished.

It would seem that kinship, marriage, and economic exchange, and hence transcendent systems of human cooperation, are somehow related to human/animal metamorphosis.

5. Ritual

The perspectival worlds described above, with their topsy-turvy through-the-looking-glass inversions, have suggestive parallels in ritual liminality, as defined by van Gennep (1909). Liminal states, like perspectival worlds, are characterized by abolition or inversion of normative categories and rules, a phenomenon which Victor Turner (1969, 1982) termed ‘anti-structure’. Turner also argued that the cultural arts, and all forms of ‘entertainment’ and ‘recreation’, are equally anti-structural. He dubbed *ludic* anti-structural states ‘liminoid’ to contrast them with the obligatory *ludic-ergic* character of ritual.
The 'grand equations' identifying women with meat and incest with cannibalism reflect a structural congruence between hunting and mating which extends also to warfare, and often has suggestive links with ritual and trance. There are societies in which marriage is only permitted between partners who are literally enemies (Lévi-Strauss, 1949; Harrison, 1993: 137). Material and metaphoric parallels between ritual, war, hunting, and erotic pursuit, are widespread (Feest, 1980). Among the Asmat, killing begins with the sinister announcement 'Your husbands have arrived!' (Harrison, 1993: 124). Among the Avatip, ritual warfare requires men to become entranced 'hunting dogs', whilst victims are conceived as 'game animals' and eaten by warriors who, outside the ritual context (where they become 'human' again), express utter abhorrence of cannibalism (Harrison, 1993). The Gnau both hunt and kill in a ritual state of 'empty or blank consciousness' (op cit: 111-2). Such constraints as fasting and sexual abstinence are commonly imposed alike on ritual participants (Turner, 1969), hunters (e.g. Katz, 1982), and warriors (Feest, 1980).

'Magical heat', a widely recognised index of sacred or transcendent states of the body, has been reported in ritual trance, in mystical experience, and in warriors embarking on the warpath (Eliade, 1956: 146-9). Eliade comments that "supernatural heat signalises the realisation of a paradox by which the human condition is surpassed" (op cit: 151). The 'mastery of fire' - walking on live coals, handling red hot iron, etc. - denotes a supernatural incombustibility (op cit: 94) and, perhaps, an anti-structural condition of 'rappiness' (cf. Lévi-Strauss, 1969). Immunity to cooking is reminiscent of the own-kill tabu (because meat cannot be cooked until it has been surrendered to the safe-keeping of women: Knight, 1987).

On top of arguments presented so far, I hope the above handful of illustrations
is sufficient to demonstrate a wide range of variations on a single theme, derived from a basic template of reified metaphors equating sex with eating and human with animal, which have suggestive links to ritual and trance experience. What Marx would call the 'forces and relations of production' - here including marriage, warfare, and hunting, but not usually fishing, gathering vegetable foods, or gardening for domestic consumption - are intimately bound up with these reifications.

It should also be clear that the pronominalist thesis cannot explicate this complex of interwoven meanings. For it is not just the 'other' who is non-human, but everyone when in a 'liminal' or 'liminoid' state such as ritual, trance, hunting, or warfare. I have not discussed gender in this chapter, but it is clear that all women, even kin, are 'game animals' in a sexual context, just as all men are 'carnivores' in relation to game, women, and enemies.

So the logocentric equations:

<table>
<thead>
<tr>
<th>First person pronouns</th>
<th>=</th>
<th>Human</th>
</tr>
</thead>
<tbody>
<tr>
<td>Third person pronouns</td>
<td>=</td>
<td>Animal/Spirit</td>
</tr>
</tbody>
</table>

give way to a performance-centred interpretation:

<table>
<thead>
<tr>
<th>Normative world</th>
<th>=</th>
<th>Structure</th>
<th>=</th>
<th>Human</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ritual/Otherworld</td>
<td>=</td>
<td>Anti-structure</td>
<td>=</td>
<td>Animal/Spirit</td>
</tr>
</tbody>
</table>

It would follow that the 'other' becomes normatively 'animal' because structurally mirroring 'us' (opposite gender, affine, enemy, or stranger). 'Otherness', in that case,
is not constructed in the normative world of everyday speech (the pronominalist position), but in the anti-structural world of ritual pantomime (the performative position). The basic essentials of human social order - gender, kin/affine segmentation, and exchange - depend on constructions of otherness through reified metaphors, upside-down ontologies, and inside-out personhood: essentially anti-structural inversions. The entire complex requires, for its generation and maintenance, a periodic 'sparagmos' (Turner, 1982), or reversion into the subjunctive state - the 'as if' condition of ritual and make-believe. As I noted in Chapter 1, the 'binary oppositions' of myth also make more sense as experiential contrasts between structure and anti-structure, rather than the cognocentric hypothesis proposed by Lévi-Strauss (1969-1981).

I have mentioned the views of Durkheim (1915), Turner (1982), and others who have argued that all human culture originated in ritual pantomime, and that ritual, or other anti-structural states (such as pretend play and 'leisure' activities generally: Turner, 1982), are necessary to sustain culture and generate cultural change. All the evidence that I have reviewed above - the equations of humans with animals, otherness as animal, the belief that animals are human actors in costume, and that actors in ritual costume become animals - also suggest that human social order, including kinship and economic exchange, originated in ritual pantomime, and, more specifically, wholly-believed-in pantomiming of animals.

Lévi-Strauss (1981: 679) noted myths telling us the same thing: that culture emerged through ritual inversion of a former social order (which he called "a reversion to a state of nature and animality"). Myths which concur with anthropological theory, and with cross-cultural evidence, deserve to be regarded as theories in their own right. Myths stating that all animals were once human may well have the same meaning as
'reversion to animality' myths, particularly as both claim to account for the origin of human society. Their manifest content is (to us) an inversion of Darwinism, but the implicit meaning might be that we were human once, and that we became enculturated by pretending to be animals (cf. Knight, 1991), and believing that the role-play was real. Since the performance was wholly-believed-in, then, to the performers, the present order of the world really did begin by turning humans into animals, as stated in the myths. There are plenty of people around the world today who do precisely that: they role-play animals in sacred rituals, and believe their masks, costumes, and actions genuinely transform them into animals. This experience of human/animal metamorphosis might lead reasonably to the assumption that all animals were created in this way.

Sahlins (1960) argued that human culture could not be established without inversion of a prior biological order: for amongst non-human primates, society is controlled by sex, whereas in humans, sex is controlled by society. This cannot be explained by point mutations, and requires an organizational change - an anti-structural inversion of a former order, affecting an entire community. The inversions of intuitive ontology noted above, associated with 'counter-biological' social systems such as kinship and gift exchange, are precisely of the kind one ought to expect if enculturated societies are to transcend selfish gene constraints on altruism.

These inversions, I have suggested, were and are achieved through ritual anti-structure. Knight (1991) proposed that the first 'symbolic' rituals created cultural order by inverting biological signals (review: Knight, Power & Watts 1995). Ritual behaviour is not a 'reversion to a state of nature', as conceived by Lévi-Strauss (1981: 679). On the contrary, ritual turns 'nature' on its head. What is 'natural' about
pretending to be a wolf, slashing yourself with knives, or swallowing burning coals? It is the violation of all things natural, turning everything familiar on its head - what Malinowski (in the context of magic: 1935) called the 'coefficient of weirdness' - that opens up the door to the supernatural.

**SUMMARY AND CONCLUSION**

Chapter 2 examined five features of cultural difference - kinship, exchange, belief, self/other perception, and ritual - all of which mutually imply each other, and operate as a functional unity. Economo-moral conduct is the basis of human cooperation, and depends on fictions that obfuscate 'biological' realities.

Western individualism would seem to have developed in opposition to vitalistic self-perceptions. Whereas animism humanizes the universe, but voids the body of essential content, western culture dehumanizes humans, voiding the body of experience and sociality. The various disembodied approaches noted in social anthropology, just as surely as perspectival world-views, suggest cultural obfuscation of the body. Western attempts to understand the anthropological 'other' complete a circular relationship between the two, creating the epistemological problem explored in Chapter 1.

The entire complex of animistic belief and behaviour suggests a likely origin in ritual anti-structure, involving the inversion of biological order (humans pantomiming animals, and wholly believing the pretence). Human societies need anti-structural behaviour also for self-repair and adaptive change. The post-industrial west has become less dependent on formal ritual, but has many anti-structural alternatives, some more formalised than others.

The transition to modern culture involved a novel application of pretend play.
Children are realists in the sense that they usually know the difference between make-believe and reality (two representations of reality are 'decoupled': Leslie, 1987), whereas adults are representationalists who, in culturally defined contexts, regularly invert the two. Human culture might be defined as wholly-believed-in make-believe. This explains why human societies can maintain such 'anti-biological' behaviour and beliefs. Anything can happen in fantasy and make-believe because play is normally sheltered from biological selection pressures. That is its function - to explore 'what if' scenarios as in a laboratory, without exposing minds and bodies to real-world hazard.

We enculturated humans, however, act out our fantasies in the real world, and this must incur biological costs. At the same time, we are a highly adaptive species, so the costs have been more than offset by the benefits of cooperation. The biological costs of enculturation may be relatively slight among foraging peoples with low-impact technology; but now we have much greater power to destroy our environment and each other, the balance may be shifting.

The existence of intuitive universals in children provides a basis for etic assessments of cultural difference. However, these in themselves are not the universal substrates of cultural performance. Somehow the real-world intuitions of childhood get turned on their heads. Somewhere between childhood and adulthood we are manufacturing a blindness to reality: our representations become so powerful that they blot out the world. What we need cognitive science to explain is the power of collective representations to turn make-believe into make-belief, and scramble our Plio-Pleistocene cognitive heritage. In the next chapter I will argue that social-mirror theory provides the essential logic, and the necessary bridge between the biological, cognitive, and social sciences.
Chapter 3. Social Display

The story I have told so far raises two basic questions:

1. Why the first rituals might have involved people pretending to be animals
2. How enculturation transforms make-believe into make-belief

The why question requires a historical level of explanation and is not the main theme of my thesis. The how question requires a psychodynamic answer. I will begin by reviewing research on pretend play and its relationship to self/other-awareness.

SELF/OTHER-AWARENESS

Theory of mind

'Theory of mind' (ToM) has become accepted shorthand for "the capacity to attribute mental states to oneself and to others and to interpret behaviour in terms of mental states" (Baron-Cohen, 1995: 55). Here, 'mental states' are specifically defined as epistemological - that is, states such as knowing, thinking, believing, imagining, dreaming, pretending, etc.

The litmus test for ToM is the 'false belief task' (Wimmer & Perner, 1983). For example:

Ann puts chocolate in cupboard A and, in her absence, Sally moves it to cupboard B. When Ann returns for her chocolate, which cupboard will she look in?

A child without ToM will reply 'cupboard B'. Without ToM, there is no concept of
knowledge as distinct from reality, and so no concept of false beliefs. The ability to attribute false beliefs to others is necessary for tactical deception, conscious lying, games like hide-and-seek, and understanding popular children’s stories - for example, why Snow White accepts a poisoned apple from her stepmother, or Little Red Riding Hood gets into bed with the wolf.

ToM fails to develop normally in children with deficient pretend play (Baron-Cohen, 1995). Normal children learn to solve false belief tasks by the age of four; the failure to do so is diagnostic of autism. However, Baron-Cohen et al. (1996) have shown, in a large population of children, that autism can be diagnosed at 18 months by the deficit in pretend play (and other deficits in ‘shared attention monitoring’).

In normal children, pretend play (beginning around 12 months) always precedes the development of mindreading ability (3-4 years) and there are quantitative and qualitative correlations between them - the amount and sophistication of pretend play at 33 months correlates significantly with insight into other people’s beliefs at 40 months (Youngblade & Dunn, 1995). Taylor and Carlson (1997) also found that children with higher scores for pretend play achieve higher scores in ToM tasks.

Not everyone believes that these correlations imply a causal relationship. Some point out that both pretend play and ToM require the ability to represent a representation, and a ‘single executive deficit’ could explain why autistic children perform poorly in both areas (Russell, 1997; contra Jarrold et al., 1994). But such asocial theories leave us with no obvious function for pretend play, and no explanation for the developmental sequence. If pretend play and ToM are both hard-wired from birth, why do they not manifest simultaneously? The idea of a ‘single executive deficit’ does not rule out the possibility that ToM has to be learned through play. The
developmental sequence suggests some need to learn by experiment (Baron-Cohen, 1995), and what is the function of pretend play if not social experiment and the acquisition of social skills such as mindreading?

There are currently two theories of how ToM develops, and both assume that ToM is learned:

1. Paul Harris’s (1991) ‘simulation theory’ proposes that we are first aware that we are aware, and then infer that others are aware by ‘mental simulation’ - that is, by mentally role-playing others. Harris makes the commonsense assumption that if we are aware, we automatically know that we are aware, and if we know something, we automatically know that we know it. Reflective consciousness, for Harris, is not an explanandum - it comes free with the territory. Until recently (Moses, 1994), this was the dominant theory, even though it contradicts most definitions of ‘theory of mind’ (the ability to attribute mental states to others and to ourselves).

2. Gopnik and Meltzoff’s (1994) ‘theory theory’ denies Harris’s commonsense assumption. According to them, we become aware of our own and other people’s mental states at the same time. We infer this ‘theory’ or concept of mental states from ‘all the available evidence’, that is, from our own and others’ collective behaviour.

Gopnik and Meltzoff support their position experimentally by turning around standard false belief tasks. In a standard task, for example, a child is shown a box of Smarties, and asked what she thinks is in the box. When she replies "Smarties," the box is opened to reveal it contains pencils. Then the box is closed, and ‘Sally’ - usually a
doll enters. The child is then asked what Sally thinks the box contains. A child without ToM will reply "Pencils". In the reversed version of the task, 'Sally' is dispensed with. After showing the pencils, the child is asked why she just now said the box contained Smarties. The child without ToM *denies having ever said any such thing*. No matter how you prompt or argue, she has no reflective access to her previous false belief.

The 'theory theory' holds that the primary human adaptation which makes it possible for us to acquire theory of mind is *imitation*. It is by imitating and being imitated by others that we become aware that we and they are aware. That is, the creation of a mental mirror (reflective consciousness) depends on the prior existence of a social mirror (imitation).

But 'imitation' covers a wide range of behaviours including language acquisition, and Gopnik and Meltzoff use the word much as Piaget did (1962), without stressing the distinction between mimicry (reflex copying without insight into meaning), imitation (insightful, goal-directed copying), and mimesis (voluntary simulation with intent to represent agents, actions, or things: Donald, 1991: 168-9). Mimesis includes pretend play but not the arbitrary referents of language. Mimesis, rather than 'imitation', may be the critical factor in the development of ToM.

Field *et al.* (1982) have shown that babies only 36 hours old can imitate adult facial expressions. Since the baby cannot see her own face, this implies that she has a proprioceptive self-image which she can match against the visual image of the adult expression - i.e. 'visuo-kinaesthetic matching' or 'VKM' (Gopnik & Meltzoff, 1994).

However, VKM, unlike ToM, is a primitive ability. Giaccomo Rizzolatti *et al.* (1996) have identified 'mirror neurones' in the ventral premotor grasping cortex of
macaques (these are present in humans as well: Nishitani & Hari, 2000). Mirror neurones fire whenever the animal performs a specific action, such as raising food to its mouth, and these same neurones also fire when the animal sees another individual (animal or human) performing the same action. Rizzolatti and Arbib (1998) and Gallese (1998) note the close proximity of premotor grasping cortex to Broca’s area, and leap from there to the evolution of language.

Mirror networks are surely implied by VKM, and we would expect individual neurones in those networks to behave as described. So Rizzolatti et al. have confirmed an important prediction. Gopnik and Meltzoff may well be correct in proposing VKM as the primitive basis of self/other awareness, but this is not sufficient to explain the unique complexities of human self-consciousness or the origins of language, or why these did not evolve in macaques.

There is a compelling logic to the idea that pretend play is necessary for ‘theory of mind’. Baron-Cohen (1995) suggests that pretending is the first epistemological mental state to be understood by children. If two children are playing together, and ‘seeing’ a pencil as an aeroplane, then what they are both ‘seeing’ is a shared mental state. If pretend play is necessary for ToM, it is equally necessary for language. What would be the point of conveying information to others if you have no concept of knowledge or belief? Autistic children, lacking normal ToM, also fail to acquire normal language use, and may not acquire language at all (Baron-Cohen, 1995).

Social mirror theory

The idea of a ‘looking glass self’ has a long history. Dilthey (1883-1911), Cooley
(1902), and G.H. Mead (1934) proposed such theories. Baldwin (1894) and Vygotsky (1978) also stressed a social origin for higher cognitive functions.

Around the turn of the century, Wilhelm Dilthey (cited in Turner, 1982) argued that it is ‘thought’s work’ to extract meaning from experience. Each discernible segment of experience (*Erlebnis*) is not complete until it has been conveyed to others through some kind of intelligible display. Introspection depends on public performance because we discover our own ‘subjective depths’ in the ‘meaningful objectifications’ of others.

George Herbert Mead (1934) specifically made role-play central to his theory of reflective consciousness: we learn to put ourselves in the shoes of what he calls the ‘generalized other’ through role-play, and from this third-person standpoint can observe our own thoughts. We become aware of our own and other people’s minds simultaneously, according to Mead, when we acquire the concepts of ‘I’ as subject, and ‘me’ as object acted upon by others.

Performative explanations of reflectivity are often referred to as ‘social mirror’ theories, and may be summarised as:

*Mirrors in the mind depend on mirrors in society*

After decades of relative neglect, Mead’s theory is enjoying a new lease of life, due to the current interest in ToM and autism. Autistic children cannot plan, apparently because they have limited access to their own past memories, intentions, knowledge, and beliefs, and cannot imagine future possibilities (Happé & Frith, 1996). They remain permanently trapped in an episodic ‘here and now’. Autistics show marked
intolerance of unpredictability, hence the repetitive behaviour which characterizes the condition. Their lack of insight into past and future states implies a deficit in reflectivity. Normal children learn to recognise mental states in self and others at the same time, and autistic children, unaware of mental states in others, are equally unconscious of their own. Autistic children cannot understand metaphor or allusive language: they are strict literalists, preoccupied with the here-and-now, as normal children are before the age of 15-18 months (Kavanaugh & Engel, 1998).

Francesca Happé (1998) cites the case of an autistic boy who explained that he had to speak his thoughts out loud in order to know what they are. Apparently, without a mirror in his mind, he has to create a mirror ‘out there’ by speaking aloud, and then hears his own voice telling him what his thoughts are. Small children also talk to themselves, presumably for the same reason; and apes trained to use American Sign Language sign to themselves, when alone in their sleeping quarters (Miles, 1994). Apparently, if you give a human social mirror to an ape, she will use it, as we do, to become conscious.

All this data reveals the error of conflating awareness with self-awareness. ‘Theory of mind’ (reading other people’s minds) appears to be the same thing as reflective consciousness (reading your own mind). Happé (1998) speculates that we may have become conscious as a side-effect of selection pressure to read the minds of others.

**Theatre of mind**

If social mirror theory is correct, we should be able to infer something about the social mirrors we use simply by observing our own minds.
Much of what buzzes around our heads all day, and at night, consists of virtual reality simulations of social scenarios involving our embodied selves as well as a whole cast of *dramatis personae* (Walton, 1990: 28, in Mitchell, 1994). Friday (1990: 28) notes the dramatic nature of our sexual fantasies. Sometimes we imagine ourselves observing a sexual encounter, and sometimes we are active in the encounter. Fantasies are often plans for future activity. Plans may include verbal instructions to ourselves, so that we appear to play a double role, both roles being subjective or objective according to where we choose to place our 'seat of consciousness'.

Humans 'evaluate their own behaviour in the light of internalized standards' (Rosenberg, 1979: 554) and are influenced by an imagined audience based on significant others (Cooley, 1902: 184; Rosenberg, 1979: 83-4). So, for example, our self-evaluations change when we are asked to visualise faces of our family members (Baldwin & Holmes, 1987). Overwhelming experience of being negatively evaluated can lead to binge eating to distract attention from a censorious internal audience (Heatherton & Baumeister, 1991). The way we represent our bodies to ourselves is also influenced by an imagined audience: when asked to correct their body image in a distorting mirror, people select images conforming to societal standards (Lerner & Javanovic, 1990; Schneiderman, 1956: 98). But our internal audience can also interfere with self-deceptive attempts to avoid negative criticism (Baumeister & Cairns, 1992), influence how we express emotions (Fridlund et al., 1990), and cause embarrassment when we realise that we fall short of some standard of self-identity (Goffman, 1967: 105).

Even 'abstract' thought can take a dramatic form. I often catch myself working out the logic of an argument by explaining it to an imagined audience, which does not
just passively applaud, but raises objections and points out errors. This helps me to polish my performance. ‘Theatre of mind’ would not work unless these imagined people had their own knowledge and volition. There is some evidence - notably from ‘multiple personality disorder’ (Bliss, 1986) and the ‘hidden observer’ effect in hypnosis (Hilgard et al., 1975; Hilgard, 1986) - that these subordinate personae can coexist, observe each other, and even converse together outside consciousness (reported by Schreiber, 1973 in the Sybil case; review: Oakley & Eames, 1985). Apparently, they themselves are self-aware, and continue to live out their independent lives even when we stop thinking about them.

Theatrical models of the mind have been unpopular because of ‘homunculophobia’ (Baars, 1997b): an over-reaction to the Cartesian notion of an ‘observer’ in the mind, with an implied infinite regress of little-green-men observing each other’s representations. But an ‘infinite regress’ of representations does not, in principle, demand an infinite regress of mirrors. Two perfect plane mirrors, facing each other in parallel, are sufficient.

Philosophical concerns aside, homunculus production is a routine activity of the human mind. Shakespeare can fill a stage with characters, all of whom speak, act, and play out their lives as convincingly as real people, and yet they are products of a ‘single’ mind. Admittedly, Shakespeare needs a cast of actors to realize these personae for us, but when we read a novel, we do all of this work for ourselves.

There is much more to reflective consciousness and mindreading than ‘theory of mind’. If this were not the case, human puberty would occur at the age of four, when theory of mind is established. The rest of childhood, I suggest, is devoted to the development of higher levels of social intelligence, including ‘theatre of mind’.
Shared experiential worlds

If so much thought is theatre, it is because we live in a theatre. Colwyn Trevarthen, after 25 years studying pre-school children in Edinburgh, drew one overriding conclusion from all his research: what makes us distinctively human, he said, is the extraordinary degree to which we are committed from birth to living in shared experiential worlds:

"As fish swim in the sea, or birds fly in the air," he said, so children must live and learn "in culture" (Trevarthen, 1995).

We humans are radically and wholeheartedly committed to living and experiencing through others. Were this not the case, we should not spend so much time in social gossip, swapping jokes, telling stories, reading newspapers, watching television, or the myriad alternative sources of vicarious experience to be found in different societies. It does not seem to matter whether these others are friends or strangers, real or fictitious, human or non-human: even the two-dimensional antics of Tom and Jerry can hold us spellbound. In Watership Down, ET, Swamp Monster, Blade Runner, and Short Circuit we find ourselves empathizing with animals, extraterrestrials, vegetables, cyborgs, and robots. The way we do this is by identifying with them: by reflectively assuming their roles, and mentally living their lives through them (cf. Allport, 1961: 534)

Role-play allows us to identify with non-human agents. Children, when they play, do not simply pretend to be the racing driver or the fireman - they become the racing car and the fire-engine as well. Mark Twain, in Huckleberry Finn, gives us a vivid picture of a small boy pretending to be a Mississippi paddle-steamer, complete with captain, crew, passengers, engines, hooter, bales of cotton, ropes, blocks,
pulleys, and twin paddles thrashing majestically to port and starboard. It took Herman Melville a whole novel (The Confidence Man) to explore this floating social microcosm, but a small boy grasps it in an instant. Needless to say, Twain, the professional novelist, is mightily impressed by this feat.

'Theatre of mind' requires not just personae, but the whole mise en scène - people, relationships, stage props, and scenery - and we can create all of that by acting it. We can, in imagination and performance, become non-human agents, animal, vegetable, or mineral. Role-play may not in itself explain the why of animism, but it can explain how it becomes a viable human option. Role-play unites all ontological domains into a living, conscious unity (cf. Mithen’s ‘metarepresentational module’, 1996a).

Language and theatre

Many people assume that language is the basis and prerequisite for ‘symbolic culture’, as well as "the source of virtually all the ‘interesting’ properties of the human mind" (Premack, 1988). They simultaneously assume that language could have evolved in a simplistic Darwinian manner (e.g. Pinker, 1994). That is because they think the utility of language is self-evident, and never ask themselves what language is for. They cannot explain why (1) other species have not evolved syntactical speech, (2) even the most articulate humans also need art, music, and dance; or (3) despite the ‘usefulness’ of language, we continue to smile, laugh, weep, and gesticulate our emotions to each other. They fail to consider the disadvantages of language - good for lying (Knight, 1998), but bad for explaining such pragmatic matters as tool-making or subsistence techniques (Burling, 1993). Hunter-gatherers do not generally use language for such
purposes (e.g. Jennings, 1995; Katz, 1982). No explanation of language origins can be
credible unless it takes account of the entire gamut of human communication, and the
functional role of language vis à vis our other communication modes.

Another problem for linguistic Darwinians is that cryptic codes require an
entire system to be conceived as a whole (Lévi-Strauss, 1950). You cannot create a
language piecemeal, one word at a time, because words are only meaningful in
relation to other words and to the whole idea of a coded system. Such relations are
syntactical as well as categorical. Durkheim (1912) pointed out that you only need
syntax for displaced reference - when you want to refer to things imagined or
imaginary, not present in the here and now for everyone to see, hear, or touch. How
can you encrypt an intangible, he asked, unless it is first made public by ritual
pantomime? Durkheim’s argument that ‘sacred’ (i.e. authoritative) ritual is necessary
to solve the ‘problem of the first utterance’ (Whiten, 1993) has never been refuted,
and is simply ignored in many Darwinian accounts of language origins.

A fully socialized use of language depends on sophisticated mindreading skills
which require a shared imaginative world. We do not merely extract literal meanings
from words and syntax, but constantly cross-check our own social experience for clues
to the author’s intentions (Baron-Cohen, 1995). Humour and irony, for example,
would be impossible otherwise. To autistic children, who sometimes acquire basic
language ability but always lack insight into the thoughts of others, most human
utterances are a perpetual mystery. Temple Grandin, who gained a PhD despite her
autism, turned to science in relief because scientific language was the only kind she
could make sense of (ibid).

The utility of language, its ‘illocutionary force’, depends on a communally
sanctioned contract (Grice, 1969; Searle 1969, 1983; Austin, 1978; in Knight, 1998),
and moral authority invested in 'collective representations' and ritual enactments
(Durkheim 1912; Bourdieu, 1991; Knight, 1998). In everyday life, as lived by the vast
majority of humans, language is the vehicle of gossip, story-telling, oratory, ritual fiat,
economic and moral dispute, political persuasion, and self-legitimation: the dramatic
shaping or re-shaping of social history, real or imagined (cf. Jennings, 1990; Dunbar,
1996; Knight, 1998). Language subserves a dramatic function, and cannot exist outside
a dramatic world. Dramatic ability, not language, is the basis and prerequisite for
human culture.

**SOCIAL DISPLAY**

There is, of course, far more to human intersubjectivity than just role-play, and more
to role-play than just 'theory of mind'. The presence of diverse performative
behaviours in humans, such as song, dance, representational art, and role-play,
suggests an explosive proliferation of social mirroring during the evolution of our
species. Our inborn commitment to living in shared experiential worlds is served by a
formidable armamentarium of intersubjective abilities, all of which are unique, or
uniquely developed, in humans.

Human social displays (Table 3.1) can be loosely classified into three kinds
(communication, play, and performance) and three modes (implicit, mimetic, and
conventional). Based on developmental data, I have divided mimesis into two sub-
modes: *projective* and *introjective*. 
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<th>Communication</th>
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<td>Gesture-calls</td>
<td>Embodied play</td>
<td>Song-and-dance Making marks</td>
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<td>Introjective</td>
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<td>Cryptic codes</td>
<td>Play scripts</td>
<td>Myth Narrative and verbal arts</td>
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<td>Economico-moral conventions</td>
<td>Games with rules</td>
<td>Economico-moral exchange Displays of material, moral, and spiritual wealth</td>
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Table 3.1. Human displays

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<th>Communication</th>
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Table 3.2. Hypothetical evolutionary sequence (by extension from Durkheim, 1912)
1. Three modes of communication

1.1. Implicit communication

Psychologists and neurologists often discuss emotions and sensations as though they occur in a private subjective world, and serve only to motivate and inform individual selves. But fast reactions do not need experiential motivation, and 'spontaneous' affect appears to be a post-event construal arising after behaviour is already under way (Bem, 1972; Zillman & Bryant, 1974; Zillman, 1984; Brown, 1991; cf. William James, 1884). As for the informing function, this is not just directed to the experiencing self. Emotions convey information to others through more or less involuntary signals: vocalizations, gestures, facial expressions, secretions, and odours. We humans, for example, smile, laugh, cry, weep tears, and artificially modify our body odours.

Burling (1993) refers to involuntary signals as gesture-calls, to emphasize the fact that they are seldom, if ever, exclusively vocal. Even speech is accompanied by gestures, facial expressions, and prosodic modulations that are part of our gesture-call system. Not only emotions, but sensations such as pleasure and pain are expressed through gesture-calls. Many of these signals are socially infectious, spreading rapidly from individual to individual throughout a group (Brown, 1991). Yawning is an example of a socially infectious gesture-call expressing an autonomic state.

Gesture-calling is not necessarily 'inferior' or 'impoverished' compared with language. People who make quasi-accurate statements such as "chimpanzees have 71 types of communicative utterance" (Noble & Davidson, 1996) apply an inappropriate digital notion derived from speech. Primate signals are analogical, using continuous sliding scales of volume, pitch, mutedness, timbre, inflection, melodic complexity, etc., and infinite gradations of gesture (Burling, 1993; Richman, 1976, 1978, 1987).
In human conversation, our own analogical signals are in no sense ‘inferior’ to language: verbal content contributes an estimated 7% to communication of overall attitude (the rest being 38% tone of voice and 55% facial expression: Mehrabian & Ferris, 1967) and is similarly unimportant in communicating emotion (Waxer, 1981; in Brown, 1991). We might ask would-be logophiles how many ‘communicative utterances’ can be produced by a grand piano, or how many people listen to Beethoven’s Choral Symphony because they like the lyrics. Music in fact appears to be a culturally elaborated extension of our gesture-call system.

Gesture-calls project internal affective and intentional states into the public domain, and *vice versa*. Since many gesture-calls are contagious, public display and private experience are joined by a two-way street; intentionality is a communal affair, and apes are networked as surely as neurones in a brain.

1.2. Mimetic communication

*Iconic gesture-calls* represent a second distinctive communication mode in humans: a potentially endless capacity to invent *ad hoc* representations, based on resemblance of shape or sound (Burling, 1993). Unlike affective gesture-calls, mimetic signals are always under voluntary control. They can be used to deceive, and the emergence of such abilities requires the prior evolution of social trust.

Human conversation is laced with iconic devices: we may enliven a verbal account by mimicking the sounds of roaring engines and squealing brakes, or express the thrill of a car chase with careering hand and body movements. Where the whole body is involved in representing an agent - animate or not - we have *mime* or, if internal states are also replicated, fully theatrical role-play.
In the absence of a common language, human communicators make greatly increased use of mime and iconic signals (Burling 1993; Donald, 1991), and our present dependence on language might blind us to the power of mimesis to communize perception, and project ideas into a public space (cf. Donald, 1991).

1.3. Conventional communication

Our third distinctive mode includes the use of cryptic codes which, in contrast to mimetic signals, bear no necessary resemblance to their referents, and so cannot be invented to order in an ad hoc manner. Codes cannot be understood without a conventionalized system of meanings (Durkheim, 1912; Lévi-Strauss, 1950; cf. Knight, Power & Watts, 1995), and, unless you happen to be Lewis Carroll, new terms have to be added consensually.

Language is only one kind of cryptic system, and even here, we use a variety of conventional signals which are not strictly linguistic, such as nodding and shaking the head to say ‘yes’ and ‘no’, manual gestures both polite and rude, and vocalizations of the ‘uh-huh’ and ‘m-hm’ variety (Burling, 1993). Other systems include hieroglyphs, phonetic alphabets, gestural languages, mathematical denotations, and traffic signals.

In addition to cryptic codes, human societies employ a welter of emblematic devices, ranging from corporate logos, badges, national flags, and patriotic anthems, to the most sacred religious icons such as crucifixes and rainbow snakes. These are what social anthropologists commonly refer to as ‘symbols’, and which Victor Turner (1967: 27-9) defined as having three characteristics: condensation, unification of disparate significata, and bipolarity. That is, a ‘ritual symbol’, such as the Mudyi tree
(or ‘milk tree’) used in Ndembu rituals, unifies multiple meanings of two quite different types: sensory/emotive (a mother’s womb, her breasts, and breast-feeding) and social/ideological (initiation, matrilineage, education, tribal custom, etc.). It is not conceived of as a ‘symbol’ but a ‘fact’, fusing multiple webs of explicit and implicit meanings, bridging the everyday and sacred worlds, and uniting humanity with the cosmos. Frequently impervious to indigenous exegesis ("Our ancestors always did it this way"), ritual icons, like ritual gestures, hover somewhere between cryptic code, inarticulate performance, and oceanic dissolution of categorical thought (cf. Deikman, 1969).

Economico-moral rules are not ‘codes’ in the cryptic sense, but they are certainly manipulative and have a communicative dimension (cf. Krebs & Dawkins, 1984). Parents (at least in Edinburgh: Trevarthen, 1995) begin to encourage ‘good’ and ‘clever’ behaviour in their children from around the age of 12 months, so grooming them for moral and economic success.

2. Three modes of play

The dramatic life of the human individual begins with play (Jennings, 1990). Human play can be divided into three fairly distinct kinds of activity which correlate closely with our three communication modes: ‘embodied play’, ‘pretend play’ (Jennings, 1990, 1991; Winnicott, 1974), and ‘games with rules’ (Huizinga, 1955). The children of contemporary foragers develop play skills in parallel with, or slightly earlier than, their post-industrial counterparts (Jennings, 1995). This may reflect our western bias toward object rather than social skills (Smith, 1988); our valuation of logic and technology over make-believe and the cultural arts (Jennings, 1990); reduced
opportunities for social play in urban contexts; and the use of television, video, and electronic toys (one-way social mirrors) as substitutes for social play.

2.1. Implicit play

Many animals discover, explore, enjoy, and develop the performative capacities of their bodies through embodied play. Primates and social carnivores also explore social and political relationships through play-fighting, games of chase, king-of-the-mountain, keep-away, tug-o'-war, etc. (Parker & Milbraith, 1994). Human embodied play begins with contingent mirror play between mother and baby. If the baby gurgles, the mother gurgles; if the mother pulls a face, the baby copies it (Beebe, 1982; Gopnik & Meltzoff, 1994). ‘Peek-a-boo’ has been observed in so many diverse societies that it may well be a universal human game (Parker, Mitchell & Boccia, 1994a).

This means that even sensorimotor play in humans has a theatre-like quality from the outset - presenting, making public, and collectivizing. And it is done ‘for fun’ - all true play occurs in a special ‘play space’, a kind of alternative reality sheltered from environmental pressures - whether a physically demarcated space such as a football pitch, theatre, chess board, or church - or a space in a less tangible sense: a mental, attitudinal, temporal, or social space (Huizinga, 1955; Winnicott, 1974). Winnicott points out that it is not possible to say exactly where play occurs. It is neither ‘in’ the individual, nor ‘in’ the environment, but takes place in a kind of hyper-space, rather like the Internet. He calls this a ‘transitional’ space, because it is here that all our enculturation takes place, and it is the permissive nature of this social space which accounts for the extreme flexibility and adaptability of human behaviour.

Embodied play is socialized in the preverbal child partly through our innate
system of gesture-calls. We even have a specific ‘play face’ - identical in humans and chimpanzees - which signals, for example, the difference between a play-fight and a real fight (Young, 1992). Most mothers, in my experience, play ‘the monster’ at some point, with raised eyebrows and covered teeth - to show that the monster is really a buffoon - whilst infants respond with squeals of terrified delight.

2.2. **Mimetic play**

*Pretend play* emerges around the age of 12 months, when iconic gesture-calls and the first words also appear. Donald Winnicott (1974) divides pretend play into two phases, *transitional* and *role-play*. Jennings (1991; *cf.* Piaget, 1962) calls the first stage *projective play*: pretending, for example, that a pencil is an aeroplane. Role-play, on the other hand, is *introjective*: pretending that *I* am the aeroplane, extending my arms as wings, and ‘flying’ around the room uttering engine noises.

There are obvious parallels between projective play and iconic gesture-calls: both project ideas ‘out there’ into the public world of things. Both are representational activities, mimicking the shapes or sounds of objects, people, or processes.

Many children become attached to a favourite doll - the ‘transitional object’ - which is loved, cuddled, and mutilated, but somehow represents the child’s developing sense of self (Winnicott, 1974). Dogs, like children, become excited when a favourite toy is taken from them, but will then happily accept a substitute. For human children, however, there is no substitute for the precious transitional object (Mitchell, 1994).

By the age of two years, introjective *role-play* has developed, with children acting out social scenarios and assuming make-believe roles adopted from adult life, stories, films, comics, or from their own fantasies. Even before this stage, a child may
become an actor in need of an audience, constantly demanding 'Look at me!' (cf. Courtney, 1980: in Jennings, 1990). Confirmation of identity may be at stake here, not merely self-esteem but self-objectification through the eyes of others. Self-knowledge, like scientific knowledge, may need independent corroboration.

Winnicott summarises his three phases of play - embodied, projective, and role - as 'me, not-me, and not-not-me'. The implication is that we create ourselves through incorporating others - including, I would point out, non-human and inanimate role-models such as aeroplanes, motor cars, and railway trains.

2.3. Conventional play

Around the age of five or six, role-play becomes highly elaborate, and children love to dress up, sometimes staging formal 'productions' with props, settings, and well-worked-out narrative scripts.

This is also the age at which children start collecting emblematic or other numinous objects - badges, tickets, Pokemon cards, etc. They become increasingly able to enjoy games with rules, a relatively inflexible extension of pretend play with the curious feature of adopting, within the confines of the game, an arbitrary - even absurd - set of conventional rules. Outside the 'play-frame' these rules may be consensually modified by players, but once the game starts, they are regarded as binding.

This may be an important preparation for adult moral, economic, and political life. However, it has been pointed out that field and 'iconic' (board and card) games appear to model territorial and political conquests, involving roles well outside the likely experience of most adults (Parker & Milbraith, 1994). Nevertheless, such games
dominate adult participatory play (Huizinga, 1955).

3. Three modes of performance

It is only in the context of play that we can begin to make sense of the cultural arts (Jennings, 1990). The information-processing paradigm has so far prevented wide appreciation, within the behavioural sciences, of the difference between communication and performance. Supposing, for example, you happen to have a favourite recording of Beethoven’s Ninth Symphony. In the course of your lifetime, you might play that same recording hundreds of times, simply because you love it. After all that repetition and redundancy, what are you getting out of Beethoven in the way of ‘information’?

Music psychologists frequently discuss music as a kind of language for ‘communicating’ emotion. We simply do not need music for that - our gesture-call system already tops the primate charts in sophistication (Young, 1992). And music is not a code - it refers to nothing outside itself. You can translate Chinese into English, but you cannot translate a Chinese melody, any more than a Chinese smile, into an English one. You might be able to characterize a tune as ‘jolly’ or ‘sad’, but you cannot ‘translate’ the other way round. Music does not necessarily express anything at all (Storr, 1993). What is the ‘affective content’ of the tune to Jack and Jill or Baa Baa Black Sheep? Music is more like massage - the pleasure is intrinsic to the performance.

Performative displays can serve many functions, and do so in many different animal species. Two species - ourselves and dolphins - have collective ‘song-and-dance’ displays which serve grooming, entrainment, and agonic functions (Connor, 1992; cf. Krebs & Dawkins, 1984; Knight, 1998). The balletic displays of male
dolphins cement the alliance of the performers (the grooming function), but also fuse
them into a single experiential unity (the entrainment function). The agonic functions
are communicative: they say to other males, 'If you attack my friend, you attack me
too,' and to female dolphins, 'We can do this the hard way or the easy way.'

Human song-and-dance displays can also serve agonic communicative
functions, but it is the grooming and entraining functions that I wish to stress - the
collectivization of inner experience. This is unlike communication, which merely
projects subjective contents into a public space, where we can see, hear, or smell
them. Performance unifies experience, ensuring we are all in the same groove, dancing
to a common rhythm, or singing from the same hymn sheet. Performance takes two or
more selfish individuals and welds them into one great big selfish individual, which
can be pretty fearsome, as in Nuremberg rallies and the like. Performance creates
emergent cooperative orders.

3.1. Implicit performance

Song-and-dance is a form of embodied play in its own right and appears to be a
playful extension of our gesture-call abilities, having many similar features (being
relatively well 'understood' cross-culturally, for example). I adopt the term 'song-and-
dance', hyphenated for the same reason as 'gesture-call', to indicate a single coherent
system - the hypothetical hard-wired behaviour whose conventionalization I assume led
to music, and which appears to be spontaneous in the melodic babbling and balletic
movements of 3-month-old babies (Beebe, 1982; Trevarthen, 1995). Music and dance
are intimately linked. When people listen to music, they tap their fingers or toes,
whilst muscle tone throughout the body - especially in the legs - fluctuates in sympathy
with the music, indicating subliminal dance (Storr, 1993).

Making marks - whether with crayons, jam, or faeces (Jennings, 1990) - is an aspect of kinaesthetic play, like song-and-dance, and the embodied beginnings of visual art: a potentially public record of a gestural and visual experiment.

3.2. Mimetic performance

Burling (1993) suggests that, as an iconic gesture draws a picture in the air, so a picture is an iconic gesture traced on a surface. But things cannot be so simple. Whereas iconic gestures and pretend play emerge simultaneously around the age of twelve months, representational art is not apparent until a year later, around the same time as role-play (Trevarthen, 1995).

Autistic children, who have deficient mimetic abilities, may nevertheless become artistic prodigies (Selfe 1977; Sacks, 1995). However, their 'art' has no mimetic intention, since they do not show their work to others (Selfe, 1977). Normal children progress from swirling 'mandalas' or closed shapes to drawing faces, then to idiographic representations of self and others - often family members. Autistic prodigies, on the other hand, use foreshortening and perspective from the outset, and their indiscriminate accuracy of detail appears no more mimetic than a photograph or tape-recording. Interestingly, Sacks (in Freeman, 1994) notes that Temple Grandin's memory is equally detailed, like a videotape. Perspective and foreshortening reflect an ego-centric vision (cf. Goodale & Milner, 1992; Goodale et al., 1991). It took European artists 40,000 years to discover these principles, presumably because ego-centric processes are necessarily unconscious.

We should also note that chimpanzees, although they can understand
photographs, iconic representations, and Packman-style computer games (Burling, 1993), do not *create* pictures. We might postulate a domain-specific learning module in humans, with its own independent developmental schedule, but requiring pretend play to take the social form we see in normal children. Children often maintain a narrative dialogue between themselves and their pictures, making vocal sound-effects of incidents portrayed, and reinventing the ‘story’ as they proceed. The representational arts, in normal children, are functionally part of our dramatic performative system, and develop around the same time as role-play.

The boundary between role-play as play, and *theatre* as performance, is somewhat arbitrary. We might say that play is autotelic - pursued just for the fun of it (Turner, 1982) - whereas performance, like communication, is also manipulative (Krebs & Dawkins, 1984). But children demand an audience from the outset, so most human role-play is ‘performance’. The very rare instances of role-play observed in language-trained apes (Parker & Milbraith, 1994) differ from the human kind in their lack of demand for an audience.

What is of profound importance for social anthropology is the point at which *drama* becomes *ritual* - that is, when it first conforms to a socially imposed screen-play (I avoid Goffman’s term ‘script’ because this led to the logocentric notion of ‘culture as communication’, sending cognitive anthropology up a blind alley: cf. Boyer, 1993). It is widely held that the first human ritual created the collective authority on which all economico-moral exchange - and hence all human enculturated order - depends (Durkheim, 1912; Turner, 1982; Knight, 1991).
3.3. **Conventional performance**

Virtually all human performance is today conventionalized in adults, and to varying degrees in children. *Music* is conventionalized song-and-dance. Digital scales, with fixed tonal intervals, presumably derive from the invention of musical instruments (Storr, 1993), as there is no reason for the human voice to constrain itself in this way (Dosher, 1994).

The *decorative arts* are conventionalized forms of mark-making behaviour. Nomadic hunters, with few possessions and no permanent homes to decorate, often paint their own bodies (Ebin, 1979), and modern children make marks indifferently on paper, walls, and themselves. The first surfaces plied with ochre by our *Homo erectus* ancestors may well have been their own hominid skins (Bahn & Vertut, 1988; Knight, Power & Watts, 1995).

The *representational arts* are equally conventionalized. The post-industrial west has seen a rebellion against the conventions of academic art: but even here, ‘spontaneity’, ‘creativity’, and ‘originality’ have become the most tyrannical of social mandates (Krauss, 1985), to the extent that we groan at the thought of another Duchamp urinal, or a sheep pickled in formaldehyde.

Strictly, what I am calling the ‘conventional mode’ is itself multiple, since it includes implicit and mimetic modes in conventionalized form. Ritual, ballet, and cinema combine music, dance, pantomime, visual metaphor, gesture in all three modes, and iconographic settings both realistic and fantastic.

The most salient feature of modern human behaviour is performative display. People who spend 35 hours a week in obligatory role-play at work (cf. Goffman, 1959), may spend as many hours watching televised role-play at home. And we have
other leisure activities, all of which involve display - not just music, cinema, and theatre, but mundane activities like cooking, gardening, and home decoration. We turn the food we eat, the homes we live in, and the plots of ground around our homes, into social displays. Then we go on holiday, where even lying on a beach is display, sometimes demanding onerous cultivation of physique and suntan.

Jewellery, sporting trophies, stamp collections, academic diplomas, Baroque churches, and even the rags of the penniless ascetic, are all displays of ‘cultural capital’ (Bourdieu, 1972) - material, moral, social, intellectual, or spiritual wealth. The fact that wealth is so often displayed reveals the fundamentally theatrical character of economic activity. Cars that can travel at twice the legal speed limit, baseball caps with Bugs Bunny ears, and lavatory brushes shaped like geese - much of the stuff we spend our hard-earned money on - are the props and backdrops for the roles we assume or aspire to in our daily lives.

‘Symbolism’ versus social display

The real-world social mirroring behaviours described above allow us to develop a scheme which avoids:

1. Creating an artificial discontinuity between ‘nature’ and ‘culture’
2. Fabricating Platonic or Saussurian worlds of disembodied meaning and ‘symbolism’

In fact we can dispense with the word ‘symbol’ altogether, except perhaps for convenience in very general contexts, usually with the proviso that more precise
definition will be attempted later.

The trouble with 'symbolism' is that the word means different things to different people, and shifts its meaning from one context to another. Consequently, cognitive, biological, and social scientists talk endlessly past each other, creating arguments which appear to be substantive but are only semantic. More fatally, the notion of 'cultural symbolism' suffers from an anthropocentric circularity of definition, sustaining the myth of opposition between nature and culture, and obfuscating our own self-ignorance.

All this can be avoided by referring instead to social mirroring behaviour. We can say with some confidence what a gesture-call is, or a dramatic icon, or projective play, just as we can call a spade a spade. We can categorize their functions as communication, play, or performance, and their modes as implicit, mimetic, or conventional. Words like 'sign' and 'symbol' can be returned to the comfortable imprecision of folk usage, where they rightfully belong.

SOCIAL DISPLAY AND SELF/OTHER-AWARENESS

Social display as a phylogenetic sequence

Our social mirroring behaviours could not have emerged all at once, and must have evolved in a logical order. Communication has to be the oldest form of intersubjectivity, since even cells 'talk' to each other in chemical languages. Human performance appears to have evolved as a playful extension of communication. Play is common to many animals (even protozoa have exploratory behaviour: Hameroff, 1994), whereas performance is more variable and specialized. So we can envisage an 'evolutionary arrow' from left to right across Table 3.1.
The same can be said for the three modes: implicit behaviour has to be older than mimetic behaviour, and both have to be in place before they can be conventionalized as we find them in modern human culture. So Table 3.1 has a 'down' as well as an 'across' arrow, and implies at least three 'rubicons' during human evolution.

If play and performance generate the preconditions for voluntary communication - cooperative trust (Whiten, 1993) and reflective consciousness (Mead, 1934) - we could infer that play or performance in one mode facilitates the emergence of communication in a higher mode. This is a general extension of Durkheim's (1912) theory that ritual pantomime (mimetic performance) is the prerequisite for language (conventional communication). So we might combine the 'down' and 'across' arrows into an evolutionary spiral (Table 3.2), and infer a parallel evolution of self/other-awareness.

We humans invent ever more expansive social mirrors - writing, printing from moveable type, telecommunications, the Internet, etc. (cf. Donald, 1991). Creating emergent orders is the special talent of our species, and in the process we continually reinvent ourselves.

Is there empirical evidence for the evolutionary sequence implied by Table 3.2, and does it correlate with the evolution of self-awareness? There are six potential sources for such evidence:

1. A comparison of social displays across animal taxa
2. A similar comparison of self-awareness, using cognitive tests
3. The development of social displays in children
4. The associated development of self-awareness
The first four types of analysis are reviewed below. I will deal with the fifth in Chapters 4 and 5, and the sixth in Chapters 6 and 7. All six approaches have significant problems, but if we can arrive at some degree of consensus between them, we can at least claim to have a hypothesis worthy of serious attention.

1. Social displays in humans and animals

Table 3.3 reveals that the hypothetically more primitive display behaviours are indeed the most widely distributed, as expected, whilst the least primitive ones are unique to humans, or tend to be restricted to our closer relatives and species convergent with ourselves - such as dolphins (Tayler & Saayman, 1973) and Congo grey parrots (Pepperberg, 1999). In the table, the letters a, b, and c indicate communication, play, and performance respectively.

One problem with the analysis is the extreme rarity of mimetic displays for comparison, let alone conventionalized displays. Mimesis, in mammals, appears to be restricted to apes, with ambivalent evidence in cetaceans and borderline 'symbolling' (metonymic signals) in social carnivores. In non-mammals, mimesis is virtually unknown with the exceptions of pretend play in Congo grey parrots (Crawford, pers. comm.) and the iconic dance of honey bees. The rarity of mimesis relative to song-and-dance-like performance, however, at least suggests that it is easier to evolve performance in an established mode than communication in a new mode.
<table>
<thead>
<tr>
<th></th>
<th>Humans</th>
<th>Primates</th>
<th>Mammals</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Implicit mode</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Gesture-calls</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>b. Embodied play</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Some</td>
</tr>
<tr>
<td>c. Song-and-dance</td>
<td>✓</td>
<td>Some</td>
<td>Some</td>
<td>Some</td>
</tr>
<tr>
<td>Making marks</td>
<td>✓</td>
<td>Some</td>
<td>Some</td>
<td>?</td>
</tr>
<tr>
<td><strong>2. Mimetic mode</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Iconic signals</td>
<td>✓</td>
<td>Some</td>
<td>?</td>
<td>Rare</td>
</tr>
<tr>
<td>b. Projective play</td>
<td>✓</td>
<td>Some</td>
<td>?</td>
<td>Rare</td>
</tr>
<tr>
<td>c. Reading pictures</td>
<td>✓</td>
<td>Some</td>
<td>Some</td>
<td>Rare</td>
</tr>
<tr>
<td>a. Mime</td>
<td>✓</td>
<td>Some</td>
<td>?</td>
<td>-</td>
</tr>
<tr>
<td>b. Role-play</td>
<td>✓</td>
<td>Rare</td>
<td>?</td>
<td>-</td>
</tr>
<tr>
<td>c. Creating pictures</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Drama</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ritual</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>3. Conventional mode</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Language ability</td>
<td>✓</td>
<td>Some</td>
<td>?</td>
<td>Rare</td>
</tr>
<tr>
<td>Conventional signals</td>
<td>✓</td>
<td>Some</td>
<td>Rare</td>
<td>Rare</td>
</tr>
<tr>
<td>Approval/disapproval</td>
<td>✓</td>
<td>Some</td>
<td>Rare</td>
<td>Rare</td>
</tr>
<tr>
<td>b. Play scripts</td>
<td>✓</td>
<td>?</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Games with rules</td>
<td>✓</td>
<td>?</td>
<td>?</td>
<td>-</td>
</tr>
<tr>
<td>c. Conventional displays</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Economico-moral rules</td>
<td>✓</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Key:  
- a = communication  
- b = play  
- c = performance

Table 3.3. Human and non-human displays

Examples of conventional displays include regional song dialects in chaffinches, which are conventionalized in the simple sense of being socially as well as genetically inherited. Dolphins have personal signature whistles, and there is evidence that these may be used referentially by third parties, rather like personal names (Caldwell &
Caldwell, 1965). Domestic dogs can learn conventional codes such as whistled commands for herding sheep. However, human conventionalization subserves a ritually constructed economico-moral order, and it is this which appears to be uniquely human and the defining feature of human culture. Conventions in wild animals therefore do not have strict human parallels.

My generalized treatment of different taxa with independent evolutionary trajectories - especially birds and insects - glosses over too many unique circumstances. Territorial bird song, for example, would not be expected to serve the entrainment function of synchronised displays in dolphins (cf. Connor, 1992) or gelada baboons (Richman, 1978, 1987). Congo grey parrots are not songbirds, but their remarkable language abilities (like those of apes) are associated with pretend play as my argument would predict. The infectious nature of ape gesture-calls represents their performative rather than communicative function: this, together with embodied social play, may be sufficient to support the limited mimetic capacities of apes.

Broadly, comparison of displays across taxa is consistent with the <communication → play → performance> and <implicit → mimetic → conventional> sequences, though more detailed inferences are less clear.

2. Self/other-awareness in humans and animals

There is clear evidence for differing levels of self/other-awareness in humans, apes, and monkeys, and between other animal taxa. Gallup (1994), for example, notes that chimpanzees understand the problems faced by another wearing a blindfold, whereas monkeys do not. Chimps can learn to recognise themselves in mirrors, whereas gorillas may have lost this ability in the recent evolutionary past. This suggests that
chimps are better equipped than monkeys to 'see themselves through the eyes of others', and, conversely, identify with problems faced by others.

A survey of child development literature and research on self-awareness in animals and humans (Mitchell, 1993, 1994) supports the conclusion that there are at least three broad levels in the evolutionary emergence of self-awareness, corresponding to the three modes of Table 3.1, viz:

Implicit mode → Mimetic mode → Conventional mode

After warning us that his summary may be anthropocentric, and mentioning the problems of species-fair testing and 'conceptual translation' between species, Mitchell infers three basic levels of self-awareness (1994: 99):

1. The self as largely implicit, a point of view that experiences, acts and, at least in the case of mammals and birds, has emotions and feelings
2. The self as built on kinaesthetic-visual matching, leading to mirror self-recognition, imitation, pretence, planning, self-conscious emotions, and imaginative experiences of fantasy and daydreams; and contributing to perspective taking and the beginnings of theory of mind
3. The self as built on symbols, language and artifacts, which provide external support for shared cultural beliefs, social norms, inner speech, dissociation, and evaluation by others as well as self-evaluation

Mitchell tells us that apes have the first two levels of selfhood, and some evidence of the third 'not dependent on complex linguistic skills' (1994: 100). Adult humans have all three, and differ from other species in having 'multiple selves'. This is an issue I will return to. It is noteworthy that Mitchell sees the third level of selfhood, which includes the development of what I am calling *economo-moral personae*, as
characterized by dissociation. Other authors discussing multiple selfhood in humans, from different theoretical perspectives, include Janet (1889), Oakley & Eames (1985), E. Hilgard (1986), Bliss (1986), Brown (1991), Laughlin et al. (1992), and Castillo (1994).

3. Social displays during childhood development

The ontogenesis of social mirroring echoes, but does not recapitulate, the phylogenetic sequence inferred above. That is, our implicit, mimetic, and conventional modalities do become manifest in the expected sequence, but all within the early months of infancy, and thereafter develop in parallel. Communication, play, and performance also generally succeed each other as expected (Table 3.4).

However, although implicit performance (song-and-dance at 3 months) does precede mimetic communication (at 12 months: Trevarthern, 1995), the appearance of index finger extensions accompanied by vocalizations at 2 months (Butterworth, 1991) suggests that aspects of mimetic signalling are developing independently of implicit performance. Conventional communication also follows an independent schedule with ‘phonemic competence’ (6 months) preceding iconic gestures and pretend play (12 months). The first words are acquired around the same time as iconic gestures and pretend play, as opposed to the assumed evolutionary sequence (mimesis before language). Further, the first words imply a period of learning and understanding before 12 months.

On the other hand, the ‘verbal explosion’ (24 months) and comprehension of language rules (30 months) do follow the emergence of pretend play. I have already presented evidence that a fully socialized use of language (including irony, innuendo,
<table>
<thead>
<tr>
<th>Age</th>
<th>1. Implicit</th>
<th>2. Mimetic</th>
<th>3. Conventional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Months:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Visuo-kinaesthetic matching</td>
<td>Primary gesture-calls</td>
<td>Contingent play</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Index finger extensions</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Song-and-dance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Indexical gestures</td>
<td>Clowning, tricks, and jokes</td>
<td>Phonemic competence</td>
</tr>
<tr>
<td>9</td>
<td>Making marks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Iconic gestures</td>
<td>Projective play</td>
<td>First words</td>
</tr>
<tr>
<td>18</td>
<td>Self-conscious gesture-calls: embarrassment/coyness</td>
<td>Deixic/praxic gestures</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td>Personal pronouns</td>
</tr>
<tr>
<td>24</td>
<td>Draws ‘mandalas’</td>
<td>Role-play</td>
<td>Verbal explosion</td>
</tr>
<tr>
<td>30</td>
<td></td>
<td>Drawing pictures</td>
<td>Language rules</td>
</tr>
<tr>
<td>36</td>
<td>Further gesture-calls: shame/guilt/pride/hubris</td>
<td></td>
<td>Internalized social norms</td>
</tr>
<tr>
<td>48</td>
<td></td>
<td></td>
<td>Theory of mind</td>
</tr>
<tr>
<td>Years:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-11</td>
<td>Embarrassment when ridiculed</td>
<td>Self-adornment</td>
<td>Games-with-rules</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Increasingly complex joint role-play</td>
<td>Consensual morality</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Peak in hypnotic ability</td>
</tr>
<tr>
<td>11-13</td>
<td>Embarrassment at any audience</td>
<td></td>
<td>Principled morality</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>$Economico-moral$ personae</td>
</tr>
</tbody>
</table>

*Table 3.4. Ontogenesis of social displays*
etc.) depends on theory of mind and so pretend play.

This pattern of behavioural emergence - early onset followed by more gradual development, and independent developmental schedules - is consistent with a set of innate capacities, evolved during Plio-Pleistocene times, which pre-adapted humans for conventionalized culture. In effect, this paraphrases Colwyn Trevarthen's conclusion that we are biologically committed from birth to living in shared experiential and culturally constructed worlds.

4. Self/other-awareness during childhood development

Child development literature provides a wealth of empirical data which broadly supports the scheme presented in Table 3.2, with a graded emergence of shared experiential worlds and self-awareness (reviews in: Frye & Moore, 1991; Whiten, 1991; Parker, Mitchell & Boccia, 1994b; Saracho & Spodek, 1998).

The first two modes in my scheme - implicit and mimetic - correspond to 'primary' and 'secondary' intersubjectivity in developmental literature (Trevarthen, 1979; Trevarthen & Hubley, 1978).

Up to six 'phases' can be identified during the development of intersubjectivity in children. Of particular interest are two developmental transitions, roughly coinciding with the emergence of (1) projective and (2) introjective mimesis, and indicated by horizontal rules across Table 3.4 at nine months and two years. During the first two years of life there is major reorganization of prefrontal cortex. Across the first transition, from 6 to 12 months, there is a 'spurt' of accelerated development, involving orbital before dorsolateral prefrontal cortex (two socially important areas: see Chapters 4 and 5). Approaching the second transition, between 15 and 24 months,
association areas myelinate.

1. Implicit self-awareness (primary intersubjectivity)

'Primary intersubjectivity' is a world of shared experience which does not refer to anything outside itself (Trevarthen, 1979). Contingent mirror play, for example, is not 'about' anything other than mother and baby learning to know and trust each other, and the baby's first lessons in the agency of self and other. Primary intersubjectivity involves self- and other-awareness at the levels of affect, intention, and social/political relationship.

Implicit self-awareness is evidenced from birth by visuo-kinaesthetic matching, and insight into others' feelings by clowning, teasing, tricks, and 'jokes' which are apparent from the sixth month (Dunn, 1991; Trevarthen, 1995).

2. The self as participant (secondary intersubjectivity)

In secondary intersubjectivity, interactions extend to comment on or refer to objects of shared attention outside the social relationship itself (Trevarthen & Hubley, 1978). If primary intersubjectivity is a world of shared experience, secondary intersubjectivity is a shared experience of the world: the 'me' and 'not-me' in Winnicott's scheme of self-concept development (perhaps better expressed as 'us' and 'not-us'). Secondary intersubjectivity implies awareness of self and other as agents capable of joint engagement with an outside reality, of shared attention, mimetic representation, pretend play and, eventually, 'theory of mind'.

Colwyn Trevarthen (1995) identifies this first major transition, around 9 months, as the emergence of the 'child as participant'. Baron-Cohen (1995) regards it
as the onset of 'shared attention monitoring'. Trevarthen contrasts this with the
cognitive self-awareness of the scientist: the child as participant strives to understand
the world "in active negotiation of creative imaginings that are valued for their human-
made unreality". The baby "starts to notice trappings of culture, like clothes, books,
toys, ways of posing and gesturing, and to use them for showing off the knowledge
gained". The 'movement-and-music' performer of early infancy has become the self-
aware 'performer before an audience', though not yet able to play the roles of others.
Such a self-perception would appear to be a logical prerequisite for iconic
communication and pretend play.

3. The self as value

The second major transition, around the age of two years, is widely recognised in folk
psychology as the beginning of the 'terrible twos' (Lewis, 1994). This represents the
emergence of a new rebellious self-concept, the concept of the self-as-value. At 18
months, children can learn to recognise themselves in mirrors (Gallup, 1994), and self-
conscious emotions like coyness and embarrassment begin to appear (Parker, Mitchell
& Boccia, 1994a). Although autistic children can also develop mirror self-recognition
(at an equivalent mental age), unlike normal children they do not show self-conscious
emotions such as coyness or shyness at their own reflection; and although they may
show pleasure at the successful completion of a task, they do not show Piagetian 'pride
in mastery' (Happé, 1998). They do not perceive themselves in terms of social value.

The use of the pronouns 'me' and 'mine' begins around 20 months (Lewis,
1994). This new 'me', conceived in value terms rather than just bodily terms,
introduces the battle of wills familiar to parents, and the rebellious idea "me does not
want to do what you wants me to do." Until that age, toddlers are relatively passive, allowing parents to dress, wash, or change them as they wish; but now there is a newly discovered autonomy, asserted by resistance. The ‘verbal explosion’, and the onset of role-play, roughly coincide with this new sense of self-value.

It would seem that we must first assert our distinctiveness from others before we can truly identify with them, and experience their pleasure and pain as our own. Although children at 10 to 12 months are visibly distressed by pain in others, it is only at 18 months that they begin to offer comfort, however ineptly. Not until 24 months can they do so with insightful empathy, and soon afterwards, begin to show self-conscious embarrassment or coyness at another’s look (Mitchell, 1994).

4. Moral self-awareness

More complex emotions of self-value - shame, guilt, pride, and hubris - follow the internalization of social norms around the age of 3 years. This is the age of self-evaluative behaviour, self adornment, and authoritarian morality (Parker, Mitchell & Boccia, 1994a), accompanied by notions of responsibility and blame (Dunn, 1991).

Although false-belief tasks suggest that ‘theory of mind’ is usually established by the age of 4, Judy Dunn (1991) has shown that children ‘in the wild’ - when playing with their mothers, siblings, and intimate peers - demonstrate much greater social insight than they do under laboratory conditions. ‘Theory of mind’ may be effectively present well before the age of four. This is the earliest age at which hypnosis becomes possible - ‘epistemological self-awareness’ (ToM) is necessary for ‘epistemological rapport’ (hypnotic suggestibility).
5. Theatre of mind

Between 5 and 8 years, children expect to be embarrassed only when ridiculed (Mitchell, 1994). Consensual morality develops between the ages of 6 and 11 years (Parker, Mitchell & Boccia, 1994a), alongside a growing interest in games with rules (Parker & Milbraith, 1994) - children are becoming increasingly adapted to living in a consensual and conventional social world. At this age, role-play can occasionally achieve hallucinatory force, and lonely children may create imaginary companions (dissociated autonomous personae: Bliss, 1986). This coincides with the peak in hypnotic ability, which (in western subjects) subsequently declines through adult life (Brown, 1991). I infer that ‘theatre of mind’ must be established at this time, if not earlier.

6. Economico-moral personae

Social self-consciousness increases towards puberty. The brain is now of fully adult size, and, through the ‘adolescent growth spurt’, the body too will reach adult size some years later. Between 11 and 13, children begin to experience true ‘stage fright’, being embarrassed by the thought of any audience and the mere risk of ridicule or contempt (Mitchell, 1994). This is also the age of idealism and principled morality (Parker, Mitchell & Boccia, 1994a). From puberty onwards children become increasingly capable of assuming adult roles and participating in the economico-moral world.

Child development: summary

Overall, a clear picture emerges of an intimate and logical relationship between social
mirroring behaviours and self-awareness, and a successive unfolding of each under influence from the other. There are many complex changes occurring at rates which vary from child to child, but it seems possible to define six ‘phases’ in this process (Table 3.5). The first two are quite sharply punctuated and accompanied by important structural changes in prefrontal cortex, whilst the third ‘ends’ with the development of ToM (Baron-Cohen, 1995). The next two are not so clearly defined, and the last is punctuated by puberty. After six or nine months, cultural influence is increasingly apparent, but otherwise, the most marked transitions (indicated by rules in Table 3.5) correspond closely with the four modes/sub-modes of Table 3.1: implicit, projective mimetic, introjective mimetic, and conventional. It takes the whole of childhood, up to the age of 11 or 13, to develop principled morality. By the time we reach adolescence, we have role-played enough to take on the mandatory roles of enculturated society, and the economico-moral *persona* of everyday life. From that point on, I suggest, we spend the rest of our lives pretending to be us.

<table>
<thead>
<tr>
<th>Self-awareness</th>
<th>Mode of social mirroring</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Months 0-9</em> Implicit self-awareness</td>
<td>Implicit/embodied play</td>
</tr>
<tr>
<td>9-24 Self as participant</td>
<td>Projective mimesis/pretend play</td>
</tr>
<tr>
<td>24-36 Self as value</td>
<td>Introjective mimesis/role-play</td>
</tr>
<tr>
<td><em>Years 3-5</em> Moral self-awareness/ToM</td>
<td>Increasingly conventional</td>
</tr>
<tr>
<td>5-11 Theatre of mind</td>
<td>Games-with-rules</td>
</tr>
<tr>
<td>11+ Economico-moral <em>persona</em></td>
<td>Conventional roles/wealth displays</td>
</tr>
</tbody>
</table>

*Table 3.5. Co-development of self-awareness and social mirroring (cf. Table 3.1)*
SELF/OTHER-AWARENESS AND SOCIETY

Emergent orders of need

The two major water-sheds in self-awareness, at 9 and 24 months, have no developmental parallel in apes (Trevarthen, 1995; Lewis, 1994) and are of profound importance for understanding the difference between a self-creating species like our own, and species which depend more on genetic mutation and Darwinian selection for self-change.

We humans clearly have levels of self-awareness beyond those of apes, with attendant hazards of psychosis and personality disorder (Jennings, 1997). Economico-moral culture creates further elaboration of self-consciousness. The emergence of economic and moral social values depends on the self perceived as value. There is anecdotal evidence suggesting that chimps do have a sense of self-value (cf. Savage-Rumbaugh & McDonald, 1988; Whiten & Byrne, 1988), though less elaborated than in humans. Apes prefer to be rewarded with real bananas: they are not impressed by Brownie points, Olympic gold medals, or PhD diplomas.

‘Moral self-awareness’ implies the ability to observe oneself from the perspective of a potentially judgemental third party, whose attitude - to a dependent child for example - could mean life or death. Infringement of a moral code might well be experienced, at the level of bodily self-awareness, as threatening physical injury or death (cf. Mauss, 1925; Erikson, 1965); and moral indignation is likely to be an emergent aspect of self-preservation. Each emergent level, though it depends on the one below, also constrains it in a top-down manner: a desire for bodily self-preservation may be redirected into an act of suicide by guilt, despair, or anger at perceived injustice.
Moral self-awareness would seem to introduce a real possibility of dissociated ‘silent’ fields of consciousness, maintained by Janetian adaptive dissociation, or Freudian repression and projection (Castillo, 1994). Our human habits of projected blame, public scape-goating, demonizing out-groups, and xenophobia would support such a view. Witch hunts, lynch mobs, and military rape camps may be counted among the less pleasant symptoms of moralizing humanity.

Apes are self-aware in the sense that they know their elbows from their noses, or their allies from their enemies, but they do not get embarrassed if they do something that might look silly to other apes. ‘Self-consciousness’ - the kind of stage-fright occurring when we are unsure of our role or commit a social gaff - implies moral self-awareness, and a highly reflective development of the self perceived as value. Some of us pursue self-worth through wealth accumulation and others through self-denial, which is not surprising, since moral and economic value share a common origin (cf. Mauss, 1925).

Behaviours relating to bodily self-preservation and reproduction will assume emergent new forms in line with emergent new perceptions of selfhood, creating a hierarchy of potential needs and motivations - survival, self-promotion, success, self-image, self-esteem, self-legitimation, and prestige. Without moral self-awareness, there could be no self-love, self-pity, self-hatred, self-abnegation, self-indulgence, conscience, justice, shame, humiliation, pride, sexual modesty, or those giddy swings in self-esteem that we call ‘falling in love’.

Biologists, who study dominance hierarchies in primates, have difficulty understanding why so many human societies are egalitarian (Knauff, 1991, 1994; Boehme, 1993, 1994; Erdal & Whiten, 1994). But the problem is solved if the
perception of the self as value creates a need for respect from others (and we certainly have such a need). Egalitarian social structures are maintained by various ‘levelling’ mechanisms, ranging from good-natured ribbing to vociferous public indignation (Erdal & Whiten, 1994). Ridicule and opprobrium could not work on individuals for whom self-value was not an issue.

The same need can account for distinctively human aspects of ambition, which in changed social circumstances (e.g. sedentary lifestyle: Hayden, 1993) can no longer be held in check by egalitarian mechanisms. Erdal and Whiten (1994) note that human hierarchies are not characterized by alpha-male dominance, but they still think in terms of genetically evolved ‘drives’ in individuals. They fail to note that human dominance is often based on collective identities such as class, caste, and gender. They assume that our ‘dominance drive’ was not selected out when our ‘egalitarian drive’ got selected in, accounting for the two types of society, rather than recognizing both as possible expressions of the same need for self-value.

The proliferation of needs generated by human self-consciousness adds to the theoretical difficulties of economists, who find themselves at a loss to define the difference between ‘needs’ and ‘wants’, or to explain why economic appetites, in contrast to bodily ones, are so curiously insatiable. Human status and prestige do not necessarily confer reproductive advantages, and the dominant classes may forgo large numbers of offspring, apparently to afford more luxuries (i.e. theatrical wealth displays) and privileges (such as sending one’s children to elite schools). In some African societies, kings were elected by capture, since it was their fate to be sacrificed, like Christ, for the public good (de Heusch, 1997). The scape-goat role of kings, and their subjection to crippling ritual constraints (Frazer, 1922), were common
enough in ancient times to suggest that kingship originated in collective demand rather than individual ambition.

**Wholly-believed-in make-believe**

If social mirrors make us conscious, 'collective representations' are conventionalized social mirrors which make us unconscious - scrambling our Plio-Pleistocene cognitive heritage, and replacing reality with make-believe. In this chapter I set out to explain how this is accomplished. Make-believe, especially role-play, clearly allows us to represent ourselves as animals or machines, animals or machines as humans, and anything as anything. But how does make-believe become make-belief?

It is a survival imperative that children should not confuse make-believe with reality: they should not swallow stones pretending they are sweets, or jump off high buildings pretending to be Batman. The ability to distinguish between reality and belief is a defining characteristic of 'theory of mind', and the same distinction is central to a major debate in hypnosis research (Heap, 1996). 'State' theorists argue that hypnosis is a dissociated mental state (i.e. 'real'), whereas 'non-state' theorists argue that hypnosis is "nothing but role-play" (i.e. 'fake': Campbell, 1996).

Spanos (1989), for example, compared 'genuinely' hypnotized subjects with controls who were merely told to simulate hypnosis. Classic hypnotic phenomena, such as anaesthesia and paralysis, could be reproduced by simulators as convincingly as by hypnotized subjects. Spanos concluded that 'altered states' including hypnosis, dissociative identity disorder, and demonic possession, are socially instituted role-plays. If the phenomena seem strange to us, he says, it is because the role requirements are strange.
Spanos, however, overlooked one real difference between hypnotized subjects and simulators: the simulators do a better job. For example, a hypnotized subject, regressed to the age of five and asked to write the word ‘psychology’, adopts five-year-old handwriting but spells the word correctly. If told that a chair is now invisible, she reports that it has vanished, but still avoids walking into it. Simulators, on the other hand, self-consciously adopt five-year-old spelling, and deliberately bump into ‘invisible’ chairs.

There is now increasing recognition that the ‘state’ versus ‘non-state’ debate is a theoretical red herring (Heap, 1996). If role-play creates dissociated personae, it seems more reasonable to regard the hypnotized condition as both dissociated and a pretence. ‘Wholly-believed-in role-play’, which characterizes so much of our enculturated behaviour, is now a widely accepted definition of hypnotized behaviour (Oakley, pers. comm).

**Subliminal signals and hypnosis**

Below the overt level of gesture-calls, which we generally perceive consciously, there is a subliminal system of microsignals which mediate rapport. Heart rate, respiratory rate, pupil diameter, lip pallor, skin conductivity, galvanic muscle response - just about anything a physiologist can think of measuring - tend to converge in two or more people who are engaged in free-flowing co-action (Brown, 1991). Physiological rapport may be the pre-representational basis of social mirroring, even more primitive than visuo-kinaesthetic matching. Song-and-dance especially would seem to have considerable potential to amplify rapport and generate coherent intentional and affective states in large groups.
An important mechanism subserving rapport is *daydreaming*. Daydream episodes tend to follow a regular ultradian rhythm, with a period of around ninety minutes, which appears to be the waking continuation of our REM sleep cycle (Brown, 1991; Laughlin et al., 1992). The daydream cycle coincides with the so-called ‘chat cycle’ which develops in free-ranging social conversation: recurring periods of heightened rapport and creative social engagement (Brown, 1991).

Rapport is essential to hypnotic induction, and *suggestibility*, defining characteristic of hypnotic trance, might be regarded as ‘epistemological rapport’. The ‘taken for granted’ way in which culturally transmitted world-views are accepted (Bourdieu, 1972) reflects the power of human suggestibility: we might say that suggestibility is to culture what copying fidelity is to genes. An involuntary tendency to see the world as others see it has sobering implications for human epistemology, and is a remarkable adaptation. Credulity, from a sociobiological point of view, is a mug’s game unless social trust is securely rooted in common interest or reliable sanctions for abuse.

From a comprehensive literature survey, Ludwig (1969) concludes that hypersuggestibility is a common feature of ‘altered states of consciousness’ (ASCs), regardless of their aetiology. The ubiquity of ASCs worldwide led Ludwig to conclude they must serve some core function in human behaviour. Play itself might be regarded as an ASC (and vice versa).

The youngest age at which children have been successfully hypnotized is four years (Bliss, 1986), the age by which ‘theory of mind’ is usually established. Hypnotic ability, as measured by standard rating scales in western subjects, increases from age four to reach a maximum around puberty (Oakley et al, 1996). At this time the brain
is approaching adult size (Tanner, 1992) and role-playing ability well established. There follows a gradual decline, which may reflect western suspicion of ASCs and role-playing generally (Laughlin et al., 1992). In many human societies, the time chosen for initiation rituals and enculturation into adult life falls around the age of puberty, the end of childhood, when suggestibility is likely to be maximal.

Role-play, like hypnosis, can achieve hallucinatory force, as in cases of imaginary childhood playmates, multiple personality disorder, and psychosis (Bliss, 1986). Sue Jennings (1997), whose experience bridges field anthropology and dramatherapy with offender patients, argues that human beings live in two realities - 'everyday reality' and 'dramatic reality'. Whereas artists and children avoid confusing these two, psychotic persons remain trapped in the make-believe world. Those with social impairments such as autism, on the other hand, are incapable of dramatic engagement, and remain trapped in the 'everyday' world, which effectively excludes them from normal human sociality.

Role performance, like hypnosis, also has physiological depth. Jennings (1995) notes that an actor who goes down with 'flu can walk on stage 'in character', entirely symptom free, only to relapse when the performance is over. This seems to parallel the ability of alternate personalities in MPD to exhibit different medical syndromes or drug responses (Castillo, 1994), the power of suggestion to control chronic conditions such as cancer and arthritis (Brown, 1991), and the therapeutic efficacy of placebos. Role-play seems to involve whole-system modelling of imagined persons, right down to the level of the immune system.

It seems that in role-play and hypnosis each persona acquires whole-system control of the brain and body, even including the immune system. As song and dance
enables whole system convergence between individuals, so role-play enables whole-
system construction of alternative *persona*. Since song-and-dance enables us to 'put
ourselves in others' shoes', this is a further reason to regard it as an evolutionary
precursor to role-play.

**SUMMARY AND CONCLUSION**

Human culture consists in wholly-believed-in make-believe and wholly-believed-in
role-play (economico-moral *persona*), sustained by implicit forms of social mirroring
which generate rapport. Rapport predisposes us to believe what others believe, and
human suggestibility has the power to turn make-believe into make-belief. Young
children unquestioningly accept what adults tell them about Father Christmas and the
Tooth Fairy, until told otherwise, or until they catch a parent in the act of deception.
Where everyone engages in the same life-long game, there is no easily discovered
reference point for 'reality'.

We are pre-adapted for enculturation by a formidable armamentarium of social
mirrors, suggesting at least three 'rubicons' during hominid evolution, with play and
performance in one mode probably establishing the preconditions for the emergence of
communication in the next.

In the remaining chapters of this essay I will build the case for a 'play and
display' hypothesis of hominid brain expansion. I will begin by examining what is
currently known about the social brain (Chapter 4), and then present my own research
on role-play (Chapter 5). The last two chapters (6 and 7) will explore the fossil and
archaeological records of hominid and cultural evolution.
PART 2

SOCIAL MIRRORS AND THE BRAIN
Chapter 4. The Social Brain

The human brain is about three times larger than that of a chimpanzee. Brains are physiologically and metabolically expensive (Aiello & Wheeler, 1995). The human brain represents a mere 2% of our total body mass, but receives 25% of the oxygenated blood pumped out of the left ventricle, and accounts for 20% of our total energy consumption. Such high costs must be recompensed by specific benefits.

WHY WE HAVE LARGE BRAINS

‘Intelligence’ and language

The assumption that ‘intelligence’ is our most distinctive accomplishment, and the reason we have large brains, has proved remarkably obstinate in the face of contrary evidence. As long ago as 1884, Sir Francis Galton, in a study of 9,000 visitors to the London Exhibition, showed, to his great disappointment, that eminent British scientists could not be distinguished from ordinary citizens on the basis of head size (Atkinson et al, 1993: 458). The wide variation in contemporary human brain volume shows no correlation with standard measures of intelligence (Walker, 1993). Hydrocephalic individuals with significantly reduced neocortical volumes may have high intelligence quotients, and even microcephalic dwarves can achieve good language competence (ibid).

Lesions in prefrontal and parietal cortices (the areas most expanded in humans) do not impair ‘intelligence’ as measured by formal tests (Lishman, 1998). Linear reasoning (the usual IQ measure) involves relatively small areas, mainly in the left temporal lobe (Gazzaniga & Smylie, 1984; Gazzaniga, 1985), and in split brain
patients, the IQ of the isolated left cerebral hemisphere is no less than that of the previously intact brain (Gazzaniga, 1985). Language also utilizes relatively small areas of the left hemisphere. Because of its association with language and linear intelligence, the left hemisphere is traditionally thought of as 'dominant', and yet the prefrontal lobe (generally credited with 'higher executive functions') is larger on the right than the left.

Although the right hemisphere, overall, is slightly smaller than the left, with less grey matter (fewer neurones), there is relatively more white matter (more connections per neurone). Left hemisphere neurones tend to have many short local interconnections, but the right has many more long axons and comprehensive interconnectivity (Atkinson et al, 1993). The right hemisphere has been shown to be more effective in solving 'holistic' tasks such as shape and pattern detection (Donald, 1991).

The global difference in bulk between left and right cerebral hemispheres is complicated by a number of 'petalias' (areas of local enlargement in one hemisphere relative to the other). The central fissure, which divides the two cerebral hemispheres, is slightly 'S' shaped in humans, reflecting right fronto-, left parieto-, and left occipito-petalias. The very existence of petalias tells us that brain expansion is never profligate: expensive brain tissue always has to earn its keep.

**Play and display**

Much of our assumed intelligence depends on performance and sociocultural support. Without embodied performance (learning to count on our fingers, chanting multiplication tables, etc.) and cultural aids to thought (denotational codes,
mathematical procedures, writing materials, etc.), our adult capacity for internalised mental operations would be severely constrained (Donald, 1991). The mathematician Giuseppe Longo (1999) has argued that the whole of mathematics, even highly abstract ideas such as infinity and imaginary numbers, can be reduced to motor actions such as grasping. We have to act before we can think, and play and performance are likely to have been major factors in human brain expansion.

Cognitive neuroscience, developing rapidly since the sixties, has tended to focus on fairly rudimentary functions such as we share with other animals, and invasive methodologies have been confined almost exclusively to animals. Where uniquely human abilities have been investigated, there has been a predictable emphasis on language and reasoning, and even music studies have tended to reflect logocentric and cognocentric assumptions. The burgeoning interest in the social brain is relatively recent.

Consequently, the cognitive and brain sciences do not as yet provide any explanation for such comprehensive brain expansion as has occurred during human evolution (Deacon, 1992). Why do we humans, relative to chimpanzees, have twice as much visual cortex? Is our vision so much sharper or more complex? Do I need three times more grasping cortex than an ape just to eat a banana? Few of the expanded areas have anything much to do with ‘cognition’ in the narrow (knowledge related) sense of the term.

Comprehensive brain expansion implies a comprehensive increase in behavioural complexity. Relative to other apes, our brains are as massively expanded as our armamentarium of social displays. If our brains are so large, it would seem reasonable to assume that their size is in part an adaptation to what we do best - social display. In particular, play and performance, rather than communication, would seem
likely to contribute most to brain expansion. There are at least four reasons why this should be so:

1. Multi-modal control and feedback demands are greater in performative display than in communication. Synchronised song-and-dance, for example, requires fine muscle control of multiple independent sets of muscles, along with equally detailed proprioceptive, auditory, and visual feedback. Leslie Aiello (1996) has pointed out that bipedalism alone would be expected to lead to some brain expansion, because it involves independent coordination of arms, hands, legs, and feet, which is not necessary in quadrupedal locomotion. Role-play itself depends on finely detailed psychomotor and psychosomatic coordination, which probably could not have evolved without preadaptation by song-and-dance.

2. A second factor is timing precision. Calvin (1983) has shown that the 'release window' involved in throwing a missile at a target, which is much shorter than the firing time of an individual neurone, calls for massive neuronal 'redundancy' to achieve the necessary precision. Large brains may permit high timing precision with slow-firing neurones, by exploiting the statistical accuracy of large numbers. Chimpanzees lack our ability to aim missiles successfully at a target, according to Calvin, because their brains are not big enough. Calvin suggests that selection pressure for skilled aiming of missiles would favour general brain expansion, because any overall increase in size would also increase the appropriate motor areas. But the existence of brain asymmetries does not support a hypothesis of prodigal expansion. Performative display, in contrast to aiming missiles, involves multiple brain areas.
Richman (1978) showed that the synchronization of voices in the choral displays of gelada baboons also involves greater timing precision than the firing times of individual neurones. He inferred that individuals must be predicting the vocalizations of others. Geladas do not have notably large brains relative to other baboons (we would expect song to lead only to expansions of structures analogous to Broca’s, Wernicke’s, and other ‘speech’ areas). In the case of human performance, that of a concert pianist for example, the subtleties of rhythm, rubato, and the characteristic ‘pulse’ which distinguishes the work of individual western composers (Clines, 1977; Brown 1991: 48), demands fine timing abilities not only in the performer, but also the listener. Musical appreciation itself involves subliminal or imagined dance-like body movements, involving all the motor cortices (Storr, 1993). Human song-and-dance, unlike gelada song, is a whole-body affair.

It is perhaps no coincidence that dolphins, whose balletic displays also involve fine timing precision, also have very large brains. Relative to their body mass (ignoring blubber weight), they may be more highly encephalized than we are (Robin Dubar, in a UCL seminar; cf. Marino, 1996).

3. A third factor of likely relevance to brain expansion is performative skill. According to one brain-mapping study of 'cello players, the cortical representations of the fingers of the left hand were larger than those of the right, and this difference correlated with the age at which the person had begun to play (Elbert et al, 1995). A further study, at the Wellcome Department of Imaging Neuroscience, examined the effects of skilled movements in trained volunteers (Karni et al, 1995). After three weeks of 10 to 20 minutes daily practice, the increased speed and accuracy of a simple
finger-tapping task approached its maximum. In contrast to a matched but unpractised sequence, this increased skill was accompanied by an expanded representation in primary motor cortex (M1). The increased signal, as measured by pixels above threshold, was around 25%, and this included a population of pixels which hardly responded during the control task (i.e. the representation in M1 was increased in area, not just level of activation). The results were consistent with findings in the monkey relating to both motor and perceptual skill learning. Human agility seems to be as dependent on brain size as on body-plan. Our capacity for acquiring an extraordinary range of motor and perceptual skills, as evidenced by athletic as well as ‘artistic’ and technological performance, is a striking feature of human versatility.

4. Role-play and ‘theatre of mind’ involve discrete whole-system mind and body representations of multiple personae. To process multiple mind/body representations in parallel would presumably require comprehensive expansions of many brain structures (sensory, motor, executive, etc). This ‘chimerical brain’ hypothesis is consistent with experimental data suggesting multiple dissociated self-representations to human minds (Oakley & Eames, 1985; E.R. Hilgard, 1986; Bliss, 1986; Laughlin et al, 1992; Mitchell, 1994), and with whole-body phenomena associated with role-play. Complex physiological changes, for example, including effects on symptoms of disease, the immune system, pharmacological responses, and remission of chronic clinical conditions, have been variously associated with theatrical performance, hypnotic states, visualization therapies, and dissociative identity disorder (E.R. Hilgard et al, 1975; Bliss, 1986; Olness, 1986; Littlewood & Lipsedge, 1989; Ioannou, 1991; Castillo, 1994; Littlewood, 1998; Jennings, 1991, 1994). At the very least, role-play, and
pretend play more generally, requires the metacognitive ability to represent representations.

These four factors probably or possibly associated with play and performative display -

1. Complex multimodal integration
2. Timing precision
3. Skill
4. Multiple personae

- would seem to be less critically necessary for communication per se. The body movements associated with affective gesture-calls are generally less complex and require less timing precision and skill than dance movements. Iconic gestures, often primarily manual, likewise seem less demanding than dance and role-play.

Adaptations conventionally attributed to communication seem more specialized for performance. For example, the tonal range of speech (roughly a musical fifth) grossly under-employs our highly tunable pharynx (with a tonal range of at least two octaves, and two or more 'registers' or 'gear shifts' in intensity and pitch: Doscher, 1994). The human pharynx resembles an analogical musical instrument, with infinitely variable pitch, rather than an adaptation for digital speech.

Digital coding even seems likely to lead to a reduction rather than an increase in brain size. Processing pitch, as an aspect of prosodic intonation, demands more neocortical activity than processing semantics and syntax (Brown, 1991). A mapping study discussed below demonstrates that deaf-dumb signing - which appears to be more
analogical than speech - engages considerably more neocortex. The remarkable
command of spoken English demonstrated by Alex, the Congo grey parrot
(Pepperberg, 1999), will hopefully help to speed the overdue demise of the
logoparadigm.

The above considerations support the hypothesis that 'play and display' were
significant factors in hominid brain expansion, and do not support the hypothesis that
language and 'general intelligence' (or tool making, hunting skills, etc.) were equally
or more important. Language might even be expected to lead to a reduction in brain
size.

AREAS OF NEOCORTICAL EXPANSION

As recently as 1992, Terence Deacon could write:

Changes in the brain give intriguing clues about the nature and uniqueness of
human intelligence. They suggest that the human brain has been shaped by
evolutionary processes that elaborated the capacities needed for language, and
not just by a general demand for greater intelligence.

Here we have cognocentrism and logocentrism in a single sentence. Yet this comment
concludes a discussion of the human brain which points in many other directions.

Brain expansion during human evolution has not been uniform. Using figures
presented by Deacon, we can estimate the absolute expansions of human relative to
chimpanzee cortical areas (Figure 4.1, Table 4.1). Note the way that Deacon presents
his data. Creating a monster - a 'typical primate' with a human-sized brain - gives the
impression that sensorimotor cortices have been universally reduced in size, and
suggests that the huge increase in the prefrontal lobe represents passive colonization of
Figure 4.1. Areas of differential expansion of human neocortex

Table 4.1. Areas of expansion of human relative to chimpanzee neocortex

<table>
<thead>
<tr>
<th>Area</th>
<th>% predicted size for a 'typical primate' with a human-sized brain</th>
<th>Expansion assuming (100 = 3X)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary cortices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Olfactory</td>
<td>32</td>
<td>0.96 X</td>
</tr>
<tr>
<td>Visual</td>
<td>33</td>
<td>1.00 X</td>
</tr>
<tr>
<td>Motor</td>
<td>35</td>
<td>1.05 X</td>
</tr>
<tr>
<td>Somatosensory</td>
<td>35?</td>
<td>1.05 X</td>
</tr>
<tr>
<td>Auditory</td>
<td>106</td>
<td>3.18 X</td>
</tr>
<tr>
<td>Secondary cortices</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual</td>
<td>73</td>
<td>2.20 X</td>
</tr>
<tr>
<td>Premotor</td>
<td>77</td>
<td>2.31 X</td>
</tr>
<tr>
<td>Somatosensory? (anterior supramarginal gyrus)</td>
<td>91</td>
<td>2.73 X</td>
</tr>
<tr>
<td>Auditory</td>
<td>117</td>
<td>3.51 X</td>
</tr>
<tr>
<td>Major expansions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prefrontal</td>
<td>202</td>
<td>6.06 X</td>
</tr>
<tr>
<td>Inferior parietal</td>
<td>?</td>
<td>?</td>
</tr>
<tr>
<td>Other temporal areas</td>
<td>?</td>
<td>?</td>
</tr>
</tbody>
</table>

Table 4.1. Areas of expansion of human relative to chimpanzee neocortex
space ‘vacated’ by the shrinking sensorimotor cortices. Only in this way can he make
language-related expansions appear to be the dominant change, as suggested in his conclusion.

**Primary cortices**

Deacon’s figures actually imply that *primary* motor and sensory areas have changed
little over the past five million years - the olfactory bulb has even slightly decreased in size. The only exception is auditory cortex, which is more than three times larger than that of a chimp, and presumably reflects more complex use of the vocal/auditory channel. No figure is given for motor areas controlling the vocal organs but we might assume a similar expansion here too. There is no *a priori* reason to attribute vocal/auditory expansions exclusively to speech, and this would ignore the many theoretical and evidential grounds for assuming a late date for the emergence of language. The early appearance of an enlarged Broca’s area in *Homo habilis* (Tobias, 1987) is more plausibly explained by the evolution of song.

**Secondary areas**

When we turn to secondary association areas a different picture emerges. Auditory association cortex is expanded, but little more than primary auditory cortex (Deacon includes Broca’s area in the ‘prefrontal’, potentially exaggerating the expansion of this classical motor speech area). But secondary sensorimotor cortices have more than doubled in size. So the bias towards auditory expansion is less extreme here; sensory and motor areas are more equally expanded.
Major expansions

All the above expansions and non-expansions cannot account for the overall three times greater brain volumes of humans relative to chimpanzees. Unfortunately, the allometric scaling studies from which Deacon has derived his data tell us little about the cortical areas which account for the bulk of human brain expansion, with the exception of prefrontal cortex, which is more than six times larger than that of our nearest relative.

'The impressive advance' in human brain organization is expansion of the inferior parietal lobule - including the angular gyrus and surrounding structures (Geschwind, 1967). The reason Deacon does not give a specific figure for this area is probably because the angular gyrus itself does not have an established homologue in ape and monkey brains: it appears to be a true human autapomorphy (i.e. a feature uniquely developed in the human ancestral line).

As I hope to make clear below, the pattern of changes implied by the anatomy of the modern human brain is consistent with a 'play and display' hypothesis. It is not consistent with the cognocentric and logocentric views espoused by Deacon and others.

CURRENT VIEWS OF THE SOCIAL BRAIN

Two discoveries have alerted neuroscientists to the importance of social factors in human mentation: the severe social deficits which commonly follow injuries to the prefrontal lobe (Damasio, 1994), and the social impairments associated with autism (Wimmer & Perner, 1983). So far, no clear links have been established between the social problems of autistic people and specific malfunctions in the brain, but there are
suggestive findings implicating the amygdala (Adolphs, Tranel & Damasio, 1998; Adolphs, 1999) and ventromedial prefrontal cortex (Baron-Cohen et al, 1994; Gallagher, n.d.).

However, anthropologically relevant neuroscience is still in its infancy. A recent review of "Social cognition and the human brain" (Adolphs, 1999) tells us that:

Humans are exceedingly social animals, but the neural underpinnings of social cognition and behaviour are not well understood. Studies in humans and other primates have pointed to several structures that play a key role in guiding social behaviours: the amygdala, ventromedial frontal cortices, and right somatosensory-related cortex, among others.

Briefly, the areas reviewed by Adolphs are:

1. Temporal lobes and amygdalae

Kluver and Bucy (1939) showed that large bilateral lesions in monkey brains, encompassing amygdala, temporal neocortex, and surrounding structures, led to 'psychic blindness'. Affected animals could still perceive and respond to objects, but lost the ability to respond appropriately to their emotional significance (handling snakes, for example). More selective neurotoxic lesions suggested that the amygdala was disproportionately involved in responses elicited by social cues (Zola-Morgan et al, 1991; Meunier et al, 1996; Emery et al, 1998).

Neurophysiological studies showed that single neurones in monkey inferotemporal cortex respond relatively selectively to the sight of faces (Perrett et al, 1982). Further, there are specific neurones which respond preferentially to specific facial information - their identity, social status, emotional expression, direction of
Other neurones respond to complex scenes of social interaction (Brothers et al, 1990; Brothers & Ring, 1993).

In humans, numerous temporal areas have been linked to facial processing. For example, visual loci within the fusiform gyrus appear to contribute to the perception of faces (Kanwisher et al, 1997). Viewing facial movements that convey socially relevant information (such as movements of the eyes and mouth) activates loci in the superior temporal sulcus (Puce et al, 1998).

A small proportion of neurones within the amygdala, which is richly interconnected with ventromedial prefrontal cortex (Damasio, 1994) as well as ‘high-level’ temporal visual areas (Amaral et al, 1992), are also involved in processing socially salient information from faces, and specifically agonistic emotions such as anger and fear. Although classically associated with responses to threat and danger, the amygdala has been shown to be also involved in pleasurably arousing stimuli, including ‘non-social’ (sic) aesthetic responses to colour patterns and landscapes. In one such study, patients with amygdala damage liked pictures with non-social content more than did control subjects (Adolphs & Tranel, 1999). Individuals with complete bilateral amygdala damage tend to be unusually friendly and inappropriately trusting towards others (Adolphs, Tranel & Damasio, 1998). Such patients, however, appear to be less socially impaired than monkeys with comparable lesions, suggesting that human brains provide a greater range of strategic options for social responses (Adolphs et al, 1995a).
2. Frontal lobes

Prefrontal cortices are of crucial importance in reading the emotional and social significance of stimuli and perceptions. Specifically, ventromedial prefrontal cortex is involved in value judgements, social persona, empathy, moral concern for others, and learning social rules (Damasio, 1994; Anderson et al, 1999). This area, together with right dorsolateral prefrontal cortex, was activated in the study of role-play described in the next chapter, and will be discussed more fully there.

3. Parietal lobes

Right somatosensory cortices (S-I, S-II, and insula) are not only involved in representing one’s own somatic body states, but also in reconstructing the body states of other individuals from their facial expressions (Adolphs et al, 1996a, 1996b).

This rather short list of brain areas treated as social by Adolphs has two major emphases. The discussion of prefrontal cortices, which I have deferred to Chapter 5, contains a great deal of important data relating to social personae. The rest of the review is dominated by the visual processing of facial information, and the extracting of potentially momentous social information from subtle cues in exemplars which are highly similar to each other. This feat appears to depend on numerous highly specific modules, processing different aspects of facial data, and distributed throughout the temporal lobes, the amygdalae, and right somatosensory cortex.
TOWARDS A BROADER CONCEPT OF THE SOCIAL BRAIN

Cognition and behaviour

Adolphs does mention the social brain hypothesis (citing Dunbar, 1998) and the likelihood that brain expansion in primates, including humans, reflects a selective premium on social skills. The hypothesis implies that any human brain areas expanded relative to those of apes, monkeys, and even other mammals, are likely to have social significance. But when Adolphs turns to the specific neural systems that subserve sociality, his account is constrained not only by the limitations of current brain research, but also by his concept of ‘cognition’. He does not discuss secondary sensorimotor cortices other than visual, nor the dramatically expanded inferior parietal lobules. He does not mention music, song, or dance. Representational art is described as ‘non-social’. Most surprisingly, his list of social brain structures does not include classical language areas. Whilst this makes a refreshing change from the usual logocentrism, it seems curious to regard language as non-social. Adolphs even asks:

How critical is language to social cognition? Is it possible that language evolved primarily to subserve social behavior?

The question reveals the difference between cognitivist and social-mirroring approaches to the brain. Cognitivism tends to assume that ‘cognition’ is primary and non-social, whereas ‘social cognition’ is something added on afterwards. Language is thought of as a ‘cognitive’ development, an aid to private rationality rather than public reflectivity, somehow created ex vacuo within the brain/mind, and subsequently projected into the social domain where it just happens to be understood by everyone else (cf. Burling, 1993, on ‘private language’). Cognition is also thought of as prior to
behaviour. This is the classic input processing output model of cognition.

A social mirror approach puts all this the other way round. In social mirror theory, behaviour ('output' in the classic model) provides the 'input' on which reflective awareness depends. Any subsequent expansions of brain areas which subserve reflective functions such as planning and reasoning therefore have a social origin, and the resulting powers of reason continue to depend on and subserve socially shared experience and knowledge. It is only when knowledge is public that we can have context-independent memory and reflective access to our own knowledge. Society is a precondition for 'cognition' in the classic knowing-and-reasoning sense.

Behaviour is continuous with physiology: both serve to maintain homeostasis under fluctuating environmental conditions. In this sense, even the most basic physiology is 'intelligent' - it responds appropriately to environmental change, challenge, and opportunity - and it is impossible to say exactly at what point physiology becomes behaviour, and responsiveness becomes cognition. However, sensory organs could not evolve in a non-motile animal, and would serve no function unless there is a circular relationship between sensation and movement. Behaviour (output) has to be older than sensation (input) and cognition (processing). We have to act before we can think, in an evolutionary as well as a developmental sense.

The inadequacy of the input → processing → output model was pointed out more than a hundred years ago by John Dewey. Even a simple reflex arc, classically defined, is just one half of a circular process: "because the motor response determines the stimulus, just as truly as sensory stimulus determines movement" (Dewey, 1896: 363). The circle is not complete until we add the other half, the internal control half: 'output → processing → input'. So, for example, if I eat a meal (behavioural output),

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digestion begins (processing in the body), and my feelings of hunger give way to satiation (input). The function of behaviour is to *change the input* (Cisek, 1999).

More embodied accounts of cognition emphasize the primacy of behaviour over cognition (reviews: *JCS*, 1999).

**Motor aspects of cognition**

Einstein once said "I think with my muscles", presumably implying some kind of 'theatre of mind'. He arrived at his theory of relativity by imagining himself riding astride a ray of light, travelling away from a clock, and realizing that the hands of the clock would appear frozen in time to an observer in such a position. Imagined movements, just like real movements, activate relevant motor areas of the brain: for example, imagined speech, or simply reading a text, involves Broca's area (Neville et al, in press). The close apposition of motor and somatosensory cortices in the brain is functionally significant. Our sense of volitional control over our own movements depends on checking 'efferent copy' of motor commands against 'afferent' feedback. The illusion of alien control, common in schizophrenic patients, probably results from faulty self-monitoring of motor commands and feedback (Frith, 2000). There is other evidence implicating motor cortices in cognition. For example, our concepts of space are first constructed in premotor cortex (Rizzolatti et al, 1997).

Adolphs, in a boxed inset, mentions VKM (visuo-kinaesthetic matching), the abilities of human babies to mimic facial expressions (Meltzoff & Moore, 1977), and 'mirror neurons' in the ventral premotor cortex (area F5: Gallese & Goldman, 1999). Matching representations of self- and other-behaviour (VKM) is surely a 'cognitive' function, and mirror neurones imply the involvement of motor cortex. Motor
sequencing (e.g. for speech) could equally be regarded as ‘cognitive’, and if the perception of facial expressions is socially important, so is the motor control of facial expressions. Yet Adolphs does not include any motor areas in his account of ‘social cognition’.

Graziano and Gross (1998) have shown that neurones in the ventral premotor cortex of macaques encode the locations of visual, tactile, auditory, and remembered stimuli. Different neurones encode spatial locations of stimuli in relation to different parts of the body - the arms, the head, and so on - and may be useful for coordinating the movements of these different body parts. So, for example, when you swivel in your chair, take a book from a shelf, and avoid knocking over your coffee with your elbow, various parts of your body follow distinct trajectories in a smooth and coordinated manner. Multiple maps with body-centred coordinates appear to be the brain’s way of solving this kind of problem. Furthermore, actions requiring spatial maps with body-part centred coordinates also involve a mosaic of areas in the inferior parietal lobule, and the specific premotor areas with which they richly interconnect (Rizzolatti et al, 1997).

The point here is that motor behaviour cannot be regarded as separable from perception, sensation, memory, etc. These functions are represented in motor cortex and, conversely, sensory and perceptual cortices are directly involved in potential motor action. The most sophisticated motor behaviours in contemporary humans include field games, gymnastics, synchronised dance, musical performance, and role-play. These social behaviours, especially dance, music, and role-play, implicate all the cortices expanded in humans, including those omitted by Adolphs - premotor, parietal, and auditory.
George Herbert Mead (1934) argued that even perception is social, because it involves the simultaneous construction of *other bodies* and *my body* on the basis of resistance to muscular effort. It is now well accepted that visual perception is learned by embodied exploratory behaviour, and the construction of 'object hypotheses' based on feedback through all sensory modalities (Gregory, 1966, 1970). If so, we could say that everything we perceive is modelled *on* past motor output and associated feedback, and is modelled *for* motor output and desired feedback now and in the future.

The French philosopher Henri Bergson (1896) argued that all perception is 'virtual action'. That is, we create objects in the world, defined by our own biological needs - by what we can do with them, or need to do to avoid them. Thus, the objects and events of the perceived world are mirrors of the action potentials of our own bodies (Robbins, 2000). One intriguing neurological finding lends particular support to Bergson's theory: blindness can result simply from severing connections between visual and motor areas of the brain (Nakamura & Mishkin, 1980, 1982).

Bergson's thesis finds a more modern parallel in James Gibson's (1979) 'ecological psychology'. Gibson took as his founding premise that organisms and environments cannot be understood without reference to each other. In this way, he replaces subject/object *dualism* with organism/environment *duality*. Environments are both 'subjective' and 'objective' because they relate to organisms in terms of *affordances*. For example, a hole in the ground is objectively real, but its affordances are subjective - to a mouse, it affords potential shelter; to a cat, a potential source of mice. So, for Gibson, as for Bergson, environments are perceived in terms of potential action. Organisms are both subjective and objective for similar reasons, because they define themselves in contrast to environmental affordances.
Gibson's thinking contributed to a growing dissatisfaction with the computer model of cognition. By abolishing the dualism of mind and body, he encouraged more embodied approaches in cognitive science. Both perception and cognition might be better understood as 'virtual action'. According to this view, such taken-for-granted realities as 'categories', 'concepts', and 'representations', as static schemata, are illusory (Rosch, 1999). Rather, we have dynamic processes that are in continual flux, are grounded in motor intentions and embodied experience, and have almost incalculably vast complexities of reference. A problem recognised in artificial intelligence research is that computers cannot solve quite simple pragmatic problems, because it is impossible to specify all the taken-for-granted human assumptions. For example, when you order a pizza from your local home-delivery service, you do not have to specify that it should not be drenched in kerosene, encased in teflon, or ten miles long.

This relates to the 'frame problem' (McCarthy & Hayes, 1969) or 'symbol grounding problem' (Harnad, 1990) in artificial intelligence (AI) theory. AI researchers are perplexed by the curious fact that computers, though they can handle strings of 'symbols' with superhuman speed and even provide rational answers to verbal questions, cannot in any sense be held to know what the symbols mean (Cisek, 1999). The problem arises from the circular relationship between cognitivism and AI research: cognitive scientists think of the brain as a computer, and AI researchers use computers to model the brain. But computers, unlike brains, do not come in bodies. They do not fall off sofas and bang their heads; they do not experience pleasure and pain; and they cannot develop human commonsense. Embodied experience creates meanings for human beings, long before 'symbols' can be used to represent them (Gibson, 1979). Disembodied computers cannot know the experiential meanings of the symbols they
use, because they do not have the experiences which the symbols refer to.

The move away from the computer paradigm towards a more embodied understanding of cognition looks to me like a welcome step in the right direction. However, it still falls short of social mirror theory. Cognitive scientists are restoring the body to its proper place in cognition, but it is still the western individualistic body. They fail to perceive that embodied human behaviour is spectacularly different from that of other apes, and I mean literally spectacular: a great deal of human behaviour is intended to be seen. To the extent that embodied behaviour and experience are social, then so is cognition, even including perception.

**Social and non-social perception**

Francis Crick and Cristoph Koch (1995), who are attempting to unravel the problem of human consciousness by studying the processes of visual perception, have adopted a somewhat Bergsonian view - consciousness as virtual action. They suggest that, for any process to be conscious, it must have direct output to motor areas of the brain.

However, this cannot be a sufficient condition for consciousness, because primate brains have two functionally specialized visual pathways: the dorsal and ventral 'visual streams'. In normal humans, the ventral stream is associated with conscious visual experience, whereas the dorsal stream is not. Further (contra Crick and Koch), it is the unconscious dorsal stream which is most directly involved in motor control (Milner & Goodale, 1995). Conventionally, the two visual streams have been interpreted as processing the 'what' and 'where' of visual perception (Ungerleider & Haxby, 1994). The (conscious) ventral stream enables us to recognise objects and faces, name them, describe how they are used, and so on; whereas the (generally
unconscious) dorsal stream enables us to reach out and grasp objects or navigate obstacles.

Lesions affecting the ventral visual stream, but leaving other visual cortices intact, result in ‘blindsight’. Patients with blindsight report no subjective visual experience: they are experientially ‘blind’. Yet, in many respects, they behave as though they can see. They can negotiate a room without bumping into the furniture, align a card appropriately to post it through a vertical or horizontal slot, catch a ball when it is thrown to them, and correctly ‘guess’ the positions of objects when questioned (Milner & Goodale, 1995: ch. 5). These navigational functions depend on the undamaged dorsal stream, and it is this discovery that revealed the unconscious nature of dorsal vision.

Damage to the dorsal visual pathway leads to optic ataxia, which is the functional inverse of blindsight. The patient reports normal visual experience, but is extremely inept at reaching for objects, grasping them, and negotiating obstacles (Gazzaniga, 1998: 109).

The phenomena of blindsight and optic ataxia are not consistent with the ‘what’ and ‘where’ interpretation of the two visual functions. A.D. Milner (1998) and Goodale (1993; 1998; et al, 1991; Goodale & Milner, 1992) propose a new interpretation. They suggest that the dorsal stream perceives the world from an egocentric perspective, necessary for navigation and visually guided movement, whereas the ventral stream perceives the world in more universalized terms - as it ‘really is’. They point out that, as we move, the image of a rectangular table constantly changes shape and position on our retinas, but we consciously perceive it as stationary and rectangular. This universalised view is the result of ventral processing.
The logical need for two systems may be illustrated by the example of a televised car chase. Our ventral system allows us to see what is ‘really’ happening out there beyond the camera: it sees the car as moving against a stationary background, and allows us to understand the movie. But the dorsal system gives us the situation relative to ourselves: the image of the car is stationary on the screen, whilst the landscape is rushing past. This is necessary for hand-eye coordination: if you want to place your finger on the image of the car, you can do so unerringly, because the dorsal system is not ‘fooled’ by the illusion of movement (Goodale, 1998).

The same applies to other optical illusions. In the ‘Titchener circles’ illusion, there are two disks of identical size. One is surrounded by a circle of much smaller disks, the other by a circle of much larger disks. The first appears larger than the second, because ventral processing constructs a ‘hypothesis’ based on visual relationships. However, if we move to pick up either of the disks, our fingers align to the correct diameter, regardless of whether the disk appears larger or smaller (Milner & Goodale, 1995). The dorsal stream is not fooled by optical illusions, because it perceives space in ego-centric coordinates, and does not go in for universalizing ‘grand theories’.

Goodale (1998) comments that, if all vision were ego-centric, television would be impossible. We might add that all social life would be impossible too. I think it is significant that autistic children, who are excluded from a normal social world, are also not fooled by optical illusions (Happé, 1996). It would seem that, in these children, dorsal and ventral visual processes are equally unreflective. As already mentioned, autistic prodigies draw with perfect perspective and foreshortening, and this suggests unconscious dorsal processing. Two-year-olds with normal sociality are
constrained to use the more public vision of the ventral stream. Hence they draw idiographic 'universal theories' of people and objects. Autistic prodigies, with no interest in showing their work to others, prefer their own ego-centric viewpoint. The method of drawing in perspective from a central viewpoint, invented by Brunelleschi in the early 15th century (Chilvers et al, 1988: 379), may well have depended on the prior invention of the camera obscura. Such a device creates a public 'mirror', making perspective and foreshortening available to reflective awareness. Self-conscious social beings may need to invent a camera in order to see like a camera.

Social mirror theory predicts that what is not public cannot be reflectively conscious. The ventral stream perceives the world in universal terms that can be experientially shared. The finding that ventral vision is conscious, whereas dorsal vision is not, is consistent with the theory. Autistic children, who do not participate in shared visual experience through art or even proto-declarative pointing (Baron-Cohen et al, 1996), would not be expected to be visually conscious. That is, they may be visually aware, but they are not aware that they are aware.

An illuminating case may be that of the Kwaio in the Solomon Islands, who use the same colour term to refer to 'blue' and 'black' (Keesing, 1981). Traditionally, they paint their houses black, but when offered some blue paint by the ethnographer, they used this indifferently for house painting, applying a patchwork of 'blue' and 'black'. When asked to explain why, they denied this was the case, asserting that the houses were uniformly and beautifully 'black'. I have no doubt that the Kwaio are aware of the sensations that we call 'blue' and 'black', but they do not appear to know this. What is not public is not conscious.

Christoph Koch (2000), in the discussion concluding the conference Toward a
Science of Consciousness: Tucson 2000, noted that some brain processes are associated with conscious experience, and others are not. There was general agreement that we still do not know why this should be so. But if social mirror theory is correct, we can suggest a simple rule of thumb: only socially useful processes are conscious.

According to Goodale (1998), our deepest ontological intuition - that there is a world out there which persists independently of ourselves - derives from universalizing processes. Since blind people share this intuition, it would seem that non-visual conscious processes also universalize.

There is a moral here for social anthropology. A direct parallel can be drawn between the dorsal/ventral visual streams, and emic/etic approaches in ethnography. An emic approach is ethnocentric, as the dorsal stream is ego-centric. With no social mirror outside itself, an emic approach cannot achieve the metacultural insight which is the ultimate aim of science. This is not to deny the need for ‘emic processing’. To be a good participant observer and avoid colliding with local sensibilities, an emic understanding is essential, just as dorsal vision is essential to navigation. But when sorting ‘data’ from ‘noise’, when making sense of field experience, and when reporting for the benefit of others, only an etic account is accessible to public scrutiny and debate. To persist with an emic perspective is, in any case, an empty posture. It is not possible to think about findings in the field without engaging one’s own cross-cultural experience, or to write a report without considering the cultural experience of the reader. Cross-cultural understanding can only be etic. And since the etic view is reflective, it does have the potential to check and correct the inevitable errors of its own ‘grand theorizing’.
Multimodal integration

Geschwind (1967) claimed that the most 'impressive advance' in the human brain is the expansion of the angular gyrus and surrounding area (inferior parietal), pointing out that this region is strategically situated for the multimodal integration necessary to sustain 'higher order associations' characteristic of human thought (Figure 4.1). His basic assumption here is that human behaviour uniquely depends on 'symbolic thought', but it is equally true that multimodal integration is essential for song-and-dance, role-play, and other forms of social display. Interestingly, injuries to the left angular gyrus commonly lead to 'visual asymbolia' (inability to understand visual sign systems including written language) or ideomotor apraxia (inability to execute actions in response to verbal requests). However, injuries to the right angular gyral region more commonly result in left-sided neglect (inattention to the left half of the body; stimuli from the left; and the left sides of other people, objects, fantasies, dreams, and hallucinations: Lishman, 1998).

Various theories have been advanced to explain the functional difference between left and right inferior parietal lobules (ibid). It probably reflects the primordial substrate of human brain asymmetries which may be inferred from the widespread specialization of the left hemisphere for 'communication' and the right for spatial processing, apparent in mammals and even birds (Bradshaw, 1991). The rat, too, is more vulnerable in the right hemisphere to lesions resulting in hemifield neglect (ibid). A modern pattern of brain asymmetries, however, is not apparent prior to Homo habilis, and the emergence of uniquely human social displays is likely to be relevant to lateralization as well as expansion in hominid brains.

Before discussing this issue, however, I will look at some brain mapping
studies of social mirroring processes, to show how such research can provide a fuller view of the social brain than that taken by Adolphs and others. I have chosen three studies to illustrate our three modes of social mirroring - implicit, mimetic, and conventional - though none is exclusively committed to a single mode.

**MAPPING SOCIAL MIRRORING FUNCTIONS IN THE BRAIN**

To date, neuroscientists have not taken full account of the implications of social-mirror theory, nor the distinction between communication and performance. Many imaging studies have investigated aspects of speech and reading; there have also been numerous studies of song and music, though most of them have used professional musicians as subjects and western classical music as material. It is known that professional musicians who sight-read music employ distinctive brain strategies, with more involvement of the left hemisphere than is the case with non-professionals (Sloboda, 1985). And, from an anthropological point of view, classical music is a problematic choice, being a highly idiosyncratic and elitist form of wealth display. But then, all music is conventionalized, and there is probably no form of music without some secondary overlay signifying ‘cultural capital’ (Bourdieu, 1972), social identity, or economico-moral value.

Other social mirroring abilities have been inadequately investigated. Studies of gesture-call processing, in the main, have been limited to reading facial expression (Adolphs, 1999), ‘biological movement’ (Bond et al, 1996; Puce et al, 1998), and prosodic aspects of speech (Brown, 1991). There has been no systematic investigation of the visual arts (Solso, 2000), and several literature searches have failed to reveal any functional imaging studies of dance or role-play.
Dance presents obvious problems for imaging research, since subjects must keep as still as possible in the scanner (R. Turner, 1997). However, imagined dance tasks, or watching film of dance, are likely to involve brain structures common to explicit dance. But until such studies are done, we might infer something about dance from past studies of music, since music appreciation is accompanied by dance-like patterns of body tension and release (Sergent et al., 1992), especially in the legs (Storr, 1993). Playing a musical instrument, and reading a musical score, can both be regarded as dance-like activities, since they correlate movements in space with sound.

It is equally possible that aspects of role-play may be inferred from mapping studies of hypnosis, since many theorists regard hypnotic trance as a culturally prescribed role (e.g. Spanos, 1989) and Method-style actors have high hypnotic ability (Oakley, pers. comm). However, in some sense hypnosis may be the opposite of role-play. That is, ventromedial prefrontal cortex, known to be necessary for the development of social personae, is suppressed in states of high suggestibility. John Gruzelier (2000a, 2000b) has confirmed this with EEG monitoring, and suggests that, especially in stage hypnosis where subjects willingly perform actions which would normally embarrass them, social persona is 'surrendered' to suggestions from the hypnotist.

Overall, there is a clear need for more functional imaging studies of specific aspects of social mirroring, and the following three studies represent a forced choice from a restricted range. Further, none of the studies was designed with social mirror theory in mind. The music study was not intended as a study of dance, and the 'theory of mind' study was not intended as a study of mimesis. The reading study was intended as an investigation of conventional communication, but American Sign Language also involves mimesis and considerable affective expression.
1. Implicit performance

Justine Sergent et al (1992) studied several aspects of musical performance - sight-reading, instrumental performance, and listening to music - in ten professional pianists. The choice of subjects and material reflects the typical belief that music is best studied as a professional and classical phenomenon. The authors even regret the rarity of brain-injured musicians, and state that "face recognition, object categorization, and letter reading" are "more universal capabilities" than musical performance. Despite this bias towards professional classical musicians and the primacy of literacy over music, their results are of anthropological interest.

The study used positron emission tomography (PET) to study brain perfusion, and magnetic resonance imaging (MRI) to provide anatomical detail. The main task involved (1) reading the score of a little-known J.S. Bach partita, (2) playing it on a keyboard with the right hand, and (3) listening to the resulting performance. Six control conditions were used in order to tease out main foci of activation associated with component parts of the task. The results, averaged across ten subjects, were (Figure 4.2):

1. Sight reading engaged extrastriate visual cortex close to but outside areas involved in reading language, in both hemispheres (Brodmann’s Area 18). Activations also extended towards the occipito-parietal junction in the right (BA 18) and left (BA 19) hemispheres, representing parts of the dorsal visual pathways. The authors suggest that these pathways are probably involved in reading the spatial locations of notes, rather than their features. To the extent that synchronized dance movements would require visual monitoring and mirroring of others, one would expect these pathways to
Superior frontal gyrus (premotor)
Precentral gyrus (motor)
Inferior frontal gyrus (premotor)
Broca's area
Superior temporal gyrus (secondary auditory)
Supramarginal gyrus (space/sound mapping for score?)
Superior parietal (dorsal visual stream)
Occipitoparietal junction
Extrastriate visual areas
Cerebellum for right hand

Figure 4.2. Brodmann's areas activated by musical performance (coloured spots centre on voxels with highest z scores)

Listening to scales
Listening to a piece
Playing scales with right hand
Playing score with right hand
Reading score
Listening and reading score

Figure 4.3. 'Glass brain' diagrams showing areas significantly more active during ToM than non-ToM tasks ('ToM-only' area highlighted in red)
be involved also in dance.

2. *Playing the score* with the right hand (after subtracting the effects of sight-reading) also recruited foci along the dorsal visual pathways (BA 7). The authors suggest these pathways process spatial information relating the staff to the fingers, and are involved more generally in visually guided skilled actions (such as dance). If so, it seems highly suggestive that *both* pathways were involved, and not just the left, as one might expect, since subjects were playing a keyboard with the right hand only.

*Playing scales*, as expected, engaged motor areas for the right hand in the cerebellum, and premotor cortex in the left hemisphere (BA 4 and 6). Interestingly, when *playing a score* (rather than a scale), this premotor involvement extended to BA 6 and 44, just anterior and superior to Broca’s ‘speech’ area. Area 44 has been linked to motor sequencing for speech, so it seems that both vocal and manual sequencing are associated.

In all primates, including ourselves, sensory and motor cortices for hand and mouth are juxtaposed, presumably because feeding behaviour requires close hand-mouth coordination. Hand to mouth investigation of objects develops early in human infants. There has been much speculation as to possible evolutionary links between speech and manual skills (e.g. aiming missiles: Calvin, 1983; tool-making: Lieberman, 1984; grasping behaviour: Rizzolatti & Arbib, 1998). Some authors propose that manual skills preadapted the brain for speech, others favour an evolutionary change from gestural to vocal language. By the extension of Durkheimian theory (performance in one mode favours the emergence of communication in a higher mode), one would expect song-and-dance skills to preadapt for mimetic communication (both gestural and
vocal), and thence for speech (which is still accompanied by manual gestures: Iverson & Thelen, 1999). That is, close hand-mouth coordinations would be expected at all levels of communication and performance. I have already mentioned associations between music and virtual dance movements, and it may be worth noting that some small children cannot sing without also moving their arms (Storr, 1993). For many adults - from Maoris to Cornishmen - singing is unthinkable without evocative or passionate hand and arm gestures.

3. **Listening to the piece** engaged foci along the superior margins of both temporal lobes (BA 22), including secondary auditory cortex (BA 42). The latter borders Wernicke’s area in the left hemisphere, classically associated with speech interpretation, and its prosodic homologue in the right hemisphere. From the left temporal areas, discernable activity extended also into the inferior parietal lobule (BA 40). **Listening to scales** also involved BA 42 bilaterally, and area 22 to a lesser extent and in the left hemisphere only.

**Listening to a piece whilst reading the score** extended these activations into the superior and posterior parts of the supramarginal gyrus (BA 40). This is adjacent to the angular gyrus and is part of the area defined by Geschwind, much expanded in modern humans, and involved in the multimodal integrations which I have suggested would be necessary for dance and other whole-body displays. The authors infer that it is involved here in mapping spatial correspondences between written notes and musical sounds. They also point out that injuries in this region (in the left hemisphere only) carry a risk of both alexia and agraphia (loss of ability to read and write). It seems likely that literacy exploits brain modules originally evolved in association with iconic
gesture, and indeed the earliest writing is iconic (pictographs). I will return to this point in relation to study 3 below (reading English and American Sign Language).

Overall, the study demonstrated a 'distributed neural network' involving all four cerebral lobes, as one would expect from the component parts of the task. In temporal, parietal, and occipital lobes, activations were bilateral, but frontal activations involved the left hemisphere only, reflecting performance with the right hand. No prefrontal activity was noted in this study.

More specifically, reading the score, translating the notations into keyboard performance, and listening to the music "resulted in activation of cortical areas distinct from, but adjacent to, those underlying similar verbal operations." The authors note that verbal (aphasia) and musical (amusia) impairments may occur conjointly or singly in musicians with injuries to the left cerebral hemisphere, depending on the size of the lesion. However, the authors do not comment on the highly suggestive difference between 'similar verbal operations', restricted to the left hemisphere, and musical tasks evoking bilateral activity.

Mammals and birds show left hemisphere dominance for processing vocal/auditory signals, although humans process prosody and music (similarly implicit) primarily in the right (Falk, 1987; Bradshaw, 1991; Brown, 1991). A 'play and display' hypothesis of human brain evolution would predict that, first of all, song would evolve by elaboration of left-hemisphere-dominant gesture-call processes, perhaps leading to more bilateral involvement (to handle the increased processing load). The subsequent colonization of former vocal/auditory networks in the left hemisphere by mimetic and conventional communication would increase the right
hemisphere dominance of older modes. If language and music engage parallel pathways, but only music shows bilateral activity and right hemisphere dominance, this would be consistent with the hypothesis, though possibly open to other interpretations.

2. Mimetic representation

A study by Gallagher et al. (n.d.) used functional magnetic resonance imaging (fMRI) to scan subjects whilst they solved problems involving theory of mind (ToM) or 'general' (non-ToM) reasoning. Tasks were presented in two modalities: written stories, and captionless cartoons. The stories were followed by questions, requiring either ToM or non-ToM reasoning to arrive at the correct answer. The cartoons required ToM or non-ToM reasoning to get the joke. Both modalities were contrasted with nonsense stories and cartoons: disconnected sentences and jumbled cartoon pictures. When control tasks are subtracted from target tasks (at least, those involving human actors), the residual activity is essentially dramatic, which is why I have chosen this study to illustrate mimesis. The three main findings were:

1. ToM tasks, whether stories or cartoons, involved a distinct locus in left medial prefrontal cortex: Brodmann’s Area 8, extending into BA 9 in story tasks only.

2. Both ToM and non-ToM tasks, whether stories or cartoons, were associated with extensive activations in the temporal poles and temporo-parietal junctions bilaterally.

3. Both ToM and non-ToM cartoons also recruited the right middle frontal gyrus (BA 6), the precuneus (BA 7), and cerebellum.
Note that the areas mentioned in (2) and (3) were significantly more highly activated in ToM tasks than in non-ToM tasks (Figure 4.3). Basically, the non-ToM tasks engaged a subset of the ToM-activated areas, with significantly lower levels of activation, and no areas were exclusively dedicated to 'general reasoning'.

Several structures activated in this study include loci implicated in other social-mirroring behaviours. BA 8 and 9, exclusively activated in ToM tasks in this study, corresponds closely to an area reported by Bottini et al (1994) in the right hemisphere in subjects processing metaphorical sentences, in contrast to literal sentences. Autistic children have difficulty with non-literal language (Happé, 1993), and logically one would expect the interpretation of metaphor (along with sarcasm, irony, humour etc: Baron-Cohen, 1995) to require mental insight.

Bottini et al also found activity in the right middle frontal gyrus, in a similar area to that involved in reading cartoons, especially ToM cartoons, in the present study (BA 6). Understanding cartoons as opposed to stories often involves reading body language and facial expression (i.e. gesture-calls). The cartoons - taken from published sources - were also, by definition, intended to be humorous. If they so much as raised an inner chuckle, this too involves gesture-call processing - of a uniquely human kind. The two ToM cartoons illustrated in the paper also strike me as overtly funnier than the more whimsical non-ToM cartoons. The additional areas activated by cartoons, but not stories, include premotor cortex (BA 6), the cerebellum (also involved in motor action) and the precuneus (BA 7). A different locus in BA 7, in the above study of keyboard performance by Sergent et al, was linked by them to visually guided skilled movement (dorsal visual stream).

The bilateral temporo-parietal structures activated in ToM and non-ToM tasks
include areas that, in imaging and lesion studies, have been associated with movement
of the eyes and mouth compared to non-facial movement (Puce et al, 1998), and hand
actions and body movements compared to object and random motion (Bonda et al,
1996). This has been interpreted as showing a role for the region in the perception of
'biological motion', but also suggests bilateral involvement in reading gesture-calls.
Bilateral parieto-temporal engagement was also noted in the study of reading and
American Sign Language discussed below, and left hemisphere activations in this area
are commonly reported in language studies (Price et al, 1977; Warburton et al, 1996).
This 'semantic system' has also been shown to be activated when reading pictures
(Vandenbergh et al, 1996). The ability to perceive 'biological motion' (and to copy it)
is an obvious prerequisite for social mirroring in all modes, and we have the
impression here of successive modes being 'built' on top of earlier ones. This is one
reason for suggesting that song-and-dance is a necessary precursor to role-play.

Francesca Happé (1998), commenting on the above study, notes that
mentalizing abilities seem to depend on a very small locus (BA 8/9). Children with
Asperger's syndrome ('high performance' autism) can learn to do ToM tasks, but do
so laboriously and using larger neocortical areas associated with 'general reasoning'
(Happé & Frith, 1996).

Two points need to be made here. Firstly, social intelligence theory holds that
primates evolved large brains because social intelligence is much more complex than
object intelligence. So mind-reading abilities should require more hardware than
'general reasoning', which is what the above study actually shows. It is misleading to
suggest that a 'small' area is involved in ToM. Attributing 'general reasoning' to the
larger areas inverts the emphasis evident in the data. It would seem more reasonable to
infer that the high object intelligence of bottle-nosed dolphins, chimps, and humans — as evidenced, for example, by the use of tools by all three species (Tayler & Saayman, 1973; Joulian, 1996) — is an epiphenomenon of their high social intelligence.

Secondly, we might question whether the tasks used in this study actually do involve no more than was intended. Examining the tasks themselves suggests that many of them not only engage ‘theory of mind’ but, over and above that, ‘theatre of mind’ (some non-ToM tasks did not feature human actors). One non-ToM story task, for example, describes a burglar entering a shop at night. He has to crawl under a laser beam to avoid setting off the alarm. As he is searching for the safe, something furry brushes his hand and rushes back towards the shop entrance. The alarm immediately sounds. Question: Why did the alarm go off?

Answering the question (11 seconds were allowed) does involve simple object intelligence, but the data was taken across the entire task (33.6 seconds). I suspect that many persons of average imagination, arriving at the detail of the laser beam if not sooner, would find themselves drawn ‘inside’ the story — identifying with the burglar; hearing the distant sounds of night traffic; feeling the surrounding darkness, the fear of detection, the frisson of excitement — and perhaps arriving at a vague theory as to why the burglar chose this clandestine career. Several of the non-ToM tasks involve mental role-play of this sort, although to a lesser and varying degree. If the results reflect role-play, what is the difference between conditions that could account for the activation of BA 8/9 in the ’ToM tasks’ only?

Some of the ToM stories and cartoons appear to involve role-switching between two or more characters. For example, in a ToM version of the burglar story, the thief drops his glove. A policeman sees this and, wanting only to tell him he has dropped
his glove, shouts ‘Hey, you! Stop!’ The burglar, hearing the policeman, puts his hands up and admits he robbed the shop. Question: Why did the burglar confess?

This task involves a minidrama with two personae. Although the question only requires us to mind-read the burglar (we are helpfully told why the policeman shouts) this cannot guarantee that subjects will be able to resist mind-reading both, and picturing, for example, the policeman’s surprise when he makes an unintended arrest. One might then hypothesize that the locus in BA 8/9 may be involved in representing multiple personae or switching between them. This is one reason why we looked at role-switching in the role-play study presented in Chapter 5. As it happens, role-switching did not significantly activate the alleged ‘ToM’ area, but most of this area is included in the ventromedial prefrontal region attributed to role-play in our study.

One final point. Language, stories, iconic representations, and jokes, are all social mirrors. So none of the tasks used in this study - not even the nonsense control tasks - can be thought of as ‘general’ or ‘non-social’. And as the findings represent subtractive contrasts between these social tasks, it follows that they under-represent the extent of brain activity involved in social mirroring. Obviously, imaging studies must select out certain elements of behaviour for investigation, and we need the cumulative findings of many studies to build up an increasingly comprehensive picture.

3. Conventional communication

A study by Neville et al (in press), which helps to build on observations made above, involved deaf and hearing subjects reading written English and American Sign Language (ASL). The study greatly extends our understanding of communicative processes, since ASL, unlike written English, has considerable iconic content.
The findings also have implications for the theory of domain specific modules. Fodor (1983) compiled a frequently quoted list of properties, showing the commonalities and differences between domain-specific processes and acquired skills. Basically, he claimed two differences: only domain-specific modules have (1) dedicated neural architecture and (2) specific deficits associated with lesions. Unfortunately for this theory, using Fodor’s own terms, language is an example of a domain-specific ability which can behave like an acquired skill, and reading is an acquired skill that behaves like a domain-specific ability. That is, children with left-hemisphere injuries which occur early in life develop language ability in the right hemisphere (Lishman, 1998); whilst reading, which must be regarded as an acquired skill, involves ‘dedicated’ cortical areas associated with specific deficits - the dyslexias (Donald, 1991).

The implication seems to be that we do have dedicated neural architecture, more suited to certain kinds of processing than to others, but we also have top-down behavioural demands which determine exactly what the architecture will be ‘dedicated’ to. Furthermore, the architecture is capable of post facto structural adjustment to accommodate its allotted function, since there are ‘opportunity windows’ early in life, after which learning becomes difficult or impossible. There seems to be a compromise between genetic predisposition and both personal and cultural flexibility.

Subjects examined by Neville et al were (1) normally hearing, monolingual, native speakers of English; (2) congenitally deaf native signers of American Sign Language (ASL), who learned English at school age; and (3) normally hearing bilinguals, born to deaf parents, who were native signers of ASL and speakers of English from infancy. All subjects were presented with simple declarative sentences in
Figure 4.4a. Brain areas activated when reading written English
Figure 4.4b. Brain areas activated when reading American sign Language
English and ASL, contrasted with baseline conditions - consonant strings and gestural non-signs. The main findings (Figures 4.4a and 4.4b) were as follows:

1. Classic left hemisphere language areas were recruited when subjects *read* their native languages, whether English (in both hearing groups) or ASL (in both signing groups). These areas include Broca's, Wernicke's, and the left angular gyrus (although the latter was less significantly activated in deaf subjects reading ASL). So speech, literacy, and gestural communication utilize common structures. This seriously undermines the only valid argument in support of a gradualistic Darwinian evolution of vocal language (e.g. Pinker, 1994), since we can no longer assert that these areas are specifically dedicated to speech.

2. Broca's area, classically linked to language *expression*, is strongly activated when hearing subjects are *reading* English or ASL. It is as though we are in the shoes of the communicator, even when we are on the receiving end. If so, Broca's area is 'dedicated', not only to vocal and gestural expression, but also to interpretation. Note that, in subjects bilingual from infancy, it is the anterior 'transmitting' areas that are most strongly and consistently activated in reading English and ASL - the posterior 'receiving' areas are less robustly activated. Perhaps subvocalising/subsigning, or role-playing the communicator, assists the extraction of meaning from the communication, whilst digital decoding in Wernicke's area is less demanding.

3. In addition to these classic structures, reading English and ASL engaged further left hemisphere areas, including dorsolateral prefrontal cortex and the entire extent of
the superior temporal gyrus. We may infer that reading and gestural communication require considerably more hardware than speech.

4. In addition to these left hemisphere structures, native signers reading ASL also recruited large areas of the right hemisphere, including the entire extent of the superior temporal lobe, the angular region, and prefrontal cortex. Two of these areas (superior temporal and angular gyri) closely parallel those activated when listening to music (Sergent et al, 1992) and, as we shall see, the right prefrontal and angular regions may also be involved in role-play. No such right-sided effects were seen in hearing subjects reading English. Furthermore, these right hemisphere activations, in deaf subjects, tended to be equal or greater in extent than those in the left hemisphere. So, not only does reading require more hardware than speech, but reading ASL requires more than reading English.

5. Finally, deaf subjects, who learned English imperfectly, at school age, and through the visual mode, processed written English primarily in the right hemisphere. This would seem to reflect late/imperfect learning and the use of visual-mode processing, rather than ‘competition’ with ASL, because these subjects tended to be right-hemisphere dominant for ASL also. Native bilinguals, on the other hand, were left hemisphere dominant for English, and, in anterior brain areas, tended to be left-hemisphere dominant for ASL as well. Bilingual hearing subjects, having learned two languages from infancy, also showed considerable individual differences in the strategies used to process both. The brain, apparently, provides more than one way to skin a cat, and brain adaptations can reflect both bottom-up genetic determination, and
top-down behavioural demands. It follows that social-mirroring behaviours can have histories as well as phylogenies.

Overall, it would seem that there are very large areas of neocortex involved in gestural communication. A subset of these (in the left hemisphere in hearing subjects, or the right in deaf subjects) can become adapted for reading written language, and a subset of this subset becomes adapted for speech in normal hearing subjects. Why is gestural communication so much more demanding than spoken language?

We need a more comprehensive mapping of social mirroring functions before making general claims. At this stage, however, we can say that the above data are highly consistent with a performance hypothesis of brain expansion, and we could speculate that all these structures were primordially adapted for analogical and mimetic processing, probably including role-play, and possibly beginning with expanded gesture-call systems including song-and-dance.

One would expect that digitally coded language would require less processing capacity than analogical codes, because the latter have infinite sliding scales and gradations of meaning, and require more holistic interpretation (Burling, 1993). The above data indicate that spoken language involves less diffuse cortical areas than gestural communication, and is consistent with a hypothesis of brain contraction following the emergence of language. This in turn would indicate a late date for the emergence of language and is consistent with Durkheimian theory (i.e. that language cannot evolve before ritual pantomime).

Specific adaptations for language are by no means precluded by a performance hypothesis of cerebral evolution, but this does not necessarily imply speech, and no
architectural dedications seem to be absolute, exclusive, or irreversible. Genetic
determination may have the first word, but certainly not the last, and the inherent
flexibility of the human brain is one of its most important enculturable characteristics.

**SUMMARY AND CONCLUSION**

I have discussed likely reasons for brain expansion in humans, areas of relative brain
expansion, and what is currently known about the social brain. Evidence supporting a
more embodied approach to cognition, and the three mapping studies examined above,
clearly show that we can extend our understanding of the social brain far beyond the
handful of structures reviewed by Adolphs.

**A 'play and display' hypothesis of brain expansion**

The evidence reviewed in this chapter is consistent with a 'play and display' hypothesis
of hominid brain expansion, and I am not aware of any other hypothesis that makes
equal sense of all the data taken together. We can spell out the evolutionary sequence
implied by this hypothesis, in three main stages:

1. The emergence of song would be expected to select, initially, for expansions of
   vocal/auditory areas such as Broca's and Wernicke's areas in the left hemisphere. The
   increased processing load on these classic 'language' areas might also recruit right
   hemisphere homologues. Song-and-dance might also contribute to increased voluntary
   control over affective signals, as in the prosodic content of modern speech.

   Synchronized dance, calling for multi-modal integration, whole-body motor
   control, and monitoring the body in space, would also lead to bilateral expansions of:
a. Premotor cortices including areas involved in visuo-kinaesthetic matching
b. Parieto-temporal areas involved in perceiving 'biological motion'
c. The ventral visual stream (perceiving social cues)
d. The angular gyrus and surrounding areas (the inferior parietal lobules emphasized by Geschwind)
e. The dorsal visual stream (visually-guided movement)

That covers all the areas expanded in modern human brains, with the exception of the prefrontal lobes, and may be sufficient to account for the left occipital and parietal petalias in modern humans. The study of musical performance described above did not implicate prefrontal cortices, though other studies have shown prefrontal involvement (Posner et al, 1988). Studies using western classical music, potentially confounded by professionalism and elitist role-play, cannot be extrapolated to more universal or archaic forms of display. Tentatively, I suggest that song-and-dance is more dependent on VKM (premotor) than 'representations of representations' (prefrontal). However, it would be surprising if song-and-dance did not lead to any prefrontal expansion at all.

Ventromedial prefrontal cortices (VMPFC) are essential to social empathy, and may be involved in representing somatic states in self and others (Damasio, 1994). Dorsolateral prefrontal cortices (DLPFC) are richly interconnected with inferior parietal areas. Injuries to right DLPFC, like those to right inferior parietal cortex, lead to left-sided neglect (Lishman, 1998). This suggests that right DLPFC is involved in monitoring the body in space. Song-and-dance display might therefore lead to some expansion of VMPFC and DLPFC.
2. Song-and-dance preadapted the hominid brain for the later emergence of iconic gesture-calls, mime, pretend play, and role-play. If new forms of communication tend to colonise left hemisphere areas formerly dedicated to implicit vocal signals, we would expect further expansion of those areas, with possibly increased displacement of implicit display processing to the right hemisphere.

Psychologically, the entrainment function of song-and-dance is a likely first step towards putting oneself 'in someone else's shoes', hence a prerequisite for role-play. As whole-body performance, we would expect role-play to select for further bilateral expansions of the same areas as those involved in dance, especially the inferior parietal lobules. Role-play, in addition, requires more complex representational abilities than dance (including epistemological mental states and social scenarios). The sixfold expansion of the prefrontal lobes, which gives the modern human face its vertical forehead, is likely to have followed the emergence of role-play.

ToM and 'theatre of mind' introduce a new level of self-awareness, allowing reflective access to reasoning, planning, and all processes generally classed as 'intelligent'. The development of mimetic behaviour would therefore have the secondary consequence of favouring bilateral expansions of temporal and other areas associated with linear and spatial reasoning.

3. The first ritual (probably involving anatomically modern humans pretending to be animals: see Chapter 2 and Knight, 1991) inaugurated a revolutionary change in the ordering of society. Conventional codes, rules, and values enabled modern humans to transcend former biological constraints on altruism. Following the precedent set by mimetic communication, language colonized left hemisphere areas formerly dedicated
to gesture-calls, leading to increased functional asymmetry in present-day humans, with mimetic signals also displaced to the right hemisphere. Since deaf signers are right-hemisphere dominant for ASL (relatively mimetic), we might assume some genetic contribution to language-induced asymmetry.

Digital language appears to be less demanding, in terms of processing capacity, than analogical communication, and would reduce dependence on iconic signals. A rule-based ordering of society would also reduce dependence on song-and-dance display and perhaps role-play. The conventionalization of music, with fixed tonic intervals and digital scales, might also contribute to reduced selection pressure to sustain large brains. Overall, some reduction in brain size would be expected, with the possible exception of areas colonised by speech.

There are three obvious ways in which this hypothetical scheme could be tested.

Ideally, if we had large numbers of perfectly preserved hominid brains, we could test much of the above in detail. In reality, we have a sparse sample of cranial casts with missing portions and limited surface detail, representing diverse populations of uncertain relatedness to ourselves. Even so, I will examine the fossil data in Chapter 6.

Secondly, we could examine the archaeological evidence for hominid behaviour, to check if it is consistent with predicted modes of display. Again, the data is far from sufficient, but I will review what we have in Chapter 7.

Thirdly, and this is essential research if we are to have an anthropologically relevant cognitive science, we need to map the neural correlates of social mirroring behaviours, especially in the neglected areas of dance and role-play. It is possible that
literacy rather than speech contributed most to the functional asymmetries of parietal and prefrontal cortices, and this might be tested by mapping studies of non-literate people from oral societies. In congenitally deaf subjects, if injuries to the left inferior parietal lobule were associated with right-sided neglect rather than visual asymbolia, this would also confirm a prediction of the hypothesis.

I have begun a programme of anthropological brain-imaging research with Robert Turner at the Wellcome Department of Imaging Neuroscience. Our first pilot study of role-play is presented in the next chapter. As we shall see, nature is always more surprising than theory, and perhaps never less so with her most elaborate product, the human brain.
Chapter 5. Role-Play and the Brain:

A functional imaging study of role-play and verse

BACKGROUND

We know remarkably little about brain processes involved in role-play, despite the fact that it has been a focus of convergent interest between the cognitive and social sciences for more than a hundred years. Role-play has been implicated in:

2. Reflective consciousness and self-representation (Dilthey, 1883-1911; Baldwin, 1894; Cooley, 1902; Mead, 1934)
3. States which appear to involve alternative self-representations, such as dissociative identity disorder, hypnosis, spirit possession, and culture-specific syndromes (E.R. Hilgard, 1986; Bliss, 1986; Spanos, 1989; Coe & Sarbin, 1991; Heap, 1996; Littlewood, 1998)
4. Enculturation and cultural performance (Goffman, 1959)
5. Cultural change and cultural difference (Eliade, 1951: 179; Bateson, 1974; Burridge, 1979; Turner, 1982)
6. Ritual origins of language and culture (Durkheim, 1912; Knight, Power & Watts, 1995)

Role-play is pervasive in human behaviour. Sue Jennings (1994) divides human experience between ‘dramatic reality’ and ‘everyday reality’. This is a model with
many anthropological parallels, from 'sacred and profane' (Durkheim, 1912) to 'anti-
structure and structure' (Turner, 1982). There are parallels also in psychology: the
'transitional space' of childhood play (Winnicott, 1974), and the alternation of telic
(goal-directed) and paratelic (playful) thought in 'reversal theory' (Apter, 1982).
However, from such sources as G.H. Mead (1934) and Goffman (1959), who stressed
the histrionic tendency of everyday life, we have grounds for regarding 'everyday' and
'dramatic' realities, in adults, as equally dramatic, and Jennings concurs with this view
(pers. comm). If we accept such a model, then there are at least two kinds of role-
play:

1. 'Dramatic reality' includes all kinds of human play and performance which take
place in a transitional (Winnicott, 1974), liminal (van Gennep, 1909), or liminoid
(Turner, 1982) space, set apart from everyday routine or domestic or pragmatic
behaviour. Theatre, state ceremonial, religious ritual, and watching television, are all
examples of 'dramatic reality'. Behavioural states ('altered states of consciousness')
such as glossolalia, trance, and spirit possession, which commonly occur in ritual
contexts (Bourguignon, 1973), and dreams, reveries, and pretend play, which are not
so culturally instituted, are also included. The idea of hypnotic trance as role-play has
been frequently challenged. For example, Gruzelier (2000a) has now provided
"irrefutable neurobiological evidence at odds with sociocognitive models of hypnosis"
including engagement of brain areas distinct from those suggested for role-play by our
own study (below). However, the 'state' versus 'non-state' debate in hypnosis research
is, to my mind, a semantic issue. If states such as hypnotic trance are "strategic
enactments and disavowals of responsibility" (Spanos, 1989), I see no reason to regard
role-play as a ‘non-state’. Gruzelier has simply clarified the sequence of events in a conventionalized hypnotic induction, showing that they involve various parts of the brain, including those necessary for the understanding of verbal instructions. This does not conflict with ‘sociocognitive models’ but, rather, adds to our understanding of them.

2. ‘Everyday reality’ may be equally varied, involving both conscious and unconscious role-play - perceived or not perceived as such by others - including the ‘affectations’ and ‘pretensions’ recognised in folk psychology, the ‘taken for granted’ cultural attitudes noted by Bourdieu (1972), the ‘scripts’ explored by cognitive anthropologists (Boyer, 1993), the manipulative ‘games’ identified by transactional analysts (Berne, 1973), the dissociated personalities involved in fugue and dissociative identity disorder (Littlewood, 1996; Krippner, 1999), and the ‘economico-moral personae’ which I have suggested we begin to assume somewhere around adolescence.

To the extent that ethnic stereotypes have some basis in real-world behaviour, they presumably reflect different normative styles of role-play. We variously pretend to be self-controlled Anglo-Saxons, demonstrative Russians, spontaneous Italians, no-nonsense Australians, or can-do Americans.

Clearly one could classify the varieties of role-play in more than one way, depending on one’s focus of interest. A division between conscious and unconscious role-play, which is of considerable cognitive and anthropological interest, would cut across both of Jennings’s categories. For example, the spirits that ‘ride’ practitioners of Voodoo are wholly believed-in, but initiation rituals in West New Britain involve cynical and
agnostic impersonations of spirits by men, with the conscious intention of terrorising women and children (Lattas, 1989). The 'sacred/profane' distinction does not coincide either: for example, economic behaviour, regarded as 'everyday' in industrial societies, is highly ritualized elsewhere, and even state ceremonial is less 'sacred' than holy communion. The telic/paratelic distinction also cross-cuts Jennings's categories, because a great deal of 'dramatic reality' is highly manipulative, propagandist, and goal-directed (Turner, 1982). But the 'dramatic' and 'everyday' split has analytical and heuristic value in anthropological and clinical (Jennings 1997) contexts, and this too must have cognitive implications. I have already discussed the curious paradox, pointed out by Victor Turner (1982), that artists and religious believers commonly claim to find 'truth' in the artifice of theatre or ritual, whilst the normative world, in which we seek our daily bread and pursue apparently pragmatic ends - including scientific research - is just as persistently regarded as 'false'. The numinous (Otto, 1958) and noetic (James, 1882; Deikman, 1969) qualities of experiential 'truth' and the dissatisfactions of everyday 'falsehood' are not well understood, if at all, in cognitive terms.

If Mead (1934), Goffman (1959), Turner (1982), and many others are correct in their assessment of the dramatic character of everyday life, then this creates a problem for any attempt to investigate the neural correlates of role-play: how to design a 'control task' that does not involve unconscious dramatic performance. There are no tested solutions to this problem. The only option is to implement a pilot study which maximises opportunities for collecting useful data, and so begin a programme of research aimed at cumulatively increasing insight.

In close collaboration with R. Turner, Principal of the Functional Imaging
Laboratory at the Wellcome Department of Imaging Neuroscience, University College London, a pilot investigation of role-play, using functional magnetic resonance imaging (fMRI), was commenced in May, 1999. In contrast to PET and SPECT scanning, fMRI is non-invasive, permits the collection of multiple brain image volumes, and has superior spatial resolution (potentially to about 2 mm: R. Turner, 1997).

We adopted an experimental paradigm which included more than one role-task, and two types of analysis: that is, in addition to a block analysis (contrasting various task 'epochs') we would perform an event analysis (comparing relatively brief activations when switching from one task to another: Friston et al., 1998). If the epoch analysis failed to reveal the cerebral correlates of role-play (which would itself be a significant finding), the event analysis might provide interpretable data. A second reason for favouring an event analysis was the earlier suggestion that an apparent 'theory of mind' locus in Brodmann's Areas 8 and 9 (Gallagher, n.d.), might in fact be a 'role-switching' locus.

METHOD

Subjects

We enlisted the aid of David Craik, a professional theatre director and faculty member at the Academy Drama School, Whitechapel, who recruited six right-handed students or recent graduates from the school, judged by him to have good imagination and a Method-style approach (the technique developed by Stanislavski which emphasises detailed re-creation of the inner states of a character). The subjects were two men and four women, aged between 23 and 30 with a mean of 26 years 10 months. All were in
good health with no history of conditions which might contraindicate fMRI; all completed a health screen questionnaire prior to scanning and gave informed consent. The study was approved by the National Hospital for Neurology and Neurosurgery Ethics Committee.

We chose to use actors accepted into drama school because they are likely to have at least average aptitude for the tasks, will readily understand task requirements, and should feel confident about performing them. Relative inexperience was favoured because of concern over the possible confounding effects of professionalism, which, from an anthropological point of view, may have limited the inferential value of some music research (cf. Sloboda, 1985).

**Task materials**

The role tasks involved two contrasting Shakespearean roles: Hamlet and Lady Macbeth. We chose five scenes from each play, because role-play can involve any conceivable human activity, and we needed to identify constancies between multiple samples of role-play. We also considered that no actor could perform a single excerpt from a demanding part a sufficient number of times without boredom, habituation, or exhaustion. More than five scenes, on the other hand, would have created a prohibitive rehearsal and direction workload.

Although we had decided against investigating song-and-dance in this study, the fortuitous availability of the *Shakespeare Made Easy* series, which gives the full Shakespearean text alongside a modern prose translation, made it possible to investigate the effects of blank verse without detracting from the primary aim of studying role-play.
Poetry has been described as 'dancing with words', but would seem to be a compound of several performative modes, including oration, drama, and song-and-dance. I assume that poetic imagery essentially employs drama and dramatic metaphor, whilst other word-play, depending on sound rather than semantic reference, is song-and-dance related. The prose texts in the *Shakespeare Made Easy* series retain most of the imagery present in the original, and since this is essential to the dramatic content, it is not possible or desirable to eliminate it. Consequently, the prose scripts can control for the 'song-and-dance' effects of verse, but not for the more complex effects of 'poetry'.

The control tasks were five passages taken from instruction manuals, financial literature, and old textbooks (1949 and 1978), chosen for their apparently uninvolving character. These were also rendered into iambic pentameter to act as controls for the verse role-play tasks. In translating these texts into verse, it became increasingly apparent just how saturated with role-play they are - despite their apparently 'non-dramatic' character. Each passage has its own idiosyncratic vocabulary and tone of voice, evoking the trustworthy craftsman, the incorruptible financier, the rigorous scientist, the lucid logician, and the recondite knowledge of the expert. In view of the apparent ubiquity of human role-play, it seems likely that no text, perhaps not even a random succession of words, could be entirely free from conscious or unconscious role-play.

**Task briefing and rehearsal**

We attempted to obviate this problem by briefing actors to treat control tasks as opportunities to relax, to read the texts without involvement or attention to their
meaning, and to ‘put nothing of themselves’ into the reading. In the verse controls, attention was to be directed only to the iambic meter, the five-foot line, and the musical sound of the words. Whereas role-play scenes were rehearsed with full stage action, control tasks were rehearsed whilst relaxing in a comfortable chair.

Actors were asked to prepare for rehearsal by reading the entire original texts of *Hamlet* and *Macbeth*, and to immerse themselves in the make-believe worlds of the plays. All tasks were otherwise equally rehearsed, in three professionally directed sessions, although perfect parity in this regard could not be guaranteed. Prior reading of the plays, undirected extra rehearsal at home, initial scene setting and blocking using original verse texts, inevitably greater discussion of character and interpretation relating to early role rehearsals, and some familiarity with the original Shakespeare, may all have favoured a greater facility of performance with the verse Shakespeare relative to the prose Shakespeare, and of both relative to the control tasks (rehearsal bias as a potential confound will be discussed below).

All tasks were rehearsed in a set sequence, which in the case of the role tasks matched the original sequence in the plays, in order to preserve story flow and character development, and allow each actor to deliver a more continuous and self-convincing performance. The rehearsal sequence also matched the order of presentation in the experimental runs. The director and I played the other parts required by each scene. The scenes rehearsed included substantially more of the script than the brief extract to be used in the experiment, so that actors had embodied experience of what their characters were doing before and after each task extract. Actors were encouraged to recreate in imagination not only the emotions, beliefs, actions, and goals of the characters they play, but also the setting, the atmosphere, the sounds, the relationships,
and the imagery of the scene, and how all this fits into the context of the entire play. For example, in the Hamlet ghost scene, actors were to envision the battlements at Elsinore, to imagine the bone-chilling cold, night sounds such as the distant hoot of an owl, and the appropriate autonomic responses - goose pimples and the like. This involved workshop-style discussion as well as rehearsal. Control rehearsals also employed considerably more text than the experimental tasks.

Since it is important that actors lie as still as possible during scanning, they were briefed to pretend that they were acting out their roles in the imagined settings and contexts of the plays.

**Study design**

The experiment used a two-by-three factorial design, controlling for the main effects of role, verse, and switching between states (Figures 5.1 and 5.2). Tasks were arranged in triplets: two role tasks and a control task. A task cycle consisted of six tasks: a verse triplet and its prose translation. Five cycles were presented in the same sequence as the task scenes occur in the plays. An otherwise unpredictable balanced order was used such that half the triplets began with Hamlet and half with Lady Macbeth, and half the cycles began with prose and half with verse. When all five task cycles had been presented once, they were presented a second time in a different balanced order, so that a complete experimental run consisted of sixty 25 second task epochs with a total run time of 25 minutes.

Tasks were cued and silently read from typeset text, projected onto a screen at the foot of the magnet. Tasks were presented as one continuous text, scrolling up the screen at the rate of one line every three seconds (to obviate any potential confound
Figure 5.1. Factorial Grid

Figure 5.2. Study design showing cycle 1. Experimental run consists of cycles 1 to 5 repeated twice
from a 'page turning effect'). There were five lines to view on the screen, to allow variation in pace and action, and tasks varied accordingly, most being 8 or 9 lines in length (but all previously timed at 25 seconds).

Data acquisition

Brain images were collected using functional magnetic resonance imaging (fMRI) with a Siemens Vision System (Siemens, Erlangen). Each brain volume was scanned in 48 axial ('horizontal') slices, 3 mm thick, with in-plane resolution of 3 X 3 mm, positioned to cover the entire brain (i.e. brain volumes were mapped in 'voxels', or three-dimensional pixels, each 3 X 3 X 3 mm).

Event-related analysis (Friston, et al 1998) requires a 'jittered run' because the time taken to collect one whole brain volume is longer than the expected duration of an event (about 1 second). In the present study, brain volumes were scanned at the rate of one volume every 4.1 seconds, so that six brain volumes were collected every 24.6 seconds, slightly out of phase with the 25 second task epochs. Each set of like events would therefore include slices from all parts of the brain. Around 365 brain volumes were collected per subject.

All subjects were debriefed after the run to check their impression of their own task performances. All were confident that they had maintained at least a fair performance standard across most role tasks. Experience during control tasks varied from 'drifting' (one subject) to more difficult than anticipated (one subject), but comments were broadly in line with experimental requirements. Switching from one task to another, as estimated by subjects, rarely took more than about one third of a line (i.e. about 1 second) though one subject estimated two thirds of a line (2 seconds).
Statistical analysis

Data were analyzed using statistical parametric mapping (Friston et al, 1990, 1995a; Friston 1997), implemented on SPM99 software (Wellcome Department of Imaging Neuroscience, UK, http://www.fil.ion.ucl.ac.uk/spm). The system allows levels of significance of activity per voxel to be assessed according to variable statistical parameters, in any sample of contrasts (averaged across volumes, tasks, or subjects), or absolute changes to be plotted against time, with many other options. Software modifications were written to allow both block and event analyses from a single run.

Image volumes from all six subjects were realigned (to correct for the effects of minor head movements during the run), coregistered, and normalised to a standard template (Friston et al, 1995b), from which sections were resampled into the stereotactic space of Talairach and Tournoux (which provides a standard system for defining brain loci using three-dimensional coordinates: Talairach & Tournoux, 1988). For individual subject analyses, images were smoothed with a Gaussian kernel of 6 mm, and for the group analyses, data were smoothed to 10 mm. Smoothing reduces the number of isolated data points, and consolidates areas of more consistent activation.

The block analysis, utilising the two-by-three factorial grid (Figure 5.1), examined ten contrasts. The first two (top line) were examined in individual subjects only:

- H-M: Hamlet minus Macbeth
- R-C: Role minus control
- V-P: Verse minus prose
- VR-PR: Verse minus prose role
- VC-PC: Verse minus prose control

- M-H: Macbeth minus Hamlet
- C-R: Control minus role
- P-V: Prose minus verse
- PR-VR: Prose minus verse role
- PC-VC: Prose minus verse control

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The event analysis examined twenty contrasts between the five events and 'non-events':

<table>
<thead>
<tr>
<th></th>
<th>-RR</th>
<th>-RC</th>
<th>-CR</th>
<th>-NR</th>
<th>-NC</th>
</tr>
</thead>
<tbody>
<tr>
<td>RR: Switching from role to role</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>RC: Switching from role to control</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>CR: Switching from control to role</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>NR: Midpoints during role epochs</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>NC: Midpoints during control epochs</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

The 'non-events' allowed direct comparison between sample volumes from epochs and all event volumes.

RESULTS

Individual

Individual analyses of all six subjects showed widely differing patterns of activity, as would be expected with such complex tasks. Activations during Hamlet versus Lady Macbeth tasks were indistinguishable. Major areas of activation evident in the group analyses were also represented in individual analyses, where in no case did they achieve exceptionally high $z$ scores (i.e. no one individual was dominating the group results).
Group analysis revealed significant differences between role and control epochs and between events/epochs (events/non-events). There were three main findings:

1. Switching from role to control activated three major areas: ventromedial prefrontal bilaterally, right dorsolateral prefrontal, and right inferior parietal (angular gyrus and supramarginal gyrus) (Figure 5.3; Table 5.1). This switch was also associated with significant deactivations (Figure 5.4; Table 5.2).

2. Maintaining the non-role state activated the horizontal and descending segments of the intraparietal/intraoccipital sulcus, mainly in the right hemisphere (Figure 5.5; Table 5.3).

3. All other contrasts, with few exceptions (discussed below), showed no salient features. Verse activated the brain indistinguishably from prose, role-play involved less activity than control, and switching from role-to-role or control-to-role showed no distinctive loci of activity.

The exceptions noted in (3) included, in the role minus control contrast (R-C), an area of left extrastriate occipital cortex (maximum z score 3.96 at Talairach coordinates -22 -94 -8, BA 17: see Figure 5.6). A similar area was seen in a study of hypnotic induction, which the authors interpreted as possibly associated with visual imagery and decreased arousal (Rainville et al, 1999).

The converse contrast, control minus role (C-R), showed ventromedial prefrontal activity (Figure 5.7) though not identical to that seen in the role-to-control switch (RC). Further questioning of the subjects revealed that two had followed an
Figure 5.3. 'Glass brain' views of activations during the role-to-control switch contrasted with role-play (RC-NR). Left hemispheres in visuals represent left hemispheres of subjects.

<table>
<thead>
<tr>
<th>Area</th>
<th>RC-NR</th>
<th>RC-NC</th>
<th>RC-RR</th>
<th>RC-CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventromedial prefrontal cortex (BA 10, 24, 32)</td>
<td>5.90</td>
<td>3.98</td>
<td>5.56</td>
<td>5.69</td>
</tr>
<tr>
<td>Right dorsolateral prefrontal cortex (BA 6, 8, 9, 46)</td>
<td>4.59</td>
<td>4.27</td>
<td>4.56</td>
<td>5.05</td>
</tr>
<tr>
<td>Right angular and supramarginal gyri (BA 39, 40)</td>
<td>4.15</td>
<td>5.14</td>
<td>5.37</td>
<td>4.19</td>
</tr>
</tbody>
</table>

Table 5.1. Major areas of increased activity during the role-to-control switch (RC-), with z scores for most significant voxels in each RC- contrast.
Figure 5.4. 'Glass brain' views of deactivations during the role-to-control switch contrasted with role-play (NR-RC)

<table>
<thead>
<tr>
<th>Inferior frontal gyrus pars triangularis/ horizontal &amp; vertical rami of lateral fissure (BA 45)</th>
<th>NR-RC</th>
<th>NC-RC</th>
<th>RR-RC</th>
<th>CR-RC</th>
</tr>
</thead>
<tbody>
<tr>
<td>-40 -24 18</td>
<td>LH</td>
<td>4.38</td>
<td>4.68</td>
<td>4.57</td>
</tr>
<tr>
<td>Medial superior frontal gyrus (BA 6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-2 0 60</td>
<td>LH</td>
<td>4.40</td>
<td>5.01</td>
<td>4.56</td>
</tr>
<tr>
<td>Superior precentral sulcus/ middle frontal/precentral gyri</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-36 -2 40</td>
<td>LH</td>
<td>3.55</td>
<td>4.46</td>
<td>5.03</td>
</tr>
<tr>
<td>Middle temporal gyrus (BA 21)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-56 -2 -20</td>
<td>LH</td>
<td>3.84</td>
<td>3.25</td>
<td>3.68</td>
</tr>
<tr>
<td>Lateral occipitotemporal sulcus/ inferior temporal/fusiform gyri</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-38 -38 -14</td>
<td>LH</td>
<td>3.53</td>
<td>3.43</td>
<td>3.23</td>
</tr>
<tr>
<td>Parallel sulcus/middle temporal gyrus</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-46 -48 0</td>
<td>LH</td>
<td>4.58</td>
<td>-</td>
<td>5.67</td>
</tr>
<tr>
<td>46 -40 0</td>
<td>RH</td>
<td>4.24</td>
<td>4.25</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 5.2. Major areas of decreased activity during the role-to-control switch (-RC), with Talairach coordinates for the most significant z score in NR-RC
Figure 5.5. 'Glass brain' views of activations during control tasks, contrasted with role-play (NC-NR)

<table>
<thead>
<tr>
<th></th>
<th>NC-NR</th>
<th>NC-RC</th>
<th>NC-RR</th>
<th>NC-CR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intraparietal/intraoccipital sulcus (BA 7a, 19, 39, 40)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LH</td>
<td>4.48</td>
<td>4.56</td>
<td>4.17</td>
<td>-</td>
</tr>
<tr>
<td>RH</td>
<td>5.02</td>
<td>5.23</td>
<td>5.29</td>
<td>3.95</td>
</tr>
</tbody>
</table>

Table 5.3. Major areas of increased activity during control tasks (NC-), with z scores for maxima in each NC- contrast

<table>
<thead>
<tr>
<th></th>
<th>RR-NR</th>
<th>CR-NR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Splenium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 -36 12</td>
<td>4.69</td>
<td>4.27</td>
</tr>
</tbody>
</table>

|                          |       |       |
| Dorsomedial precentral & postcentral gyri (BA 4, 1, 2, 3, 5) |       |       |
| -14 -26 68              |       |       |
| 8 -34 70                |       |       |
| LH                      | 3.92  | 4.58  |
| RH                      | 4.17  | 3.96  |

|                          |       |       |
| Medial superior frontal gyrus/cingulate sulcus (BA 6, 24) |       |       |
| -14 16 40               |       |       |
| 24 20 40                |       |       |
| LH                      | 4.12  | -     |
| RH                      | -     | 3.52  |

Table 5.4. Contrasts between switching to a role and role-play (RR-NR & CR-NR), with z scores for maxima

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Figure 5.6. 'Glass brain' views of role-play contrasted with control (R-C): left extrastriate occipital cortex (maximum z score 3.96; Talairach coordinates –22 –94 –8; BA 17)

Figure 5.7. 'Glass brain' views of control minus role-play (C-R): ventromedial prefrontal (maximum z score 5.28; Talairach coordinates –6 28 –2; BA 24)
unexpected strategy when reading the scrolling text: focusing on the bottom line of the visual display for most of the run, and hence having event times perhaps nine seconds earlier than other subjects. We therefore concluded that the task midpoint volumes (i.e. 'non-events' NR and NC) were more truly representative of task activations, and the following discussion is based on the event analyses only. A further study is planned which will not use scrolling text, in order to control event times accurately.

The other exceptions noted in (3), associated with switching to a role (RR & CR) minus role-play (NR), were bilateral activations of dorsomedial sensorimotor cortices, and unilateral activity in medial superior frontal gyrus/cingulate sulcus, (Table 5.4). These activations were only seen in the RR-NR and CR-NR contrasts, and are associated with one apparently false positive (the splenium is white matter, being the caudal terminus of the corpus callosum).

DISCUSSION

1. Switching from role to control tasks (RC)

When role-play is being ‘switched off’ (the RC switch) there were three major areas of activation, shown in the ‘glass brain’ diagram in Figure 5.3, and in selected sections on an anatomical image in Figures 5.8-5.10. These three areas are of considerable interest in relation to social mirror theory, reflective consciousness and metacognition, and the evolution of the human brain. I will discuss each area in turn, followed by a discussion of ‘deactivations’ during the RC switch.

1. Ventromedial prefrontal cortex

The ventromedial prefrontal area, consisting of perigenual (i.e. the part surrounding
the 'genu' or bend in the corpus callosum) anterior cingulate gyrus and the adjacent area of superior frontal gyrus (Figure 5.8), lies between the cerebral hemispheres just above the eye orbits, and is already known to have socially important functions. This is the area damaged in ‘Phineas-Gage’-type injuries. Phineas Gage was the victim of a blast accident in the mid-nineteenth century (Harlow, 1848). A metal bar was shot through his head, from below the left cheekbone and up through the cranium (see Figure 1 in Dolan, 1999). He recovered with no apparent loss of intellectual function, but a radically altered personality - a complete loss of social empathy and a callous disregard for his formerly loved ones. He became unemployable because, though intellectually quite capable of doing his job, he had lost all concern for the social consequences of his actions, as well as any sense of long-term economic provision (Dolan, 1999; Damasio, 1994). That is, his injury led to a loss of economico-moral persona.

Since then there have been many cases with similar injuries and similar social deficits (Damasio et al., 1983, 1990; Bechara et al., 1994). Two individuals who sustained such injuries in the first fifteen months of life, in addition to the expected impairments, also failed to learn social rules and conventions (Anderson et al., 1999). This might be contrasted with the effects of damage to left-hemisphere language areas in early childhood, where the right hemisphere takes over the language-learning and expressive functions (Zaidel, 1977, 1978; Gazzaniga, 1983). The brain seems to afford no default option for moral learning, presumably because the requisite architecture is bilateral, and also because of its unique interconnectivity with other cerebral structures. This area is the only known source of frontal projections into centres of autonomic control (Lishman, 1998: 80). Ventromedial prefrontal cortex also has

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Figure 5.8. Switching from role-play to control (RC-NR): sectional slices through ventromedial prefrontal cortex

Figure 5.9. Switching from role-play to control (RC-NR): sectional slices through inferior parietal cortex
Figure 5.10. Switching from role-play to control (RC-NR): sectional slices through dorsolateral prefrontal cortex

Figure 5.11. Inferior parietal lobe (red) in relation to sensorimotor cortices (tan) (after Brodmann, 1909)
functional and anatomical interconnections with the amygdala (Bechara et al., 1999), a complex structure with multiple social and emotional functions including aversive and reward related responses. Ventromedial/orbital prefrontal cortex appears to play a central role in representing and modulating autonomic responses such as heart rate, blood pressure (Critchley, in press) and skin conductance response (Critchley, n.d.) and their integration with cognitive, somatomotor, and affective brain systems.

Ideas linking autonomic feedback to emotional experience have a long history: the James-Lange theory of emotion held that subjective ‘feelings’ are interpretations of visceral responses (James, 1894). More recently, Nauta (1971) proposed that patients with orbitofrontal damage cannot ascribe somatic meanings or values to situations or thoughts, whilst Luria (1980) has argued that all stimuli reaching the organism are integrated and tagged with informative or regulatory significance in prefrontal cortex. According to Damasio’s (1994) ‘somatic marker hypothesis’, ventromedial/orbital prefrontal cortex is crucially involved in the development of affectively loaded values, related to experiences of reward and punishment, which enable us to make rational choices and decisions. Specifically, he suggests that this cortical area enables us to represent to ourselves the somatic states which are the likely outcomes of our behavioural options. That is, rational decisions depend on a kind of mental role-play.

The ‘limbic system’ is conventionally associated with affective experience and affectively coded memory, and the amygdala has been particularly linked to agonic reactions (Adolphs, 1999). I have already mentioned the way mothers commonly stimulate small children by playing ‘monster’, adopting a ‘play face’ very similar to that of chimpanzees (Young, 1992). The near ubiquity of play fighting among primates and social carnivores suggests a phylogenetically ancient role for fear and aggression
in socialization, and a subversion of agoncic behaviours to hedonic ends.

Ventromedial prefrontal cortex is equally sensitive to rewarding and aversive contingencies, in contrast to the more evident agoncic role of the amygdala (Adolphs, 1999). Also, prefrontal reward-related representations are less stimulus driven than in the amygdala, and allow greater flexibility of response (Schoenbaum et al., 1998).

By loose analogy with grooming behaviour in apes, the area might be thought of as a 'grooming centre'. Ventromedial damage leads to loss of empathy with others, and there are sectors which respond to pleasurable bodily contact (Rolls, 2000), complementary and affectionate words (Maratos et al., 2001), and pleasant as opposed to discordant music (Blood et al., 1999). This suggests a range of functions essential to experiences of intimacy and rapport, particularly the close social-mirroring and bonding which we experience as babies towards our mothers, as well as the loving relationships of adult life. Empathy, the capacity to simulate the internal states of others (regardless of sympathy or concord with them: Railton, 2000), is clearly requisite for role-play.

The above comments make no claim to exhausting the functions of ventromedial prefrontal cortices. The anterior cingulate gyrus in particular appears to be multifunctional, and since the advent of scanning technology, has been increasingly reported in studies of a wide range of mental and physical activities (Paus et al., 1998). Tasks involving effort, physical or mental, frequently engage loci within the anterior cingulate gyrus (Paus et al., 1993, 1998), and it is the comprehensive range of inputs to prefrontal cortex more generally which seem particularly suggestive in the context of role-play. Since Method-style acting, dissociated personalities (Castillo, 1994), and perhaps more everyday types of role-play described by social scientists
(Goffman, 1959, etc.), comprehensively recreate internal states appropriate to the role or persona, any putative ‘role-play module’ would be expected to have modulatory capacities relating to physiological and affective responses.

The known associations with this area suggest that it must be involved in the creation of social persona and economico-moral personae - the obligatory roles we play in everyday life. We might also reasonably infer a parallel involvement in the conscious role-play of theatre performance, and in creating and motivating imagined personalities - the dramatis personae who inhabit our dreams and daydreams, the essential performers of social imagination or ‘theatre of mind’.

2. Right inferior parietal cortex

As can be seen from the glass brain diagram (Figure 5.3, cf. also sectional views in figure 5.9), the area of the angular and supramarginal gyri activated when ‘switching off’ role-play forms the apex of a truncated triangle, bounded along its superior and posterior sides by the dorsal visual stream, along its base by the temporal lobe incorporating the ventral visual stream and auditory cortex, and along its anterior side by primary somatosensory and motor cortices (Figure 5.11).

Almost all inputs to this area come from other cortex, and it is strategically placed for the integration of multimodal data (Geschwind, 1967) and selection of data for action and access to consciousness (Rafal, 1994) - in other words, attention, intention, contact with the world, and monitoring the body in space (Lishman, 1998; Driver & Mattingley, 1998).

Injuries to this area lead to left-sided neglect. That is, in the acute phase of the condition (Lishman, 1998), subjects lose the left half of their world and the left sides
of everything in it. They brush only the right side of the head, wash or shave the right half of the face, read or write from the middle of the page, draw only the right halves of objects or copy the right halves of drawings, and eat from the right side of the plate (Rafal, 1994).

The neglect may be either left sided in relation to the body, or in relation to the attended object. So, for example, if a patient eats only the right half of a meal, you might expect that turning the plate through 180° would allow the patient to finish the meal. However, if the patient sees you turning the plate, the plate’s left-right coordinates may rotate with it, and the patient will remain unconscious of the uneaten food (cf. Behrman & Moscovitch, 1994; Rafal, 1994). To make this feat possible, the whole plate and its spatial coordinates must be perceived and tracked outside consciousness. Other evidence makes it clear that visual and other perceptual data are fully processed up to the highest semantic level, but are simply ignored or denied (A.W. Young et al., 1992; Driver et al., 1993; Grabowecky et al., 1993; McGlinchey-Berroth et al., 1993; Driver & Mattingley, 1998).

For example, after the acute phase, when left-sided awareness is recovered, a more persistent deficit is left-sided extinction (Lishman, 1998). That is, if two like objects are presented simultaneously, the one on the left will be extinguished and its existence denied by the patient. But the ‘identity’ of the two objects is determined by the patient’s own intentions towards the object. So, if asked to name the colour of a presented object, a green fork will extinguish a green spoon, but not a red fork. If asked to name the object category, the green fork will now extinguish the red fork, even if they are entirely different types and sizes of fork (Baylis et al., 1993; Berti & Rizzolatti, 1992). The identity is established cognitively outside consciousness,
persisting even when objects are shown at very different and confusing angles. The brain is clearly classifying the two objects, and ‘selecting’ which ones to extinguish: the surprising implication being that metacognitive processes can themselves be unconscious. And, as with the dinner plate, the left-right axes can be rotated, so that the patient extinguishes the ‘left’ object regardless of whether the investigator, holding the two objects one in each hand, extends his arms sideways, diagonally, or vertically.

Parietal neglect tends to improve with time, and is usually relieved, momentarily, by directing the patient’s attention to the ignored hemifield or side (Driver & Mattingley, 1998). If, for example, you say "John, you have only shaved half your face today," John will glance in a mirror, or feel his face, and agree that you are right. It would appear that this simple comment duplicates the normal function of the injured cortex - directing attention to data which is fully perceived and processed, but otherwise excluded from reportable consciousness.

Social mirror theory predicts that we can only have reflective access to mental contents which are reflected by the behaviour of others, and if you direct John’s attention to his unshaven side, you are acting as a social mirror. Crick and Koch (1995) have suggested that mental processes cannot be conscious unless they have direct access to motor planning systems, but, as explained in the last chapter, Milner and Goodale have shown that visually guided movement, which is intact in blindsighted patients, is unconscious (Goodale, 1993, 1998; Goodale et al., 1991; Goodale & Milner, 1992; Milner, 1998; Milner & Goodale, 1993, 1995). What is unconscious, apparently, is egocentric data, and access to motor systems may only be relevant as a precondition of social mirroring.

There is now a growing body of evidence for a curious phenomenon known as
'change blindness' (Simons & Levin, 1997). Major changes to a visual scene are not perceived by normal people if they occur during a saccade or blink, or if a distracting 'mud splash' appears on the picture at the moment of change. Theorists such as Churchland et al. (1994) infer that we do not perceive in detail, but repeatedly scan and foveate a scene to extract 'task relevant information' as and when it is needed. Kevin O'Regan (2000) describes our subjective impression of comprehensive visual awareness as a 'grand illusion', and the envisaged scene as an 'external memory store'. However, whenever I look out of my study window, I always see the same trees, whether they are 'task relevant' or not. I suggest, rather, that they are potentially task relevant when I choose to look at them, and such potential tasks are often social, such as my decision to write about them just now, and are always relevant to potentially shared experience. It is the function of dorsal processing to analyze task relevant information in the detail requisite for fine visually guided movement. If I make a drawing of the trees (another social task) I will also detect any rearrangement that occurs between glances. What investigators fail to note is that unperceived changes are always socially meaningless: for example, the reflection of a mountain in a lake appears or disappears, or a railing behind a conversing couple moves up or down (O'Reagan, 2000). An eye-tracking study of the latter showed the viewers' gaze circling between the faces and hands of the conversants, the likeliest sources of social cues.

A social interpretation of change blindness is supported by evidence from studies of 'attentional blindness' (Mack & Rock, 1998: 227; Mack, 2000). Although we are not usually conscious of unattended objects, even when the eyes are fovealy focused on them, we are if the objects are socially meaningful images such as a happy
face icon, a human stick figure, our own name, and possibly the word ‘stop’ (Mack, 2000). This appears to be a visual analogue of the well-known ‘lunch queue phenomenon’, where we are deaf to unattended conversations until our own name or other socially salient word is mentioned (Oakley & Eames, 1985).

The inferior parietal area is not only responsible for maintaining contact with the real world, but is involved in contact with imagined worlds as well. So, patients with parietal neglect will describe only one half of an imagined scene (Bisiach et al., 1978, 1979, and review: Bisiach, 1993). If asked to describe Trafalgar Square as seen from the north, they will describe the western half, and then if asked to imagine the view from the south, they will describe the eastern half, and each time will be satisfied that they have given a full account (Rosenfield, 1992). Patients who also have delirium report only the right sides of hallucinations (Chamorro et al., 1990; Mesulam, 1981), and in REM sleep, the eyes saccade to the right only, as they selectively view the right sides of their dreams (Doricci et al., 1991).

Earlier, I suggested that ventromedial prefrontal cortex is likely to be involved in the creation and motivation of the dramatis personae required for imagined social scenarios. It seems equally likely that this second area - inferior parietal cortex - adds the arms and legs, the embodiment, the contact with the world and the mechanics of social imagination - the puppetry, stage setting, and stage props for ‘theatre of mind’. We might expect these two areas to be of central importance in both real-world role-play and running social scenarios in imagination.

As yet unresolved is the question of why right-sided neglect, associated with lesions to the left or ‘dominant’ hemisphere, is much rarer than left-sided neglect in
humans (Lishman, 1998). In rats, injuries to dorsomedial prefrontal cortex produce diminshed responsiveness to events on the contralateral side of the body (Vargo, Richard-Smith & Corwin, 1989: in Bradshaw, 1991). However, right sided lesions produce more lasting deficits and even result in some ipsilateral neglect. Asymmetries of response to extracorporial space may be ancient: Cambrian trilobites show a marked predominance of healed predation scars on the right (Babcock & Robinson, 1989: in Bradhsaw, 1991). In the case of mammals and birds, right hemisphere dominance for spatial processing may reflect the specilaization of the left hemisphere for vocal signals. However, none of these animals has any close homologue of the inferior parietal area.

In humans, injuries to the left angular and supramarginal gyri result in deficits other than right-sided neglect: ideomotor apraxia (inability to execute verbally requested actions), components of ‘Gerstmann’s syndrome’ (finger anomia, left-right disorientation, dyscalculia, and dysgraphia), and, most notably, ‘visual asymbolia’ (Lishman, 1998). This latter usually refers to an inability to read or write (alexia and agraphia) but extends generally to the creation and interpretation of visual symbols.

Geschwind, in ‘Neurological foundations of language’ (1967), emphasizes the distinctive human ability to form higher-order associations between sensory stimuli. In non-human primates, the main outflow from sensory association cortex is to the limbic system, where experiences are linked to values relating to basic drives such as feeding, mating, and aggression. Links between sensory modes are relatively meagre in apes and monkeys. In human brain evolution, the impressive advance, according to Geschwind, is the expanded area around the angular gyrus at the tempo-parieto-occipital or hearing-touch-vision junction, which allows multi-modal associations to be
formed between 'non-limbic' stimuli. Geschwind points out that inputs to this inferior parietal area are almost all from other cortex, and it is one of the last to myelinate.

In Geschwind's view of visual semantic processing, a seen object stimulates visual association cortex, which via the left angular gyrus is linked to associations with the 'heard name' in Wernicke's area (auditory association cortex), which is interconnected via the arcuate fasciculus to Broca's (speech) area of motor association cortex. Coding is reorganised at each way-station. With this scheme, Geshwind is able to account for the various dysphasias associated with lesions in these different areas. His argument closely follows the essence of Wernicke's original theory of language processing (1874).

I mentioned that the inferior parietal area is bounded by sensory and motor processing cortices. Whilst this is strategically appropriate, in the right hemisphere, for the attentional, intentional, and imaginal functions discussed above, it would seem to be equally strategic for the interpretive functions associated with language and literacy in the left hemisphere. Language is a relatively recent human innovation, and literacy is certainly a culturally acquired skill - the domain of specialised scribes or elite groups throughout most of its history, and still far from universal in our species. A viable hypothesis to explain the preponderance of left-sided neglect might be that the emergence of language and literacy displaced former left parietal functions into a more diffusely organised system. There appears to have been displacement (whether due to language or not) even into the right hemisphere, because the right parietal cortex has distinct foci for attention to the right and left hemifields, whereas no such foci have been found in left parietal cortex (Corbetta et al., 1993). Research using traditionally non-literate subjects might help to support or disconfirm this hypothesis. The study of
deaf signing and reading, which I discussed in Chapter 4, indicates that parietal and temporal areas in both hemispheres are readily adaptable to language-related functions (Neville et al., in press).

Theories of human communication, as I have pointed out, have often been biased by excessive emphasis on language, and it is regularly forgotten that face-to-face human conversation is accompanied by a rich variety of prosodic, facial, and gestural signals (Burling, 1993). Scanning studies have shown that processing the prosodic content of speech takes up at least as much neocortical volume in the right hemisphere as semantic and syntactical processing in the left (Brown, 1991). Ross has suggested that processing the affective components of language in the right hemisphere - prosody, emotional gesture, etc. - closely parallels that of propositional speech in the left, and provides evidence for a whole series of ‘aprosodic’ subsyndromes - ‘motor aprodnesia’, ‘sensory aprodnesia’ etc. - which parallel the dysphasias caused by equivalent left-hemisphere lesions (E.D. Ross, 1981; E.D. Ross & Mesulam, 1979).

Lishman (1998) cites several cases of speech loss following left hemispherectomy in patients who nevertheless retained the ability to sing familiar songs and hymns with little hesitation or articulation errors (Smith, 1972; Burklund & Smith, 1977; Searlman, 1977). Music, one of the most powerful of human social mirroring abilities, is primarily processed in the right hemisphere (Kimura, 1961, 1964; B. Milner, 1962; Shankweiler, 1966; Gordon & Bogen, 1974; Wyke 1977), though less markedly so in professional musicians (Lezak, 1995; Schlaug et al., 1995). This too may in part reflect displacement following the emergence of language. It is possible that the evolution of song-and-dance display, as discussed in Chapter 4, requiring integration of visual, auditory, and sensorimotor processes, may have pre-
<table>
<thead>
<tr>
<th>Brodmann’s areas</th>
<th>Talairach y coordinates</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6, 8</td>
<td>18 - 38</td>
<td>Superior frontal gyrus</td>
</tr>
<tr>
<td>6, 8, 9, 46</td>
<td>18 - 54</td>
<td>Middle frontal gyrus, superior part</td>
</tr>
<tr>
<td>46</td>
<td>36 - 52</td>
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<td>10</td>
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<td>Middle frontal gyrus, inferior part</td>
</tr>
<tr>
<td>47</td>
<td>46 - 46</td>
<td>Lateral orbital gyrus</td>
</tr>
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*Figure 5.12. Right frontal and prefrontal activations during role-to-control switch (RC-NR)*
adapted many left and right hemisphere structures for the future emergence of mimetic abilities, including role-play and theatre of mind, which in turn laid the foundations for the emergence of language.

3. *Right dorsolateral prefrontal cortex*

The third major 'area' activated when switching off role-play is illustrated in Figures 5.3 and 5.10. This is a rather scattered set of structures extending also into dorsal and lateral orbital regions, as can be seen more clearly in Figure 5.12.

All of these loci are prefrontal with the exception of the dorsal frontal area (BA 6), which is premotor cortex. Dorsal prefrontal cortex (BA 8 and 9) receives heavy input from the parietal lobe and is known to be activated during decision making (what to do and when) and also imagined movements (Frackowiak et al., 1997). Dorsolateral prefrontal cortex (DLPFC) is conventionally associated with executive systems which enable us to control and delay spontaneous responses, and which control 'slave systems' such as visual scratchpad memory. DLPFC is activated during active memory, mental imagery, and selective attention (*ibid*). So this area generally shares a number of functions - attentional, intentional, and imaginal - with the inferior parietal cortex discussed above. Indeed right DLPFC lesions can cause very similar symptoms of left-sided neglect (Kinsella *et al*., 1993; Duhamel *et al*., 1992).

It has been reported that, whereas posterior lesions produce attentional neglect, anterior lesions lead to motor neglect by disrupting the internal representation of an intended trajectory (Mattingley *et al*., 1992; see also Bisiach *et al*., 1990; Tegner & Levandar, 1991). However, this former orthodoxy has now been questioned (Mattingley & Driver, 1997). A recent study has shown that inferior parietal lesions
(sparing superior parietal and frontal cortices) can incur specific motor deficits
(Mattingley et al., 1998), and this is consistent with monkey data indicating that motor
intentions are initiated in the posterior parietal lobule (Snyder et al., 1997; Driver &
Mattingley, 1998).

Right DLPFC lesions have also been linked to neglect of internal imagery. Two
patients with mainly parietal lesions did not evidence neglect in visual imagery
(Anderson, 1993) whereas a patient with a frontal lesion causing neglect of imagined
scenes did not have perceptual neglect (Guariglia et al., 1993). Such distinctions
between frontal and parietal injuries may reflect, rather, the complexities of both
areas. A better interpretation may be that the parietal lobe features a mosaic of
specialized areas all of which are interconnected with corresponding frontal areas (cf.
Rizzolatti et al., 1997), accounting for the clinical diversity of patients presenting with
lesions to either lobe.

Prefrontal lesions generally are associated with a ‘frontal lobe syndrome’
(Lishman, 1998: 76) characterized by profound personality changes, notably
disinhibition. The social behaviour of such patients is marked by expansive
overfamiliarity, tactlessness, over-talkativeness, childish excitement ('moria'), prankish
joking and punning ('Witzelsucht'), diminished social and ethical control, lack of
concern for the future or the consequences of actions, sexual indiscretions, petty
misdemeanours, and gross errors of judgement regarding financial and interpersonal
matters (Lishman, 1998: 17, 76ff). What is striking here is the loss of socially-aware
control over behaviours which are themselves social and complex in their own right.
Gruzelier (2000b) points out the close parallels between the disinhibited behaviour of
the prefrontal patient and the phenomena of stage hypnosis, in which people are
persuaded to perform ludicrous actions which they would normally find embarrassing or humiliating. He also points out the analogous cause - suppression of prefrontal controls.

Prefrontal patients may also exhibit a loss of reflective insight and mood elevation - mainly an empty or fatuous euphoria, in contrast to 'true elation' which tends to be infectious (Lishman, 1998: 17). Other cases are characterized by lack of initiative, aspontaneity, and profound psychomotor slowing (especially with tumours) which may progress to virtual stupor.

Despite impairments of concentration, attention, and planning, formal intelligence is surprisingly well preserved in prefrontal patients, as can be shown by appropriate testing if the patient's cooperation can be secured. The sophisticated nature of prefrontal executive controls accounts for the 'silent' nature of many DLPFC lesions - which may get large before neurological signs become apparent. In other cases, the overall picture may resemble a generalised dementing process even with sharply focal lesions (Lishman, 1998: 17).

Prefrontal injuries have also been implicated in 'environmental dependency syndrome' (Lhermitte, 1986: in Lishman, 1998: 79), characterised by compulsive role-play in response to social cues. For example, a female patient taken into a room with a buffet promptly assumes the role of hostess, laying out glasses and offering food to the psychiatrist. Confronted with make up, she immediately uses it; seeing needles and wool, she knits. A male patient, taken to a bedroom with the sheet turned back, undresses and prepares to sleep. Hearing the word 'museum' in an apartment, he methodically examines paintings, and goes from room to room inspecting objects. Lhermitte, commenting on these patients' lack of personal autonomy and excessive
dependence on the 'social and physical' environment, suggests their symptoms reflect
decreased frontal control of parietal sensorimotor systems which link the subject to the
world. Orbital prefrontal lesions are more specifically associated with 'forced
utilization' behaviour (Lhermitte, 1983). Again there are evident parallels here with
hypnotic phenomena.

So we have a range of functional and anatomical links between the prefrontal
and parietal lobes, and many symptoms of the 'frontal lobe syndrome' reflect the
superordinate control of prefrontal over more posterior systems (Lishman, 1998: 79). DLPFC is also interconnected with anterior cingulate (ventromedial prefrontal) cortex (Paus, 1993, 1998). The dorsolateral and orbital structures activated during the role-to-
control switch (Figure 5.12) may be interpretable as 'way stations' between the
inferior parietal and ventromedial prefrontal cortices also activated during this event,
with executive controls extending to many areas of the brain.

The question remains as to why parietal and DLPFC activations in this study
are apparent mainly in the right hemisphere. The most suggestive clue seems to be the
great predominance of left-sided over right-sided unawareness and neglect, associated
with lesions to these two areas, and I have suggested that the organizational changes in
the left hemisphere following the emergence of language and literacy may account for
this. Just as there are loci in right parietal cortex involved in attention to left and right
hemisfields (Corbetta et al., 1993), there are right DLPFC areas with bilateral
functions (Fink et al., 1999). It seems significant that most of the activations
associated with 'switching off' role-play are in the right hemisphere whereas most of
the deactivations, which I will comment on next, are in the left.
4. Deactivations during the RC switch

The seven most significant loci are listed in Tables 5.2 and 5.5. Two of these are in premotor (BA 6) cortex, one is within or overlapping Broca’s area (BA 45), and four are in temporal cortex. This pattern of distribution suggests language related functions, and three of these are similar to areas identified in a PET study of inner speech and auditory verbal imagery by McGuire et al. (1996). In this latter study, the ‘inner speech’ tasks required subjects to generate simple sentences ending with a cue word presented on a computer screen, mentally reciting each sentence once, in their usual ‘inner voice’, without speaking or subvocal articulatory movements. The ‘auditory verbal imagery’ tasks were identical to the ‘inner speech’ tasks except that subjects were to imagine the sentences being spoken to them in another person’s voice. Control tasks involved silently reading similar sequences of words. Words selected for the study were adjectives readily applicable to people, mostly derogatory (e.g. ‘stupid’, ‘ugly’); such words were chosen because they occur frequently in the auditory hallucinations of schizophrenia. Table 5.5 compares activations (i.e. significant increases in regional cerebral blood flow, rCBF) in the McGuire et al. study with RC deactivations in the present study (NR-RC).

The activation of Broca’s area during both ‘inner speech’ and ‘auditory imagery’ were interpreted by McGuire et al. as suggestive of imagined speech articulation (there was no evidence of overt articulation, which was monitored using a sensitive throat microphone). Many of the additional regions activated by auditory imagery, including ventral premotor cortex and supplementary motor area (SMA), are associated with overt articulation (refs. in McGuire et al., 1996). The authors suggest that imagining alien speech may involve a more prominent component of mental
### Inner speech-Control

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
<th>z</th>
<th>Z score</th>
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<td>3.1</td>
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<td>24</td>
<td>18</td>
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### Auditory imagery-Control

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<td>24</td>
<td>18</td>
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<tr>
<td>-44</td>
<td>0</td>
<td>24</td>
<td>4.8</td>
<td>L inferior frontal gyrus (BA 44)/precentral gyrus (BA 6)</td>
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<td>-2</td>
<td>40</td>
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<tr>
<td></td>
<td></td>
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<td>L middle frontal gyrus (BA 6)/precentral gyrus (BA 6)</td>
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<tr>
<td>-6</td>
<td>-2</td>
<td>64</td>
<td>3.2</td>
<td>Supplementary motor area (BA 6)</td>
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<td>60</td>
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<tr>
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<td>0</td>
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<td>-20</td>
</tr>
<tr>
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<td>8</td>
<td>4</td>
<td>3.2</td>
<td>R insula</td>
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<tr>
<td>-36</td>
<td>-42</td>
<td>8</td>
<td>2.8</td>
<td>L superior temporal gyrus (BA 22)</td>
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<td>L middle temporal gyrus/parallel sulcus (BA 22)</td>
<td>46</td>
<td>-48</td>
<td>0</td>
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<td></td>
<td>R middle temporal gyrus/parallel sulcus (BA 22)</td>
<td>46</td>
<td>-40</td>
<td>0</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>L lateral occipitotemporal sulcus</td>
<td>-38</td>
<td>-38</td>
<td>-14</td>
</tr>
</tbody>
</table>

*Table 5.5. Coordinates of maximally significant increases in rCBF during 'inner speech' and 'auditory verbal imagery', compared with deactivations during RC switch*
articulation than inner speech, possibly reflecting an additional element of ‘inner imitation’. They further suggest that the left temporal activations associated with auditory imagery may correspond to the internal ‘inspection’ of imagined speech. Some of the differences between the two studies may reflect the different controls used: silent reading of simple adjectives in the study by McGuire et al. versus much more complex silent reading tasks in the present study.

5. Summary of RC changes and comment

All the above findings clearly present an explanatory problem. If the deactivations during the RC switch reflect reduced inner speech activity, which would not be surprising if this represented the cessation of role-play, why do they not persist during the control task (NC)? They clearly do not because the NC-RC contrast shows the same loci as other minus RC contrasts.

Even more problematic are the three major areas of increased activity during the RC switch: ventromedial prefrontal, dorsolateral prefrontal, and inferior parietal. For all three regions I have presented evidence suggesting their likely involvement in role-play. But in our experiment we do not see this - all we see here is significant activation when role-play is being ‘switched off’. How do we explain these ‘wrong way round’ findings?

Before I attempt to answer this question, there is one more ‘wrong way round’ finding to consider.

2. Maintaining the non-role state (NC)

In a conventionally designed experiment, the ideal is to find a control task which
exactly matches the target task in all respects other than the target activity which is the object of the investigation. So, when control task activations are subtracted from target task activations, the remaining activity should represent the activity of interest - in the present case, role-play. Any activity in the opposite contrast - control minus target - ought to represent areas of relative deactivation during the target task.

In the present study we see the converse of this ideally expected result. In the role-play minus control contrast (NR-NC) there were no salient features, other than a false positive in the left lateral ventricle (cerebrospinal fluid: similar false positives, usually in both left and right ventricles, were apparent in all -NC and -RC subtractions, except when NC and RC were subtracted from each other).

On the other hand, in the control minus role-play contrast (NC-NR) there were extensive bilateral activations of the horizontal and descending segments of the intraparietal sulcus and adjacent areas. Activity was more extensive, and with higher $z$ scores, in the right hemisphere than in the left (see Figures 5.5 and 5.13, and Table 5.3). These areas of increased oxygen consumption, relative to role-play, are unlikely to reflect deactivations associated with role-play, because they appear in all four 'control minus’ contrasts (NC-NR, NC-RR, NC-CR, NC-RC), but not in other ‘minus role-play’ comparisons (RR-NR, CR-NR, RC-NR). They appear to be specifically recruited during maintenance of the non-role condition.

The horizontal and descending segments of the intraparietal sulcus form the upper and posterior boundaries of the parietal area discussed earlier in the context of ‘switching off’ role-play - the supramarginal and angular gyri (Figure 5.14: adapted from the atlas of Duvernoy, 1991). From there the sulcus descends into the occipital lobe where it becomes the intraoccipital sulcus. It forms part of the dorsal visual
Figure 5.13. Maintaining the non-role state. Sections through intraparietal sulci

Figure 5.14. Surface anatomy of the intraparietal/intraoccipital sulcus (after Duvernoy, 1991)
stream, which maps visual space in body-centred and object-centred coordinates (Andersen et al., 1997; reviews: Ungerlieder & Haxby, 1994, Rizzolatti et al., 1997, Graziano & Gross, 1998), and presumably supplies the data which make possible some of the remarkable phenomena of parietal neglect. The dorsal visual stream generates the ego-centric information necessary for smoothly coordinated action (Graziano & Gross, 1998).

The intraparietal sulci are activated in a variety of spatial tasks, including out of phase bimanual movements (Fink et al., 1999), visual rotation tasks (Carpenter et al., 1999), and reading both verbal text (Turner, unpublished) and musical scores. In a mapping study of musical performance (Sergent et al., 1992), there were bilateral activations along this route associated with reading a musical score whilst playing the melody with the right hand. Written music uses an analog scale relating spatial ‘movements’ of the notes to their musical pitch, and playing an instrument also requires movement coordinated with sound. In this respect, both reading a score and playing an instrument have dance-like properties - notations ‘dance’ on the stave as the fingers ‘dance’ on the keyboard.

As far as the control task is concerned in the present study, there were no dance-like requirements, other than in the blank verse controls, and these were matched by the Shakespearean iambic pentameter of the role tasks. Further, such activity did not appear in the verse-prose contrasts. Possible reasons for the involvement of the intraparietal sulcal areas during our control tasks will be considered below.

**Interpretation of the ‘wrong way round’ findings**

Three possible explanations for our apparently paradoxical results have been suggested:
1. Rehearsal bias

I have already mentioned a number of factors which may have contributed to a rehearsal bias, potentially leading to greater facility of performance favouring verse Shakespeare over prose Shakespeare, and Shakespeare over control. Hypothetically, such a bias might have made the role-play tasks easier to perform than the control tasks, with consequently greater brain activity during the latter. Subjectively, however, actors reported finding the role tasks, and constant switching between roles, much more demanding and exhausting than the control tasks (one reported ‘drifting’ during control epochs). Further, there should have been a similar though smaller difference in difficulty between verse and prose Shakespeare, which was not apparent in the prose-role minus verse-role contrast. Also, though the rehearsal bias argument might explain the greater activity during control tasks, it does not explain the large and different areas of activation when switching from role to control. But the strongest reasons for doubting the relevance of rehearsal bias are the brain areas involved.

The intraparietal sulcus, though admittedly active during reading tasks, is not known to be involved in cognitive aspects of reading: the classic language interpretation areas are left temporal and left inferior parietal, whereas our study showed greater activity in the right. The dorsal stream processes visual data, and coordinates visually guided movement. Imagined movement and visualization were required only in role-play tasks - drawing swords, wringing hands, moving about the stage, gesturing, and visualizing the scene. The control tasks required no such effort, and were rehearsed relaxing in a comfortable chair. A rehearsal bias cannot explain this.

Even more germane to the argument are the three areas activated when ‘switching off’ role-play. These are areas with major social and imaginal functions,
which might reasonably be expected to be involved in 'theatre of mind' tasks, but not, with the exception of the anterior cingulate, in non-social tasks. This strongly suggests a very different interpretation.

2. Non-social tasks are more difficult than social tasks

This is undoubtedly true, and has been elegantly demonstrated using Wason tests (Wason & Johnson-Laird, 1972; Griggs & Cox, 1982). Wason tests compare performance on pairs of tasks which are logically identical, but one is presented as a social problem, the other as an abstract logic problem. For example, a social problem might require the subject to imagine he is a barman, who has to ensure that no one aged under eighteen years consumes alcohol in his bar. He knows the ages of two drinkers (one is over eighteen, the other under) and knows what two others are drinking (one has a Coke, the other a beer). The subject has to say which drinks or ages need to be checked. In a typical study, around 70% of university undergraduates get this kind of problem right (the answer being to check what the under-eighteen is drinking, and the age of the beer-drinker).

In the abstract version of this task, the subject is presented with four cards, marked E, K, 2, and 7, and asked to check the rule that every card with a vowel on one side must have an even number on the other. Only around 30% get this one right (the correct answer is to turn over cards marked ‘E’ and ‘7’).

Various objections to the validity of these tests (e.g. the bar problem is simply more familiar than the card problem) have been met by suitable modifications of the tests (e.g. inventing exotic and bizarre social rules: Cosmides & Tooby, 1992).

So we can say that people find social problems easier to solve than non-social
ones, and can further say that 'theatre of mind' makes social tasks intuitively easier (the barman task clearly involves imagining the role, the bar scenario, the employee responsibility, the long arm of the law, etc). Subjectively, most of us find abstract logic or object-centred reasoning 'work-like', whereas social logic (as in following the tangled personal relationships in a soap opera) tends to be 'entertainment'. Educators are well aware that the 'three Rs' have to be taught, whereas social learning takes place spontaneously in play. Such observations are also consistent with social intelligence theory (Byrne & Whiten, 1988; Dunbar, 1998).

Applying this to the present study, we might argue that because the brain is specifically adapted to social tasks, these can be solved without discernible increases in activity, whereas non-social tasks, for which the brain is less well adapted, demand more effort. This meets with some of the same objections as the rehearsal-bias argument: for example, it does not explain why actors found the role-play tasks harder than the control tasks (unless it is also argued that the cognitive effort during control tasks, but not that during role-tasks, was unconscious), nor does it explain the distinct activations associated with 'switching off' role-play. Further, it can just as well be argued the other way round: if the brain is adapted to social logic, which is manifestly more complex than abstract or object-centred logic (it is easier to manipulate inanimate objects because they are not trying to manipulate you), then one would expect larger brain areas devoted to social reasoning than to mechanical reasoning (this is the basic premise of social intelligence theory - brain expansion in primates is due to the complexities of social reasoning). When these areas are presented with a demanding social task (as opposed to the smaller areas recruited by an abstract task), then these larger areas should show increased activity. If they do not, that would suggest either
that the brain is running social problems all the time, or that natural selection has provided us with such superabundant brain-power that the difference between working and idling is negligible - a notion hardly compatible with the parsimony of natural selection or the physiological costliness of brain tissue (Aiello & Wheeler, 1995). But we hardly need to speculate about this - the 'theory of mind' studies discussed in Chapter 4 consistently showed greater brain activity during social than non-social tasks (Gallagher et al., n.d).

The 'social is easier' argument is not incompatible with a third interpretation of our 'wrong way round' findings, and even strongly points toward it (with the suggestion that the brain may be running social problems all the time).

3. Role-play is a full-time activity of the human mind

A third possible explanation might be that role-play is a full-time activity of the human mind (in awake adults), and cognitive effort is required to suppress or ignore social imagination during tasks involving abstract logic or the behaviour of inanimate objects. This hypothesis has the virtue of potentially explaining all the observed data, and the further strength of explaining why human beings find such tasks more difficult than social reasoning, and perhaps why autistic children, having impaired role-play abilities, occasionally show an exceptional aptitude for abstract tasks (e.g. spatial reasoning: Happé & Frith, 1996; Happé, 1998). Interestingly, subjects with Phineas-Gage-type lesions (and known deficits of social reasoning) have been shown, using Wason tests, to achieve higher abstract logic scores than subjects with other lesions, including other prefrontal injuries (Adolphs, 1999; Adolphs & Damasio, 1995; Adolphs et al., 1995b). For the purposes of this argument, it is unfortunate that normal subjects were
not used as controls, but the abstract logic scores achieved by the patients with ventromedial prefrontal lesions (68% correct) were higher than those achieved in studies of undergraduate students (30% correct, versus 70% for social logic: Cosmides & Tooby, 1992). Apparently, the severe impairment of social logic is advantageous when solving abstract problems.

If the full-time activity hypothesis is correct, then 'theatre of mind' was active continuously throughout our study, in both role-play and control conditions, the difference being that it was conscious during role tasks, and unconscious during control tasks. Three areas that one would reasonably expect to be involved in role-play - ventromedial prefrontal, right dorsolateral prefrontal, and right inferior parietal - are in fact major role-play areas, but were not apparent during the role condition because equally active during control tasks. However, a brief 'flash' of increased activity was seen in these areas at the point of dissociation (the RC switch).

The intraparietal sulcal areas activated during control tasks would in this case represent cognitive effort required to maintain the exclusion of social imagination from awareness. Such effort might itself have been conscious. For example, actors, making a deliberate effort to avoid role-playing the control tasks, may have concentrated unduly on the mechanics (as opposed to the meaningful content) of reading the control texts. Alternatively, they may have focused attention on their supine bodily posture and the requirement to avoid bodily movements during scanning. Either of these strategies might have recruited such posterior parietal areas.

A further experiment is in preparation, designed to obviate the main weakness of the present study protocol - the scrolling text, which permitted too much variation in event times between subjects. My current hypothesis is that improved definition of
event times will yield similar RC results to those reported above, but with higher $z$
scores (i.e. more significant activations), and that the C-R contrast will resemble the
NC-NR contrast.

If role-play is as ubiquitous as some people think, it will be difficult, perhaps
impossible, to design a control task which sufficiently obviates ‘theatre of mind’. Role-
play may be part of the ‘noise’ that gets subtracted out of every contrast in all brain
mapping studies. The problem of finding an appropriate control activity presents a
major challenge for future role-play research. An interesting possibility is that 5- to
11-year-old children would not have full-time mental role-play, but then the problem
would be one of ensuring task compliance. This is a problem even with adult subjects
(debriefing sessions are intended to check for compliance).

The full-time activity hypothesis would seem to be testable. For example, if
rest periods were included in a study, then according to the hypothesis these would in
fact be role-play tasks. Contrasts between rest and role-play should not therefore reveal
brain activity associated with role-play, whereas switching from rest to control should
resemble switching from role to control. Assuming that a role-free control task can be
devised, contrasts between rest and control which match contrasts between role and
control should represent role-play activity.

3. Verse and prose

Within the limitations of our study design and the technology used, we were unable to
show any difference in brain activity between verse and prose. This is in itself a
noteworthy finding in view of the profound subjective difference between the two
which many of us would claim to experience. It is important to bear in mind that the
main difference between verse and prose in this study was rhythmic. There was no rhyme scheme or assonance, and very little alliteration or other acoustic wordplay. Much of the purely ‘musical’ (pitch, tone, etc.) and affective content of speech lies in its prosody, which could hardly fail to be similar in verse and prose tasks; whilst affective and dramatic imagery, important components of ‘poetry’, were equally common to both. It is currently fashionable for actors to speak blank verse in as naturalistic a manner as possible, leaving the iambic pentameter to look after itself: an aspect of style which audiences may or may not consciously appreciate, and which we did not attempt to modify in this study.

In view of these constraints, and the fact that our study was not primarily designed to investigate the main effects of verse, it may be inappropriate to attempt an interpretation of this particular negative finding. However, it is worth noting that cross-cultural studies have established the remarkable ubiquity of the three-second line, in poetry, music, and dance (Pöppel, 1988). Even more remarkably, the most prosaic everyday conversation also has features common to poetry, song, and dance: a three second line structure and rhythm (Brown, 1991: 51-2), as well as the use of dramatic imagery and stanza-like structure (Riessman, 1993; Gee, 1985, 1986, 1991). For this reason, several psychologists have inferred that not only poetry but music itself developed out of the rhythmic and prosodic content of everyday speech (Brown, 1991: 63). I have already argued, in relation to song-and-dance display, that the evolutionary sequence and arrow of causality must in fact be the other way round: we would not expect systems of primary intersubjectivity to derive from secondary (mimetic) or tertiary (conventional) communication. It is tempting to extend this reasoning and speculate whether poetry did indeed derive from prose, or whether this assumption too
should be reversed. If Durkheim was right, and ritual must precede the emergence of language, it seems inevitable that 'sacred speech' must be older than 'mundane' speech, and hence that poetry may be older than prose.

**SUMMARY AND CONCLUSION**

This pilot study of role-play and verse showed significant differences between role-play and control conditions, and between switching to role tasks (RR and CR) and switching to control tasks (RC). These differences, however, were entirely attributable to the control condition and switching to the control condition. All other contrasts, including those between verse and prose, showed few or no salient features. Until further studies are done, it would be premature to draw firm conclusions regarding the neural correlates of role-play. Even so, we did see activity in areas of the brain which one would expect to be activated during role-play, and the results are consistent with the hypothesis that role-play activates some of the most expanded human brain structures (which is hardly surprising), and appears to be a full-time activity of the awake adult brain. Further research is planned which will potentially disprove this interpretation. If it does not, then we will have additional evidence supporting the 'play and display' hypothesis of brain expansion, and the evolutionary sequence described in the conclusion to the previous chapter.

What this pilot study has successfully demonstrated is that fMRI is a useful technique for investigating the social brain, and that such research is likely to provide insights which are of relevance to social, biological, and palaeo-anthropology, as well as to the cognitive sciences *per se.*
PART 3

EVOLUTION OF SOCIAL MIRRORS AND THE BRAIN
We cannot begin to understand the evolution of human thought and behaviour until we know what human thought and behaviour are. My thesis started with ethnographic data and the peculiar problems we have in understanding it, in order to show that cognitive science alone is not sufficient for the task. This is not simply because typical research subjects, such as western undergraduates, present a culturally biased sample. Actually, they gossip, argue, sing, dance, and role-play just like everyone else. But ethnography sets up a self/other mirror which makes us see what is universal about western undergraduates and what is not. Cross-cultural data also reveals that it is the job of culture to obfuscate the body and scramble universal intuitions about ourselves and the world, and western scientists are not immune to this. Our enculturated view of our own behaviour is worse than impoverished. Disembodied notions such as 'symbolism', 'information processing', and 'communication' obfuscate what would otherwise be most salient about human behaviour: namely, play and display.

So my starting point is a parsimonious hypothesis of hominid brain expansion: that our large brains are an adaptation to what we do best, and what we do best is fundamentally play and display. Reflective abilities such as ToM, planning, rational decision making, language, etc. are contingent on play and display. The rub here is that social mirroring behaviours, unless they involve objects made from durable materials, do not leave obvious traces. However, modern behaviour must have some kind of evolutionary past. Song, dance, and role-play must have emerged at some point, and we only have to ask why, where, and when. There may have been detours along the way, and perhaps ancestral social mirroring abilities have been lost, as may
be the case with gorillas (cf. Gallup, 1994). If so, this would buck the general trend - an explosive proliferation of social mirroring during the evolution of our species - and would require special explanation.

Social mirror theory is the only current theory which fits all the data I have discussed previously, and which is powerful enough to make specific predictions about sequential evolutionary change and what we should expect to find in the fossil and archaeological records. Paul Harris’s (1991) ‘simulation theory’ makes no such predictions, except possibly that language developed from grasping behaviour (Gallese & Goldman, 1999; cf. Rizzolatti & Arbib, 1998; Gallese, 1998). Even Gopnik and Meltzoff’s (1994) ‘theory theory’ does not get beyond imitation. These theories are not sufficient to explain why language or theory of mind developed in humans but not in monkeys, or why we have such large brains. They do not tell us about anything beyond the evolution of mirror neurones or visuo-kinaesthetic matching, which are unlikely to be unique to primates, let alone humans.

Social mirror theory, as developed in this thesis, allows only one basic story to be told about the past. It does not tell us about specific whys and whens, but it does tell us that a certain sequence of changes is implied by the way we think and act today. The whys and whens have to be inferred from archaeological and fossil data, so far as this is possible. The result may be yet another ‘just so’ story of human evolution. But if such a story cannot be made consistent with the data, this amounts to a disproof of the ‘play and display’ hypothesis.

‘Just so’ stories can do more than merely test a hypothesis. Strategic models of evolution act like organs of perception, without which ‘data’ and ‘noise’ are indistinguishable, and vital pieces of evidence escape perception altogether (Tooby &
de Vore, 1987). No one would so much as pick up and examine a hominid bone without some idea that it might be significant, and this implies a hypothesis, whether anthropological, forensic, or just superstitious. Right or wrong, hypotheses are essential to discovery. And in contrast to some other ‘just so’ stories, the social display hypothesis is not monolithic. It has the merit of addressing a comprehensive suite of modern human behaviours, and explaining the complexities and inconstancies of hominid evolution.

THE PHASED PATTERN OF HOMINID BRAIN EXPANSION

Three stages in the evolution of display

Based on evidence presented previously, I have inferred at least three major ‘rubicons’ in the evolution of human display, involving the emergence or expansion of:

1. Implicit displays such as song-and-dance (primary intersubjectivity)
2. Mimetic displays, especially role-play (secondary intersubjectivity)
3. Conventional displays, including conventionalized forms of (1) and (2), together with innovations such as language and wealth displays

The expansion of hominid crania (and associated change in postcranial anatomy) has not been constant across time, but shows a pattern of relatively ‘punctuated equilibrium’ (cf. Eldredge & Gould, 1972), with two ‘grade shifts’ of accelerated brain expansion (Aiello & Wheeler, 1995), and, more arguably, a third phase of declining brain size (Ruff et al, 1993). I will provisionally assume that these three grade shifts represent the three rubicons crossed by our ancestors, and then check how
well the data stacks up against this assumption.

If, as a general principle, behavioural change precedes genetic change, then new forms of display will initially be inherited in a Lamarckian fashion, sustained by changes in the physical and social environment (cf. Maynard Smith, 1989: 11-2). So behavioural change should appear first in the archaeological record (assuming it leaves a discernible trace), followed by any resulting anatomical change in the fossil record. We should also expect new display behaviours to be followed by archaeological evidence of increased self/other-awareness and/or cooperation.

In the following account, I use the abbreviations ‘mya’ for ‘million years ago’ and ‘kya’ for ‘thousand years ago’. Table 6.1 gives the timespan considered, with geological and archaeological ages. Archaeological dates are approximate and vary regionally.

Three grade shifts in cranial capacity

Figure 6.1 is a simplified schema, plotting absolute cranial capacities against time, based on data from Aiello and Wheeler (1995) and Ruff et al. (1993).

The figure shows two plateaux of relatively unchanging cranial capacities: the first in australopithecine and pithecanthropine species, which evolved over a three or four million year period, and the second in hominids of Homo erectus grade, with a duration of around 1.5 million years.

These two plateaux are punctuated by two grade shifts of accelerated change, the first involving the earliest Homo species, the habilines, and the second affecting late Homo erectus and Homo sapiens species. In both cases, brain sizes approximately doubled within a few hundred millennia. The second grade shift is itself terminated by
Table 6.1. Geological and archaeological ages
Cranial capacity (cc)

<table>
<thead>
<tr>
<th>1,600</th>
<th>1,200</th>
<th>800</th>
<th>400</th>
</tr>
</thead>
</table>

- **Homo sapiens** species
- **Homo erectus** grade hominids
- Habilines
- Australopithecines
- Pithecanthropines

**Figure 6.1. Grade shifts in hominid cranial capacities** (data from Aiello & Wheeler, 1993; Ruff et al., 1993)

- Upper Palaeolithic/Later Stone Age industries (from 40 kya)
- Mousterian (Middle Palaeolithic: from 125 kya: Europe)
- Middle Stone Age (from 250 kya: Africa)
- Levallois technique (from 300 kya: Europe)
- Acheulian (1.4 mya to 90 kya)
- Developed Oldowan (from 1.6 mya)
- Oldowan (from 1.9 mya)
- First Stone tools (from 2.7 mya)

**Figure 6.2. Major stone tool industries** (for comparison with Figure 6.1)
the third, characterized by an apparent decline in cranial capacity, and marking the advent of unequivocally modern enculturated behaviour. This evolutionary U-turn, though not accepted by all authors, is a problem for cognitivist hypotheses of brain expansion, but is predicted by a performance hypothesis.

I am not suggesting an absolute one-to-one correspondence between these three grade-shifts and the emergence of the three modes of human performance. Non-human apes have some mimetic and pretend play abilities, and there is no reason to expect less of australopithecines. However, we are looking for substantial expansions of abilities which are minimally present in our nearest relatives. We would also expect new modes of intersubjectivity to select for changes in older modes. For example, the 'surprised face' (implicit mode) could not evolve before theory of mind and hence pretend play (mimetic mode).

**Constraints on brain size**

The first two grade shifts imply that a metabolic and nutritional 'lid' on brain expansion was lifted in each case (Aiello & Wheeler, 1995), and that there was selection pressure for larger brains. Although the modern human brain constitutes only 2% of total body weight, it accounts for around 20% of energy consumption. Some 60% of non-aqueous brain matter is lipid, and the microconnections of the brain are substantially lipid in nature (Horrobin, 1998). Hence brain expansion has a high energy cost (Aiello & Wheeler, 1995) and demands adequate levels of essential fatty acids and essential amino acids in the diet (M.A. Crawford, 1992; Horrobin, 1998, 1999).

These nutritional and metabolic requirements were apparently met, in habilene
species, by scavenging carrion. Early Homo used stone tools for butchering meat and, importantly, cracking the larger bones to extract the marrow. This provided a new high quality food source in concentrated packages, which could meet the energy and lipid requirements of brain expansion, and permit a compensatory reduction in gut size. Both gut and brain tissue are physiologically expensive, and there is an inverse correlation between gut and brain size in modern primates. Gorillas, for example, because of their high fibre vegetarian diet, have large stomachs and small brains. In modern humans, gut size is reduced to a degree which exactly compensates our unusually large brains, requiring no overall increase in basal metabolic rate (Aiello & Wheeler, 1995).

In late H. erectus/early H. sapiens species, the nutritional and metabolic ‘lid’ was presumably lifted yet higher by increasingly sophisticated hunting technology, and perhaps by cooking, since ‘pre-digestion’ using fire would permit a further reduction in gut size (ibid).

Besides our large brains and small guts, modern humans have other interesting traits relating to lipid metabolism, and reflecting the importance of meat and dietary fat in human evolution. One is our subcutaneous fat storage, which gives human bodies their smooth appearance relative to those of other apes, and another appears to be a set of modifications to phospholipid processing in neuronal membranes (Peet, Glen & Horrobin, 1999). This may explain the genealogical link between schizophrenia and - on the one hand - dyslexia, manic depression, and a whole range of psychoses conventionally classified as discrete (American Psychiatric Association, 1994), and - on the other hand - high creativity, outstanding achievement in many fields, musical talent, charismatic leadership, and strong religious convictions.
(Horrobin 1998, 1999). The relationship between dietary lipids, psychoses, and exceptional performative talent seems highly pertinent to a performance hypothesis of brain expansion.

The third grade-shift, in anatomically modern humans, implies reduced selection pressure for large brains and hence, according to a 'play and display' hypothesis, reduced dependence on analogical performative abilities.

Horrobin (1998) suggests that the phospholipid changes underlying schizophrenia and human creativity led to increased microconnectivity in the brain rather than increased size. He assumes such changes account for the emergence of modern human culture, art, religion, warfare, and possibly also music, between 50 and 250 kya. He supports his thesis by pointing out that brain expansion is not accompanied by 'increased creativity', as evidenced by the slow development of stone tools, whereas archaeological changes (new stone tool 'industries': see Figure 6.2) do not necessarily occur during periods of brain expansion. He ascribes no 'creative' significance to brain expansion alone. Hence the selection pressure for brain expansion has nothing to do with 'creativity' (he even suggests that almost any animal would benefit from brain enlargement, presumably because this would confer 'intelligence').

There are five points worth making here:

First of all, lack of evidence for creativity is not evidence of lack. It would all depend on what the function of such creativity might be, and what kind of trace it might leave in the archaeological record. The apparent crudity of early tools does not necessarily indicate lack of ability. Oldowan tools, for example, might be regarded as 'low effort' rather than 'primitive' (Gamble, 1993; cf. Toth, 1985b). People today make similar tools if the job in hand requires nothing more laborious.
Secondly, the first unequivocal stone tools appear around 2.7-2.4 mya (Bilsborough, 1992: 136-7), prior to the first grade shift, as would be expected if behavioural change generally precedes genetic change. This suggests a change of lifestyle: presumably scavenging for meat, on which phospholipid changes and brain expansion both depend. It seems unlikely that phospholipid changes preceded this first evidence of ‘increased creativity’ and tool-assisted carnivory.

Thirdly, the extraordinary stasis of Acheulian stone tool technology does not suggest any increase in creativity relative to earlier industries.

Fourthly, Levallois technique and Mousterian technology (in Eurasia) and MSA tools (in Africa) originated during the second grade shift, and before the assumed major increase in micro-connectivity which Horrobin uses to explain modern culture.

Finally, this is (almost) another ‘macromutation’ hypothesis of cultural origins, attributing cultural displays to a major increase in micro-connectivity towards the end of the second grade shift, and ignoring the principle that behavioural change usually precedes genetic change.

From the remarkably uniform prevalence of schizophrenia (0.5 to 1.5% of all known populations), Horrobin infers three or four specific genes, which, inherited singly or in various combinations, predispose to different psychopathologies and creative talents. He presents evidence of a particularly strong link between schizophrenia and musical ability. 15% of adopted-away children of schizophrenic mothers were professional musicians or showed exceptional talent, compared with none from normal controls (Heston, 1966, 1970). 12.5% of such children (and none of the controls) were highly religious. This implies that at least some of the ‘schizophrenia genes’ affect primary intersubjectivity, and would be expected to have originated well
before 250 kya.

The 'schizophrenia made us human' thesis is interesting because it gives individuals with exceptional performative talents a major role in social innovation. If the conjunction of multiple 'talent genes' predisposes to significant pathologies, this would explain why artistic and other prodigies remain rare in human populations. But the hypothesis cannot explain the formidable performative abilities possessed by all normal humans, or parallel brain expansions occurring in more than one hominid line, spanning perhaps 20,000 generations. This implicates more than a few discrete mutations, and shows that exceptional brain expansion in hominids is due to exceptional selection pressures and not the high improbability of lipid-altering mutations.

The first plateau

The earliest hominids, the australopithecines ('apiths'), were diminutive relative to modern humans: the type specimen, 'Lucy', was about one meter tall. Anatomically, she shows ape-like features - long arms and a conical rib cage - adapted for brachiation (swinging from branch to branch). However, her pelvis and legs are clearly adapted for bipedal locomotion, and this is confirmed by the 'Laetoli footprints' - the tracks of three apiths, left 3.5 mya in a fossilized layer of mud (Leakey & Hay, 1979). So we can say that she was less strictly confined to an arboreal habitat than modern apes, and did not need to 'knuckle walk' as they do. Apith cranial capacities (400-500 cc), however, were little larger than those of modern chimps.
The first grade-shift

Somewhere between 2.5 and 2 mya, the habiline/pithecanthropine radiation occurred, during which average cranial capacity, in at least one habiline species (ancestral to Homo erectus), doubled to around 800-900 cc. Opinions vary widely concerning the number of hominid species originating from this time. Tobias (1987) insists that there is only one habiline - Homo habilis - but if so it is anatomically highly varied. Some are short, like ‘Lucy’; others tall, approaching the stature of Homo erectus. There are specimens with relatively human-like crania but ape-like postcrania, and vice versa (Walker, 1993), suggesting a mosaic of traits evolving in parallel with those of our own ancestral line. It is difficult to find two authors who agree on the species assignation of many early Homo fossils (Gamble, 1993).

We have few hominid crania from the period between 2.5 and 2 mya, but from around 2 mya there is already a wide diversity, with cranial capacities ranging between 400 and 800 cc, suggesting a fan of diverging evolutionary trajectories before that date. The earliest erectus-grade hominid so far found in Africa lived around 1.8 mya, but early dates for the arrival of H. erectus in Asia (e.g. Riwat, in northern India, 2 mya: Noble & Davidson 1996: 181), if confirmed, suggest that this species grade is at least as old as most known habiline fossils, which could not in that case be strictly ancestral to H. erectus. However it is most likely that erectus-grade hominids evolved from a tool-making habiline.

The first unambivalent stone tools appear around 2.5 million years ago, coinciding approximately with the completion of the Arctic ice cap (Vrba, 1988). A period of climatic cooling may have triggered the apith radiation. Cooler periods tend to be drier, as water is taken up into ice caps, which means less rainforest and more
open savannah. Pithecanthropines, with increasingly robust bodies and massive grinding teeth, appear to have adapted by an increasingly tough vegetarian diet, whereas habilines adopted a scavenging lifestyle, providing dietary lipids necessary for brain expansion, and requiring greater mobility.

Much of the brain expansion during the first grade shift could be explained simply as a consequence of increasing body-size (Aiello, 1994), but there was relatively slight brain expansion in pithecanthropines (who were also increasing in body-size), and other factors must have been significant. Noble and Davidson (1996) point out that stature increased in line with brain size during the first grade-shift, but not during the second. Therefore, there was a significant increase in encephalization quotient (EQ = ratio of actual brain mass to that predicted from body mass) during the second grade shift, but not the first. But small animals tend to have higher brain-to-body-mass ratios than large animals. Modern humans have the same brain to body mass ratio as squirrels (2% in both species: Horrobin, 1999). The meaningful achievement in humans is that brain expansion kept pace with increasing body size during the first grade-shift, and continued during the second, when bodies were actually getting smaller.

The emphasis on EQ assumes a ‘telephone switchboard’ model of brain function (Byrne, 1996). Larger bodies require more telephone lines and hence a larger switchboard. But if brains are more sophisticated than switchboards, absolute brain size has to mean something. As we shall see, it is absolute brain size, not EQ, which makes significant predictions about primate group dynamics (Dunbar, 1993).

Apart from bipedal locomotion and enlarged brains, habilines had a number of features which anticipate those of modern humans. The name Homo habilis means
'handyman', and reflects the essentially modern anatomy of the habiline hand, with a short opposable thumb and broad finger pads. This is a hand adapted for manipulation rather than brachiation, capable of both power and precision grips, suggesting that habilines were among the earliest makers of napped stone tools. Oldowan tools themselves, and actualistic experiments - making copies of the tools - suggest that early tool-makers were generally right handed like ourselves (Toth 1985a, 1985b), though not everyone finds the arguments conclusive (Noble & Davidson, 1996).

Tobias (1987), from an examination of six habiline cranial casts, concluded that Homo habilis (his name for all habilines) was indeed the first true Homo species, and the first to show a human-like pattern of left-right brain asymmetries. That is, the frontal lobe is larger on the right than the left, whereas the parietal and occipital lobes are larger on the left than the right.

Features of the habiline cranium which are not apparent in apiths include increased bulk of frontal and parietal lobes, a marked sulcal and gyral patterning of lateral frontal cortices, a prominent inferior parietal lobule, complex middle meningeal blood vessels, and prominent enlargement of Broca’s and Wernicke’s ‘speech’ areas. Tobias infers that habilines could speak, but homologous swellings can be seen in macaques, and we should be aware that, in all primates other than ourselves, gesture-call vocalizations are processed in the left hemisphere (Falk, 1987). Displacement of gesture-calling to the right hemisphere in modern humans is presumably a consequence of speech acquisition. Prominent Broca’s and Wernicke’s areas in habilines are more likely to reflect elaborate gesture-call performance - i.e. ‘song’ - than to indicate speech.

Brain asymmetries reflect a compromise between pressure for brain expansion
and the metabolic costs of brain tissue. Most asymmetries in modern humans involve
social and performative skills. Apart from handedness itself, language, prosody, visuo-
spatial abilities, and all the cultural arts, involve lateralization. Since noradrenergic and
serotonergic transmission (agonic and hedonic social behaviours?) are concentrated in
the right hemisphere, we could also speculate that bonding and dominance behaviours
are lateralized. Linear reasoning is lateralized to the left hemisphere, but if we accept
the social intelligence hypothesis and evidence from Wason tests, it would seem that
even this is primarily a social adaptation. In the ToM mapping study mentioned earlier
(Gallagher et al, n.d.), ToM reasoning involved more activity in 'general reasoning'
areas of the brain than 'general reasoning' did.

Tobias further observes that brain expansion in Homo habilis specifically
increased the width and height of the brain, rather than the length, involving frontal
and parietal rather than temporal and occipital lobes. Since primary motor (frontal) and
primary somatosensory (parietal) cortices are not significantly expanded in modern
humans, we can infer that most of this expansion affected secondary motor and
somatosensory areas, along with the inferior parietal lobules, and so functions relating
to monitoring and controlling body orientation and movement, and multimodal
integration of sensory inputs. Less certainly, a major expansion of prefrontal areas
might have been expected to increase the length as well as the breadth of the brain.
The temporal lobes were not sufficiently preserved for detailed comment, though one
would expect auditory cortices to expand in parallel with Broca's area. All these
changes are more consistent with a performative than a cognitivist hypothesis of brain
expansion, and correspond precisely with brain areas predicted for song-and-dance.

Some habiline trends first appear in australopithecines, including bilateral
transverse expansion, increased height especially of the parietal lobes, and a well
developed superior parietal lobule, larger on the left than the right. Superior parietal
functions in modern primates include visually guided movement, and mapping space in
body-centred and object-centred coordinates (dorsal visual stream). Several factors
could be involved here, including bipedal locomotion, tool use (not necessarily stone),
and 'dance-like' social display.

The more rounded shape of the habiline brain, with markedly less front-to-back
and top-to-bottom tapering, together with Broca's and Wernicke's areas and the
specific asymmetries mentioned above, suggest organizational changes, and not simply
a general consequence of increasing body size. From these anatomical changes alone
we can say that the habilines represent a highly unusual group of primates, whose
social lives were likely to have been more complex and qualitatively different from
those of any previous primate.

To say more we need to consider archaeological data. Here the evidence is
oblique for our purposes, but at least suggestive. The problem is that the earliest sites
with unambiguous stone tools (from 2.7-2.4 mya) have not been sufficiently
investigated. Inferences drawn from Oldowan sites (from 1.9 mya) and back-projected
into the first grade shift therefore assume certain continuities of selection pressure
across this archaeological gap. One continuity we can reasonably assume is predation
pressure. Most diurnal primates suffer predation (Dunbar, 1992b), and there are aphi
specimens showing direct evidence of predation by leopards. Bipedalism incurs
exposure in relatively open terrain, and there is every reason to believe that predation
was a significant factor in habiline brain expansion.

Oldowan sites are characterized by broad scatters of bone and stone, some 10
to 20 meters in diameter, indicating that these early hominids returned repeatedly to the same sites, bringing animal carcasses for butchering, and stone for making tools. These fixed butchery sites could hardly have been used as ‘home bases’ (Potts, 1994). Early hominids lacked the use of fire for protection from predators, and these sites, smelling of blood and meat, attracted regular visits from carnivores. So they would have been dangerous places to sleep, and certainly not suitable bases where the very young or infirm could have been left unguarded. Some are located close to water - not places to linger if you want to avoid predators (ibid). Not only Oldowan sites, but the very earliest sites with stone tools, at Hadar and Omo in Ethiopia, are all riverside sites. So some Oldowan strategies may have originated in an a priori ancestor before the first grade shift, as predicted by the ‘play and display’ hypothesis.

Potts (1987) has described a typical ‘type C’ Oldowan site at Bed 1, the oldest level at Olduvai Gorge, which has six butchery scatters distributed around a central rocky outcrop. The six scatters are evenly spaced at approximately 2 km intervals, and each is about 2 km from the central outcrop, forming a near perfect hexagram centred on the source of stone. Potts argues that such ordered regularity could be the result of stochastic processes rather than conscious planning. Useful pieces of stone discarded on one occasion would increase the chances of a second visit to the same spot, an effect which would make convenient locations cumulatively more attractive and more frequently used for butchering meat.

The six scatters were located in very diverse habitats - lake shore, riverine, bush, and more open savannah. Apparently, these Oldowan hominids chose to optimise time-and-motion rather than safety, and were not diffident about working in situations with the highest predation risk (near water or surrounded by bush). These risks are not
hypothetical - the sites were regularly visited by dangerous carnivores such as hyenas and lions. Some animal bones from Oldowan sites show hominid tool cuts overlaid by marks of carnivore teeth, whereas others show the opposite pattern. Apparently, the Oldowan tool-makers pursued a strategy of ‘confrontational scavenging’, sometimes driving carnivores from their kills, and sometimes being driven off in their turn. To successfully outface lions and hyenas - themselves highly cooperative predators - it would seem that Oldowan hominids, less well endowed with teeth, claws, and physical strength, must have operated in larger and/or better-coordinated groups. Robin Dunbar (1994), from extensive field studies, has shown that predation pressure is the single factor determining minimum group size in modern primates.

So, by Oldowan times, early tool-makers had developed effective strategies for dealing with dangerous social carnivores. Oldowan hominids coped successfully with a level of predation pressure unprecedented in any primate before or since (Potts, 1994). They also faced unprecedented time demands - confronting (or avoiding) hostile predators, carrying stone and meat around the landscape, making tools, butchering carcases, and perhaps teaching their numerous skills to the young. Leslie Aiello (1994) has pointed out that the postcranial anatomies of the habilines show adaptation to lives of increasingly strenuous physical exertion.

We can now draw further inferences from habilines cranial capacities, based on Robin Dunbar’s theory of ‘vocal grooming’. Dunbar (1992a, 1993) has shown that, in modern primates, there are positive straight-line correlations between absolute brain size, group size, and grooming time. That is, primates with larger brains live in larger groups and, because of the high number of alliances and coalitions they need to service, spend more time grooming each other.
Primate time budgets, however, are not infinitely elastic. Resting, feeding, and journeying between food sites make irreducible time demands (Dunbar, 1994). Larger groups exhaust food sources more quickly, which increases journey time, and consequently reduces time available for grooming. The maximum tolerated grooming time in modern primates is about 20% of the daily time budget. If group size creates a greater grooming demand than time budgets allow, the group becomes unstable and likely to split into smaller groups.

Extrapolating modern primate brain size correlations onto fossil crania, Aiello and Dunbar (1993) have calculated hypothetical group sizes and grooming times for the various hominids. Their predictions for the largest- and smallest-brained habilines in their sample are:

<table>
<thead>
<tr>
<th>Fossil</th>
<th>Cranial capacity</th>
<th>Group size</th>
<th>Grooming time</th>
</tr>
</thead>
<tbody>
<tr>
<td>KNM ER 1470</td>
<td>752 cc</td>
<td>92.12</td>
<td>25.67%</td>
</tr>
<tr>
<td>KNM ER 1813</td>
<td>509 cc</td>
<td>70.97</td>
<td>19.60%</td>
</tr>
</tbody>
</table>

According to this projection, even the smallest-brained habiline was pushing the maximum tolerated limit on grooming time. However, as we have seen, the time budgets of early tool-makers were stretched by demands unparalleled in modern primates.

Dunbar (1993) points out the urgent need to find a time-saving substitute for one-to-one grooming, which would allow simultaneous bonding between multiple individuals. He postulates 'vocal grooming' as a possible origin for speech. Leslie Aiello (in a postgraduate tutorial at UCL) suggested something like the purring of a cat
might be sufficient to qualify as ‘vocal grooming’, but the large-group coordination implied by an Oldowan life-style would seem to require something more elaborate. Since few animal signals are exclusively vocal (Burling, 1993), ‘gesture-call grooming’ or ‘song-and-dance display’ might be more appropriate terms.

In Chapter 3, I argued that song-and-dance could achieve high degrees of affective/intentional cohesion and rapport, potentially in very large groups. Dunbar (1993) himself notes that the complex vocalizations of gelada baboons, which include synchronized choral ‘song’ performances (Richman, 1978), may well explain why they are able to live in groups sometimes as large as 260 individuals - far in excess of the maximum predicted on the basis of brain size alone.

Hominids living in large groups would certainly have complex communication needs, but whole-body performance - i.e. ‘dance’ - would be expected to have more impact on brain size than communication or exclusively vocal performance. The kind of pressures faced by early Homo primarily require concerted action and intent. This need is better served by performance than communication: information can be disputed, but you cannot argue with dance. Finally, communication is no substitute for grooming. Modern mothers do not usually talk their babies to sleep - lullabies and rhythmic motion are far more effective. Speech, however flattering, can never match the grooming potential of song and dance.

Song-and-dance displays are common in birds. Out of forty-two bird of paradise species, at least thirteen have communal ‘lekking’ behaviour, where males collectively display to females (C.B. Frith & Beehler, 1998: 115). Analogous displays in primates, however, serve functions other than courtship: cementing social bonds, advertising in-group solidarity to rival groups, and, potentially, warning off predators.
A large group of seventy or a hundred hominids, presenting a loud, vigorous, and cohesive display, might deter all but the most formidable carnivores. With fixed butchery sites as essential resources, Oldowan groups may also have been territorial. Song-and-dance displays, in that case, could resolve out-group confrontations non-violently, though violence might still occur between evenly matched groups.

Once butchery scatters become an established feature of the landscape, they become potential displays in their own right. They even have an entrainment function in the simplistic sense that they provide foci for collective action. Virtually any salient mark habitually made by animals - whether by teeth, claws, urine, or faeces - is a potential signal, and may become adapted to that function. Bears, for example, have evolved musk glands near the anus. Animals use such signals to monitor the presence of conspecifics and find potential mates. Although Oldown sites may have originated by stochastic processes, if they deterred territorial intrusion by rival groups there would be some selection pressure to maximise their impact. The constraining factors here would include time budgets and numbers of predators attracted, though positioning them in areas of high predation risk would also enhance their impact by advertising the fearlessness of the group (this is known as the 'handicap principle': Zahavi & Zahavi, 1997).

Oldowan butchery practices imply an ability to defer satisfaction, and so a need to allay fears that others may get the best portions of meat. Such anxieties, evident in foraging people even today (Erdal & Whiten, 1994), provide another potential function for collective grooming behaviours. The playful and experimental sexuality of modern humans, which we share with bonobos (de Waal, 1987, 1992), is a further grooming substitute that could have proved adaptive during this early period.
Prefrontal brain injuries in modern humans are characterized by disinhibition, including lewd and 'sexually inappropriate' behaviour (Lishman, 1998). Increased ability to defer satisfaction might require some expansion of dorsolateral inhibitory areas in habilines, whilst complex grooming substitutes might involve expansion of the ventromedial prefrontal 'grooming centre' (representing somatic states in self and others: cf. Damasio, 1994). Tobias notes increased gyral and sulcal folding in habiline lateral frontal cortices, but does not say to what extent this indicates prefrontal or premotor expansion.

In conclusion, I suggest that evidence relating to the first grade-shift suggests that novel forms of primary intersubjectivity would have been necessary at this time. I do not suggest that habilines entirely lacked secondary intersubjectivity, but there are no obvious grounds for supposing greater mimetic abilities than, for example, bonobos, who diverged from common chimpanzees around the same time as the habiline radiation (Vrba, 1985). Displays involving primary intersubjectivity seem sufficient to meet their peculiar adaptive needs, and are consonant with cranial and behavioural changes. As I will show in relation to Homo erectus, a 'song-and-dance culture' also makes better sense of the known data than the 'mimetic culture' proposed by Donald (1991), or the 'proto-language' proposed by Mithen (1996).

The second plateau

The first grade-shift was followed by over a million years of evolutionary and technological stasis. Homo erectus shows little or no brain expansion during this period (Leigh, 1992). Oldowan 'pebble tools' appear from around 1.9 mya (Bilsborough, 1992), 'Developed Oldowan' from 1.6 mya (including small numbers of bifaces: 267

...
Stiles, 1979; Gowlett, 1988), and Acheulian from 1.4 mya (Asfaw et al., 1992). It is possible that Homo erectus was responsible for all these ‘industries’, with their leisurely pace of innovation. Certainly Homo erectus was responsible for the Acheulian industry, which included tools of Oldowan type alongside larger numbers of distinctive bifaces - straight edged ‘cleavers’ and symmetrical almond-shaped ‘handaxes’ (Bilsborough, 1992). The Acheulian axes are, to many observers, aesthetically pleasing, and commonly conform to a standard template, with a curved edge at one end, and two straight sides converging to a point at the other.

This distinctive shape seems to have proved highly effective, since it is remarkably stable across time (from 1.4 mya to 90 kya: Bischoff et al., 1992) and space (from South Africa to India and southern England: Noble & Davidson, 1996). But in what sense it was effective is anyone’s guess. Acheulian ‘handaxes’ could hardly have been used as axes - this would necessarily involve a power grip, and all edges are flaked to an equal sharpness. Actualistic experiments show they can be used for butchering large carcases, digging, and stripping tree bark (Bilsborough, 1992: 181). However, none of these uses accounts for their specific shape. The flakes struck from the core during axe manufacture yield the sharpest obtainable cutting edge, and use-wear studies reveal that such flakes were used for butchering (Potts, 1989), just as they were in the Oldowan (Keeley & Toth, 1981). Although some handaxes were used for cutting meat (Keeley, 1993), in general the edge seems too blunt for all but the heaviest duty butchery (Noble & Davidson, 1996).

I have already suggested that the production of napped stone tools may tell us little about the cognitive capacities of the maker. Orangutans can be induced to make and use stone tools, with appropriate help and incentive (Wright, 1972), and the
bonobo chimp Kanzi even developed new ways of doing it (Toth et al., 1993). That such tools were made by hominids rather than apes probably reflects a difference of need rather than ability (Wynn & McGrew, 1989). Non-human carnivorous primates capture animals much smaller than themselves, start eating them whilst still alive, and tear them apart in a general mêlée (Strum, 1981; Teleki, 1973, 1981). Systematic butchery, as in the Oldowan, suggests considerable ability to defer satisfaction and some assurance of equitable sharing, rather than an unseemly race to grab the meat before others consume it.

The forms of Oldowan tools are largely determined by the shape of the initial core (Toth, 1985b). What is novel about Acheulian handaxes is the extraordinary fidelity to a single predetermined form. Interpretations range from the romantic to the kill-joy: being taken to imply aesthetic, intellectual, symbolic, geometric, linguistic, planning, and other assumed attributes of modern human reflectivity (Wynn, 1979, 1993; Gowlett, 1984) as opposed to handaxes as 'finished with' discards rather than 'finished' tools (Noble & Davidson, 1996: 197-9). Neither of these extremes is plausible.

The romantic approach makes too many false assumptions. An 'aesthetic' ability to appreciate geometric symmetry would seem to be primitive - implicit in many animal displays and necessary for mate choice, predator recognition, and so on - whilst the reflective ability to envisage a desired shape within a core, or select a core with a plan in mind, would not predict the constancy of Acheulian form. If you can visualize one shape, you can visualize others, and even apes show regionally variable tool types and occasional originality. The Acheulian handaxe, rather, suggests habituation rather than planning, context dependent learning and memory, and
stereotyped action: signs which, in modern humans, are diagnostic of autism.

Acheulian technology is, if anything, more conformist than ape technology, suggesting greater social cohesion rather than a higher level of reflective insight or 'creativity'. This is consistent with a song-and-dance culture rather than any expansion of secondary intersubjectivity: shared behaviour rather than shared ideas.

The kill-joy position, on the other hand, would seem to require some intrinsic polarity in igneous minerals such as flint, quartz, and obsidian, making it 'economic' to flake to a curve at one end of a core, and to a point at the other. The 'discard' theory also fails to explain the uneven distribution vis à vis flakes: some sites show a large preponderance of flakes; others show heavy concentrations of axes (Clark & Haynes, 1970; Binford, 1972).

It seems more conceivable that Developed Oldowan bifaces, which are so much more arbitrary in shape, might have originated as 'finished-with' discards, for which some fortuitous use may have been found. The Acheulian handaxe would then represent subsequent adaptation to this new function. The pointed end of the axe suggests nothing so much as a weapon, and throwing has been suggested, though many axes seem too small to be effective against large game. O'Brien (1981) has shown that their symmetry does confer aerodynamic stability, and Calvin (1993) pointed out the likely efficacy of throwing handaxes into a herd of animals drinking at a water source.

An interesting suggestion, from Marek Kohn (1999), is that the many apparently impractical features of Acheulian handaxes and their disposal make perfect sense if their primary function were social display. He invokes the 'handicap principle' (Zahavi, 1987) - the apparently paradoxical idea that a handicap can increase Darwinian fitness by demonstrating fitness to others. An example is the marathon
runner who completes the race dressed as a waiter and carrying a tray of drinks. He attracts a great deal more social attention than others, dressed in singlets and shorts, who finish at the same time. Antelopes who perform spectacular ‘stotting’ leaps across the path of an approaching lion, or a skylark who continues to sing when chased by a hawk, are saying in effect ‘Don’t bother chasing me - look how much energy I have to spare!’ The spectacular tail of the peacock says to the peahen ‘Look how splendid my plumage is, despite the burden of this enormous tail.’ When a Homo erectus male makes a handaxe, Kohn suggests, he could be demonstrating his excessive eligibility to females and male rivals: he still gets enough meat despite his self-imposed handicap. This would explain why Acheulian axes were so often discarded after minimal use, or even no use at all, and why they are more common at open than wooded sites: the user has to be seen to be the maker of the tool.

The discovery of Homo erectus tools on the island of Flores (Indonesia) has provoked some reappraisal of erectus abilities. Predictably, cooperative boat building, navigation, and therefore speech have been invoked. No such ambitious proposals are made to explain the presence of giant turtles on the Galapagos Islands. But, if chimpanzees are capable of cooperative bridge building across an electrified fence, cooperative boat building by Homo erectus does not seem too far-fetched, though there is no need to postulate language for this. The romantic urge to project modern human abilities into the remote past, telescoping vast periods of evolutionary time, leaves no adequate explanation for subsequent grade-shifts, especially the dramatic behavioural changes of the Upper Palaeolithic.

However, upgrading our view of H. erectus abilities may not be unreasonable. Oldowan sites show evidence of diverse habitat use, and from around 1.5 mya, H.
*erectus* sites tend to be more extensive with greater densities of artifacts, suggesting longer periods of occupation, larger social groups, or both. There is also greater site differentiation, with apparently distinct ‘factory’ and ‘butchery’ sites, and others sometimes identified as ‘occupation’ sites (Bilsborough, 1992). There is good evidence that *H. erectus*, during Acheulian times, was not subject to the predation pressures evident at Oldowan sites, suggesting a high degree of ecological dominance (Potts, 1987).

As sites and habitats become more diverse, fossils become more similar. The wide anatomical differences evident around 2 mya, suggesting perhaps six or more niche-specialized hominids, eventually give way to fossils of exclusively *erectus* type. Early *Homo* disappears from the record by 1.5 mya, and even the robust pithecanthropines by 1 mya. Presumably, the most successful species emerging from the habiline radiation was able to out-compete rivals in all potential *Homo* niches.

If complex gesture-call displays did indeed emerge and expand during the first grade shift, this would favour, in *Homo erectus*, a high degree of collective rapport, cooperation, and conformist intentionality. Self- and other-awareness at the levels of conceptual or epistemological thought (‘theory of mind’ as defined by Baron-Cohen, 1995) need be no greater than in modern apes. A ‘song-and-dance culture’ would generate high levels of social cohesion and coordinated action, sufficient to meet a wide range of environmental challenges, whilst favouring a strictly conservative material and performative culture.

The relatively complete skeleton from Lake Turkana in Kenya, the ‘Nariokotome boy’, an early *erectus* grade specimen (dated to about 1.53 mya), has an essentially modern postcranial anatomy, apart from the conical (ape-like) rib cage. His
collar bones are unequal in size, strongly suggesting right-handedness (Walker & Leakey, 1993), and his brain, like those of habilines, shows an essentially modern pattern of asymmetries, including an expanded Broca's area. His cranial capacity is about 880 cc, and might have reached 910 cc in adulthood.

With a dental age of eleven, this individual was already about 160 cm tall, suggesting an ape-like rate of childhood growth. Although chimpanzees do have a period of extended infancy, compensated by an ‘adolescent growth spurt’, this is shorter and less pronounced than in modern humans. Without a modern extension of childhood, this *erectus* grade hominid would have limited opportunity to develop pretend play, role-play, theory of mind, or other mimetic abilities, to levels much beyond those of apes. He may have had potential language abilities similar or superior to those of apes or Congo grey parrots, but without a shared world of epistemological insight, he would have had no use for language.

The Turkana boy, like modern humans, has a very narrow pelvis. This is an adaptation to bipedalism (Shipman & Walker, 1989), but a generally tall, lean build is also a hot climate adaptation, seen in Turkana peoples even today (Ruff & Walker, 1993). Although this specimen is male, the sacrum bone from Olduvai hominid OH 28 indicates that females also had narrow pelvises. Walker (1993) inferred that *Homo erectus* females must have had narrow birth canals in relation to adult brain size, hence ‘secondarily altricial’ infants (i.e. babies born helpless because their brains are relatively under-developed at birth). If Walker is correct, female cooperation in childbirth (midwifery) may also have been necessary, and mothers carrying helpless babies would face considerable handicap in terms of hunting or gathering activities, again implying pressure to develop cooperative behaviour, and possibly a gendered
division of labour with paternal investment in child care.

So, out of two modern adaptations of human child development - extended infantile helplessness, and extended childhood play - *Homo erectus* probably had the first, favouring primary intersubjectivity and gesture-call performance, but lacked the second, important for secondary intersubjectivity, mimetic performance, and language.

### The second grade shift

Following the long period of stability and conservatism in *Homo erectus*, sometime after 500 kya cranial capacity again began to expand. By 100 kya, average cranial capacities were around 1,500 cc in Neanderthals and perhaps even higher in early modern *Homo sapiens* (based on data in Aiello & Dunbar, 1993; Aiello & Wheeler, 1995; cf. Noble & Davidson, 1996: 179).

There are obvious differences between the first and second grade shifts. The apith/habiline radiation produced a number of hominids adapted to different ecological niches. Subsequent *erectus* grade fossils are more uniform, the greatest differences reflecting geographical separation rather than sympatric niche specialization. The second grade shift affected widely dispersed populations in Asia, Africa, and Europe. This looks less like a radiation and more like parallel or convergent evolution, with an uncertain contribution from gene flow between populations (cf. Wolpoff 1992; Aiello, 1993). It would seem that parallel selection pressures were operating in widely disparate areas. These might include global changes in climate (Vrba, 1988), and the social strategies adopted by *Homo erectus* grade hominids.

The nutritional and metabolic requirements of brain expansion suggest that hominids of this period were relatively proficient predators, and may have used
cooking fire (Aiello & Wheeler, 1995). Direct evidence for this is admittedly limited. Noble and Davidson (1996: 186-90) maintain there is little evidence for planned cooperative hunting - e.g. by ambush or trapping - before 100 kya, and the same goes for cooking hearths (ibid: 205-7) and built shelters (ibid: 207). However, they concede some suggestive instances, and note two wooden spears, from Clacton, England (about 300 kya: K.P. Oakley et al, 1977) and Lehringen, Germany (120 kya: Thieme & Veil, 1985). Curiously, they treat these as evidence of ‘planning’ but not of ‘planned hunting’. In the Lehringen example, the point was hardened by fire, and this in an Acheulian context, well before the arrival of modern humans and the Upper Palaeolithic in Europe.

The second grade shift appears to follow an accelerating curve, suggesting something like an ‘arms race’, and has been attributed to inter-group conflict (Alexander, 1989). However, the evidence for warlike confrontation is mainly negative before the emergence of behaviourally modern humans. Stone tools, for example, show no evidence of escalating weaponry, and the pace of technological change remained minimal. Acheulian technology persisted until 90 kya, and many alleged innovations may have been invented by archaeologists rather than hominids (Noble & Davidson, 1996).

Probably before 300 kya, a technique known as Levallois first appears. A stone core was prepared by flaking to allow a single flake of predetermined shape to be struck with a single blow. However, there are cases where the assumed tool was discarded along with the core (Schafer, 1990; Van Peer, 1992; Davidson & Noble, 1993a), and the technique was uneconomical in material terms - wasting an entire core to produce a single Levallois flake. Noble and Davidson (1996) conclude that
Levalloisian tools may be a figment of the archaeological imagination.

The first new ‘industry’ to appear since the Acheulian is the Mousterian, generally associated with Neanderthals (from 125 kya), but with a distribution extending beyond the Neanderthal range. Mousterian tools were also made by anatomically modern humans at Skhūl and Qafzeh in the eastern Mediterranean area. The industry is continuous with the Acheulian, and differs from it by a somewhat increased variety of tool types, including Levallois and other flakes more certainly produced from prepared cores.

However, the enormous variety of tools identified and classified by François Bordes (1961), whose system was adopted by many archaeologists, resulted from a misperception. Many of the supposed ‘types’ have been shown to represent different stages in the life of a single tool, as its dulled edges were repeatedly refreshed by striking off new flakes (Dibble, 1987, 1989). This discovery likewise collapsed such notions as ‘sub-industries’ within the Mousterian, and variable ‘tool kits’ (as proposed by Binford & Binford, 1966). Use-wear studies further revealed a contingent pattern of use rather than specific tools for specific tasks (Beyries, 1987). The Mousterian in no way anticipates the revolutionary technologies of the Upper Palaeolithic (Mellars, 1989), and does not show the progressive trend that cognitivist theories would predict from continuing brain expansion, or the inter-group conflict proposed by Alexander.

Perhaps the most compelling evidence against bellicose inter-group relations is an evolutionary process known as ‘gracilization’. Homo erectus was adapted to a strenuous lifestyle, being stoutly built, with highly robust postcranial bones, thickened cranium, and powerful muscular physique. These hominids evolved, in Africa, to become first ‘archaic’, then ‘early modern’, and finally ‘anatomically modern’ Homo.
sapiens, characterized by a number of progressive changes, including increased cranial capacity, and reduced robustness of bone and muscle (Ruff et al, 1993).

Gracilization would seem highly unlikely in a species given to the kind of violence that occurs, say, in dolphins, which can lead to serious wounding. Gracilization, rather, implies a lifestyle of increasing leisure in our closer ancestors, which was apparently not shared by Neanderthals. Measures of strenuous exertion during life and stress during childhood, indicated by limb bone thickness relative to length, bone curvature, size of muscular attachments, and tooth wear patterns (Trinkaus, 1992), and by dental enamel hypoplasia (pits and grooves in enamel caused by developmental stress: Ogilvie et al, 1989), are all significantly greater in Neanderthal than in early modern fossil samples. Comparison of femoral bones from anatomically modern humans, at Qafzeh and Skuhl, with those of their Neanderthal neighbours at Kebara, reveals different neck shaft angles (Trinkaus, 1993). The Neanderthal neck shafts were more horizontal, indicating greater usage-stress in childhood, as if Neanderthals frog-marched their children on gruelling daily manoeuvres, whilst anatomically modern children were enjoying a greater degree of 'sheltered irresponsibility', an extended period in which play skills could be honed to maximal effect. All work and no play, according to social mirror theory, makes Jack (or Jill) autistic.

From this data one would expect an extension of childhood, such as we ourselves have, to evolve in early modern humans rather than Neanderthals. The sparsity of fossil samples, often fragmentary, and uncertainty of age at death, make life-cycle assessments difficult. However, from around 125 kya, Neanderthal remains are relatively abundant, and comparison with anatomically modern humans suggests at
least that modern humans were relatively longer lived, and the data are consistent with
a shorter childhood period in Neanderthals (Trinkaus & Tompkins, 1990).

A number of trends which distinguish anatomically modern humans from
Neanderthals, including a more vertical forehead and reduced measures of muscularity,
are more marked in Upper Palaeolithic females than males (based on the four most
complete crania from Mladec: Frayer, 1986). Among living humans, gracilization is
greater in women than men, and this difference is ultimately attributable to a hunter-
gatherer division of labour, with males doing the more strenuous hunting, whilst
pregnant females and mothers with dependent children can remain closer to a secure
home base. This would seem to be a precondition for extended childhood and
increased pretend play, and, if pretend play is a precondition for modern culture, we
would expect earlier and greater gracilization in Middle Palaeolithic females relative to
males.

There has been much speculation about the large brain capacities of
Neanderthals, though much less about the equally large brains of their 'anatomically
modern' contemporaries (Ruff et al, 1993). Neanderthal brains were not only larger
than our own, but were different in shape. However, the Neanderthal cranium - long,
low, and narrow - makes it difficult to assess the differential pattern of expansion
relative to our own, and may lead us to overestimate the significance of the receding
frontal bones.

Neanderthal brains, in common with those of Homo erectus, had human-like
rather than ape-like gyral and fissural configurations (Gibson, 1996), including classic
'language' areas such as Broca's and Wernicke's, and enlarged inferior parietal lobules
(Holloway, 1985). These are areas which I have associated particularly with song-and-
dance behaviour. Several authors (e.g. Kochetcova, 1978) note that Neanderthal frontal lobes seem to be significantly smaller than ours. If so, then the parietal lobes must be correspondingly larger. Some authors note variations in parietal areas, and in the positions of features suggesting differential expansions of parietal and temporal lobes (lateral fissure) and parietal and occipital lobes (parieto-occipital fissure and lunate sulcus: Boule & Anthony, 1911; Connolly, 1950). Others, notably Holloway (1985), deny any significant differences relative to modern humans, and especially any indication of a ‘primitive condition’ in Neanderthal brains.

The habit of referring to Neanderthals as ‘archaic’, which seems misleading if they are not ancestral to ourselves, may reflect a primitivizing bias. Cognitivist interpretations of Neanderthal cranial casts suggest lesser planning abilities and goal-oriented behaviour, and perhaps more limited ‘creative capacities’ (Mellars, 1996; Gibson, 1996).

Others have postulated, in modern humans, more complex interconnections between processing areas (Gibson, 1988, 1990, 1993), increased microconnectivity (Horrobin, 1998), genetically-determined ‘modules’ relating to ‘symbolic and verbal communication’ (Tooby & Cosmides, 1992), and comprehensive cross-linking between modules (Mithen, 1996b). These speculations ignore the evident importance of top-down behavioural influence in determining both domain-specificity and interconnectivity. Maturation of the brain is characterised by decreasing numbers of neural connections, apparently by a Darwinian principle of ‘survival of the useful’ (Plotkin, 1994; cf. Edelman, 1992). Genes which increase microconnectivity would seem likely to have little effect unless there were appropriately complex behaviour to maintain the new connections.
In modern humans, prefrontal expansion gave us a prominent vertical forehead, which, together with our equally apomorphic chin, creates a relatively vertical face, which may enhance legibility of facial displays. The relative absence of such changes creates the more ‘low brow’ and prognathous face of classic Neanderthals and earlier hominids. If we can interpret Neanderthal brain expansion as ‘more at the back than the front’ relative to ourselves, this would be consistent with greater development of song-and-dance ability rather than role-play. If Neanderthals had less planning ability than modern humans, this would be a consequence of their greater dependence on primary intersubjectivity.

Encephalization and gracilization in early modern humans was accompanied by other physical changes, including the extension of human childhood beyond that inferred for *Homo erectus*, and probably the menopause. Punctuating the mid-point of the potential life-span, the menopause cannot be attributed to the more gradual processes of senescence. The ‘grandmother hypothesis’ holds that cessation of fertility allowed mothers to continue caring for their last brood of children throughout their extended childhood, and to assist in caring for their grandchildren (Pavelka & Fedigan, 1991). The important role of the grandmother amongst modern foraging peoples is consistent with this hypothesis. Trinkaus and Tompkins (1990) concluded from fossil evidence of longevity that very few Neanderthal females survived beyond reproductive age. The more vertical foreheads of the Mladec females relative to males could conceivably implicate maternal adaptation to pretend play, though inferred from a sample of four (Frayer, 1986).

Taken together, the above data may indicate a greater development of secondary intersubjectivity in modern *Homo sapiens* than in Neanderthals - indexical,
iconic, and praxic gesture-calls; projective play and role-play; theory of mind; and socially learned adult roles. Conversely, we might infer a greater development of primary intersubjectivity in Neanderthals - perhaps including mark-making and song-and-dance display.

Now we might consider the likely impact of Pleistocene glaciations on *Homo erectus* (intensifying from around 900 to 800 kya: Roberts, 1992). During ice ages, rain forests contract and areas of grassland and savannah expand, with herds of herbivores roaming across them. A large carnivorous hominid such as *Homo erectus* would need to extend foraging ranges during glaciations. At the same time, pregnant and lactating females with relatively helpless offspring, who bear the brunt of the metabolic and physical burdens of brain expansion, would need to get their share of the meat (Knight, 1991).

There are two basic strategies that could satisfy these requirements: either a ‘baboon-like’ strategy, with entire communities trekking across the landscape; or a hunter-gatherer strategy, allowing females and infants to stay closer to a ‘base camp’. The latter is more difficult to achieve, since it requires security from predators, paternal investment in child care, and high levels of sexual trust sustaining male confidence in paternity. Secondary altriciality (helpless babies) implies a need for specific cooperative adaptations. Midwifery has already been mentioned, and we might also expect adaptations of the female reproductive cycle to encourage paternal investment.

The unique sexual biology of the modern human female - synchronised ovulation (which can occur when women live in close proximity), concealed oestrus, and sexual receptivity throughout the reproductive cycle - appear to be specifically
adapted to deterring male promiscuity, preventing harem building, and encouraging
one-to-one mating ratios (Turke, 1984; Power & Aiello, 1997). These are the
conditions necessary for male confidence in paternity, paternal investment in child
care, and provisioning of mothers and children with the products of male hunting. The
fly in the ointment for this theory has always been menstruation - revealing which
females are imminently fertile, and potentially drawing male interest away from
pregnant and lactating females, the ones most in need of paternal investment (Power &
Aiello, 1997).

Menstruation is an unusual (thought not unique) human trait, of uncertain
function, and should not be confused with the bleeding which occurs in other
mammals at the time of ovulation. In contrast to most other primates, who signal the
fertile phase of the reproductive cycle, human females signal the infertile phase. So
menstrual synchrony favours a hunter-gather strategy, indicating a ‘safe period’ when
males could collectively leave females, even for days at a time, confident that they
cannot be fertilized by other males during their absence (note that ‘confident’ here
does not assume knowledge, only evolvable behaviour).

We have no reason to assume different sexual traits in African and European
hominids, other than their diverging evolutionary trajectories, but such a difference
could explain why a hunter-gatherer strategy might evolve in relatively arid Africa,
and a more baboon-like strategy in Europe, with profound consequences for
subsequent expansions of performative abilities.

Increased foraging ranges might tend to increase the frequency of encounters
with rival groups, with the possibility of conflict along lines suggested by Alexander
(1989). However, if the second grade shift did indeed reflect an ‘arms race’, it
depended on brains rather than brawn, and frank violence was rare enough not to
prevent gracilization in our immediate ancestors. From a performance perspective, the
first option available to late Homo erectus, in managing hostile encounters, would be a
quantitative increase in the abilities these hominids already had, rather than a
qualitative change in performative mode. I have already suggested that song-and-dance
could function as a means of non-violent resolution of confrontations, as it does today
in some societies (e.g. in New Guinea: O'Hanlon, 1989: 125). Selection pressure then
would favour individuals able to sustain larger and louder groups. Gracilization may
have favoured increasing agility, advantageous for competitive dance display. Another
possible factor could have been female sexual preference for cooperative/performing
males.

Two anatomical changes during the second grade shift suggest increasing 'song'
abilities, both in anatomically modern humans and Neanderthals:

1. In early Homo erectus grade hominids, based on the 'Nariokotome boy'
described earlier, the spinal canals of the upper cervical and thoracic vertebrae are
narrow, like those of apes, and unlike those of modern humans which are greatly
expanded. Expansion of the upper spinal column has been deemed necessary for the
fine breath control required by speech (Walker, 1993), for breath control during
running, or for holding the chest cavity still when throwing (Noble & Davidson, 1996;
Aiello, 1996). Of the three suggestions, only speech requires complex neuronal
sequencing. Fine breath control seems more crucially necessary for song than for any
of the above functions.
The skulls of *erectus* grade hominids also lack the basal flexion associated with the modern descent of the larynx and the formation of a large tunable pharynx (Laitman *et al.*, 1979). Leiberman (1984, 1989; Leiberman, *et al.*, 1972) points out that this is necessary for vowel formation and so, he claims, rapid comprehension of speech. Vowels, however, do not carry much information ('es thas sentens cleerlee demenstreet') (Burling, 1993). In modern children, the 'semantic explosion' occurs well before the full development of the pharynx (at adolescence), and this does not unduly compromise their speech. The pharynx is an analogue instrument, capable of infinitely sliding tonal variation. Its tonal range far exceeds the modest requirements of speech. Overall, the modern pharynx more closely resembles a musical instrument, adapted for song, and pre-adapting the vocal organs for speech.

Leiberman (1989) has presented his reconstruction of Neanderthal vocal anatomy, and claimed that Neanderthals lacked a descended larynx and enlarged pharynx, and were therefore incapable of rapid and articulate speech. His anatomical conclusions, if correct, would also undermine the case for Neanderthal 'song'. However, Leiberman's drawings have been shown to include anatomical errors (Houghton, 1993), and the only Neanderthal hyoid bone we possess - from the Kebara cave burial (Arensburg *et al.*, 1990; Lieberman *et al.*, 1992) - closely resembles those of modern humans, though larger than the modern average (Arensburg *et al.*, 1989). So there are no grounds to argue that Neanderthals lacked human pharyngeal abilities.

Arguments that Neanderthals could not 'speak' are hopefully the last in a tradition of 'Neanderthal knocking', which began with early misconstructions based on an osteoarthritic specimen, and represented these hominids as stooped, shambling, and
‘subhuman’. The existence of handicapped individuals, particularly one who survived into old age despite numerous disabling injuries (Trinkaus, 1983), indicate that Neanderthals were compassionate hominids who cared successfully for the infirm despite their demanding lifestyle.

Neanderthals, in the eastern Mediterranean region, may have lived sympatrically with anatomically modern humans since their occupation of Tabun around 120 kya (Stringer, 1990). Skhul (modern humans), and Tabūn and Kebara (Neanderthals) are all on Mount Carmel, in present-day Israel, whilst Qafzeh (moderns) and Amūd (Neanderthals) are 35 and 50 km east of Mount Carmel respectively (Bar Yosef, 1989). They may not have been living cheek by jowl: rather, their occupations may have alternated as populations moved south or north with climatic changes (Aiello, 1993). But, unless there were a regular strip of no-man’s land between populations, contact would seem likely, particularly as both were using Moustarian tools, and hunted and killed the same game animals.

Even after populations bearing culture of fully modern type entered Europe, indigenous Neanderthals coexisted with them for some six to seven thousand years (Mellars, 1999), and apparently adopted aspects of their culture to produce the Châtelperronian. When one considers how quickly immigrant species can displace indigenous ones, as grey squirrels displaced red within decades in Britain, it is clear that any ‘inferiority’ of Neanderthals to modern humans must have been slight. They were different from us, but extremely well adapted to a range of environments extending well beyond Europe.

A fragment of bone from Isturitz in the Pyrenees, engraved by modern humans of the Magdalenian period, shows a series of bison on one side, apparently wounded
by an arrow, and a similar series of human females on the other, with a similar wound on the only figure which is wholly preserved on the piece (Bahn & Vertut, 1988). This has been interpreted as evidence that modern humans hunted Neanderthals as game animals, although Knight (1991) suggests rather that modern human females ritually imitated wounded game animals. There is no other evidence of interspecific violence between hominids in Europe, but if there were, the long survival of Neanderthals suggests they coped well with it.

Conceivably, Neanderthals might have envied the more leisurely lifestyle of anatomically modern humans, and, from 40 kya, also their culture, which they apparently imitated (Mellars, 1999). But, if the performative interpretation offered above is correct, they would have had little reason to envy the social relations of the newcomers into Europe. Neanderthals, in this view, would have enjoyed high levels of collective rapport, empathy, and relations of personal intimacy. Since Mousterian technology is centred on the Neanderthal territorial range, but extends beyond it, it seems likely that anatomically modern humans, prior to developing a unique culture of their own, imitated Neanderthals. If we can infer anything from our own reactions to music, Neanderthal song-and-dance performances would have been profoundly absorbing to participants, perhaps far more so than our own.

Certain birds of paradise have collective male 'convergence displays', which can be heard hundreds of meters away. These noisy and visually bewildering song-and-dance performances are exciting, not only to their female targets, but to human observers as well (Frith & Beehler, 1998). Something of their 'meaning' translates across species boundaries. It does not entirely stretch credulity to suppose that Cromagnons could have copied Neanderthal performances. Role-play even implies that
any remarkable behaviour is likely to be imitated, if only by children. Certainly Neanderthal displays could have projected a powerful message to the new-boys in Europe: 'Think twice before you mess with us!'

Anatomically modern humans, as at Qafzeh and Skuhl, had the same level of Mousterian culture as their neighbours, and a similar diet. If their mimetic abilities exceeded those of Neanderthals, this did not appear to confer any advantage in terms of technological inventiveness. Apparently, revolutionary new tools required a new kind of culture, which depended on mimetic performance but transcended it through conventionalization - endowing certain performances with transcendent authority, and creating a world of collective identities and economico-moral *personae*. Social change, rather than such post-industrial notions as 'utility' and 'progress', may explain technological variation in the Upper Palaeolithic.

Prior to this change, extended childhood, pretend play, mimetic communication, and role-play, would have conferred epistemological levels of hypnotic suggestibility and mindreading. Such cognitive rapport may have been as technologically conservative as the affective kind evolved by Neanderthals, but their more leisurely life-style suggests that 'pre-cultural' modern humans could communicate pragmatic intentions, coordinate collective strategies, and take effective short-cuts in the pursuit of subsistence.

*The third grade shift*

Brain expansion had reached its maximum, in modern humans, by or soon after the end of the Middle Pleistocene (125 kya). Unlike the first grade shift, the second did not terminate in a period of technological stasis, but led to the emergence of essentially
modern behaviour including visual art, musical instruments, personal adornment, ritual, sophisticated tool kits, and considerable regional variation in material culture. A comprehensive conventionalization of social-mirroring behaviour, the mark of all human societies today, had been achieved. This change is referred to as the 'Middle to Upper Palaeolithic transition', occurring between 50 and 40 kya in Europe. The change is dramatic enough to be referred to, by some authors, as the 'symbolic explosion' or 'human revolution' (Mellars & Stringer, 1989). Other authors question the abruptness of the transition, which in Europe (where we have most evidence) reflects the late arrival of modern humans rather than any change in their behaviour at that time (Mellars 1999; contra d'Errico et al 1998).

To understand what happened, it is first necessary to attempt some resolution of a controversy, which led to a spate of conference volumes and journal articles since the late 1980s (Aiello, 1993). At the poles of the debate are two radically opposed hypotheses of modern human origins.

The 'regional continuity' model holds that all modern humans arose pretty much where they are found today (review: Thorne & Wolpoff, 1992). That is, Homo erectus, and all subsequent hominids in Africa, Asia, Europe, and Australasia, represent one single chronospecies which evolved into modern humans in all these areas. This implies a single gene pool with significant global gene flow. It also implies that features which distinguish geographically different human populations today are actually older than those which distinguish modern from archaic Homo sapiens. Thus, the large noses and rugged features of Europeans are interpreted as Neanderthal traits, whilst certain early features of Australian aboriginal crania are derived from Sangiran Homo erectus ('Java man': Thorne & Wolpoff, 1981).
At the opposite pole, the ‘out of Africa’ model holds that modern humans arose in Africa (Leakey, 1963: 43, cf. Heberer, 1963, in Aiello, 1993), and spread from there in a second global dispersal, displacing all other hominid groups with little or no regional hybridization. This model received considerable support from genetic analyses which suggested that all modern mitochondrial DNA derived from a ‘mitochondrial Eve’ living in Africa around 200 kya (Cann, Stoneking & Wilson, 1987; Wilson & Cann, 1992). Although early genetic research ran into trouble due to faulty computer procedures (Templeton, 1992), later analyses supported the original findings, and indicated dates for major population separations and expansions which correlate closely with archaeological data (Harpending et al, 1993). The work of Harpending et al suggested a ‘population bottleneck’ around 100 kya in Africa: that is, a population with as few as 500 females of reproductive age, ancestral to all modern humans. Recent expansion from a small African population would explain the remarkable genetic uniformity of modern humans, with greater diversity within Africa than exists between some African populations and the rest of the world.

Between these incompatible hypotheses there are two intermediate positions, which accept the fossil and genetic evidence for African origins, but allow regional hybridization (Braüer, 1982) or invoke ‘out of Africa’ gene flow (Smith, 1985). Leslie Aiello (1993) points out that all four models are simplistic and do not exactly tally with the fossil data. She suggests a modified ‘out of Africa’ model, which does better justice to the complexities especially of the Asian data. Her version allows for at least two dispersals into Asia (additional to the earlier spread of Homo erectus) - the first involving archaic, and the second modern Homo sapiens - and a measure of gene flow between neighbouring populations.
Since the ‘regional continuity’ hypothesis was first proposed by Franz Weidenreich (1939), there have been major revisions to the way we view the Palaeolithic (Aiello, 1993). Africa was long thought to be an evolutionary backwater, lagging far behind the ‘progress’ seen in the European record. But improved dating methods revealed the opposite: technology and hominid evolution in Africa proved to be at the cutting edge of change. New dating techniques also showed that anatomically modern humans in the eastern Mediterranean, once assumed to be more recent than the more ‘primitive’ Neanderthals, were much earlier, and probably contemporaneous with Neanderthals from around 120 kya (Stringer, 1990). Whilst ‘regional continuity’ still has its proponents, notably Milford Wolpoff and those influenced by him, Aiello points out that his arguments - based on cranial features - could have other explanations, whilst postcranial anatomies show striking discontinuities. Neanderthal pelvic anatomy, for example, indicates an archaic form of bipedal locomotion, little changed since 1.5 mya, and does not suggest hybridization with modern humans.

Opinions have shifted away from multiregional evolution, particularly in the light of genetic evidence. A further nail was driven into the coffin by analyses of Neanderthal DNA from Feldhofer Cave in the Neander valley, Germany (Krings et al, 1999), and Mezmaiskaya Cave in the northern Caucasus (Ovchinnikov, 2000). Since the Caucasus was a likely port of entry of modern humans into Europe, and the Mezmaiskaya infant was one of the last living Neanderthals (dated to 29 kya), any evidence of hybridization might be expected to show up in its DNA. The analyses placed the two Neanderthals, separated geographically by over 2,500 km, together in a clade distinct from modern humans. The level of pairwise difference found between them was similar to that found in a random sample of 300 modern Africans, but more
than that found in similar samples of Caucasoids and Mongoloids. As predicted by the 'out of Africa' hypothesis, both Neanderthal sequences were equidistant from those of the modern African, Caucasoid, and Mongoloid samples used for comparison.

So we may assume that the second grade shift led to a dispersal of behaviourally modern enculturated humans from Africa around 50 kya, which largely or entirely displaced other hominids. *Homo sapiens sapiens* laid the foundations of the world we see today, the world explored by social and cultural anthropologists, who attempt to understand the astonishing variety of counter-intuitive practices, perceptions, and beliefs, surviving or deriving from those times.

I have suggested that the emergence of conventional human culture also led to the third grade shift, a retrograde U-turn in encephalization. This is another area of controversy, though less passionate than the one described above. There are authors who question whether there has been any significant reduction in brain size (e.g. Hayden, 1993). Some question all our inferences concerning encephalization. They point out that the larger *Homo erectus* crania fall at the lower end of the modern range, and even the largest Neanderthal calvarium is within two standard deviations of the modern mean. Some even deny the relevance of brain capacity to any understanding of behaviour, regarding everything before 100 kya as unreflecting and 'unsymbolic' (e.g. Noble & Davidson, 1996).

Trinkaus and Tompkins (1990) tell us that Neanderthal endocranial capacities were indistinguishable from those of early modern humans, and both were larger than in recent humans:
Neanderthals    1,518.9 ± 169.5 cc (n = 9)
Early moderns   1,566.9 ± 122.5 cc (n = 16)
Living humans  1,325.0 ± 25.0 cc

These figures are in line with measurements given by other authors (Aiello & Dunbar, 1993; Noble & Davidson, 1996: 179). Although some Neanderthal crania would be considered exceptional in present day humans (e.g. Amud 1: 1,750 cc; La Ferrassie 1: 1,689 cc), and most of the early modern specimens (1,520 cc to 1,600 cc: Aiello & Dunbar, 1993) are well above the average for living humans, they are still within the upper limit of modern human variability.

Occasional Neanderthal crania are at the low end of the modern range (e.g. Gibraltar 1: 1,200 cc), and few represent contemporaneous breeding populations (Trinkaus & Tompkins, 1990). Samples are spread across a period of 80,000 years or more. Further, in the larger Neanderthal sample given by Aiello and Dunbar (n = 15), there is an apparent trend towards increasing cranial capacity across time. The more recent half of their sample gives a higher average:

Earlier Neanderthals 120 to 64 kya  1,395 ± 146.5 cc (n = 8)
Later Neanderthals   50 to 41 kya    1,545 ± 156.5 cc (n = 7)
Living humans        1,383 ± 116.5 cc

Trinkaus and Tompkins state that reduced brain size in modern humans is "almost certainly due to reduced body size". This 'meat-head' hypothesis (Holloway, 1981) explains the different cranial capacities of living men and women (men: 1,467 ± 128;
women 1,299 ± 105: Aiello & Dunbar, 1993). However, if Neanderthals led more strenuous lives than early modern humans, as argued on numerous grounds by Trinkaus (1983, 1984, 1986; Trinkaus & Thompson, 1987), the ‘meat-head’ hypothesis would not predict that their endocranial capacities should be ‘indistinguishable’. Further, according to a study of femoral bones by Ruff et al (1993), gracilization began in late *H. erectus*, and continued at a geometrically increasing rate through the second grade shift. So, contrary to the ‘meat-head’ hypothesis, brains got bigger whilst bodies got smaller during this period.

The ‘meat-head’ hypothesis does not explain why brain expansion ceased in modern humans. Reluctance to accept the evidence of a retrograde third grade shift may reflect western attitudes to brain size and ‘intelligence’, and assumptions of ‘progress’ relative to our ‘primitive’ ancestors. The ‘play and display’ hypothesis would predict a reduction in brain size following the emergence of modern culture. The reasons include:

1. Extracranial methods of achieving cooperation (classificatory kinship and economic exchange) and hence a reduced dependence on social displays, especially song-and-dance

2. Digital vocal communication (speech) is likely to involve a reduced processing load relative to analogical whole-body communication (iconic gesture-calls, mime, etc)

3. Digital musical scales may similarly require less brain capacity than analogical song
SUMMARY AND CONCLUSION

I have argued that (1) a major expansion of primary intersubjectivity seems likely during the first grade-shift, leading to a 'song-and-dance' culture in *Homo habilis* and *Homo erectus*; (2) there were major expansions of both primary and secondary intersubjectivity during the second grade-shift, leading to a relatively more mimetic culture in archaic and early modern *Homo sapiens*, but possibly less so in Neanderthals, who developed (literally) more spectacular song-and-dance display; and (3) the expansion of mimetic abilities led to the emergence of conventionalized display - ritual - in modern humans, which, even though Neanderthals could copy it with considerable success, for the first time gave a marginal survival advantage to behaviourally modern humans.

The three grade shifts correlate with anatomical and archaeological changes which are at least consistent with the 'play and display' hypothesis of brain expansion, and not consistent with alternative views which do not take account of real-world human behaviour, ethnological considerations, or functional brain anatomy as discussed in previous chapters. What my account lacks so far is direct archaeological evidence of play and display behaviour, especially prior to the Upper Palaeolithic/Later Stone Age, and a clearer account of the transition to culture of modern type. These issues are the subject of the next chapter.
WAS THERE A 'CULTURAL EXPLOSION'?

A few social scientists, notably Durkheim (1912), Lévi-Strauss (1950), and Sahlins (1960), have presented specific arguments for a 'big bang' origin for human culture. Others prefer not to speculate, but the common belief that cultural phenomena have an irreducible sui generis causality tacitly implies a revolutionary transition (cf. Maynard Smith & Szathmáry, 1995). Was there a 'symbolic revolution', or did modern culture develop by incremental Darwinian steps?

In Europe, the archaeological transition to the Upper Palaeolithic, in a geological time scale, is distinctly 'sudden'. Not only that, but there is persuasive evidence for a new kind of sui generis social order. The pace of change greatly accelerates relative to earlier periods: successive 'traditions' appear at intervals of mere millennia, with discrete temporal substages and a host of regional variants - all within 30 thousand years (Bahn & Vertut, 1988). In contrast, the more amorphous Mousterian lasted eighty thousand years or so, and the Acheulian 1.3 million (Table 7.1).

Across large areas of Europe and western Asia, broadly between 40 and 30 kya (Mellars, 1989), anatomically and behaviourally modern people first appear, with a rich material culture - including works of art in durable materials; personal adornments such as pierced teeth, shell pendants, and necklaces; musical instruments; tool kits with marked regional and temporal differences of style; large numbers of blades, burins, and other specialized tools; and items carved from bone and ivory or even moulded in terracotta (Bahn & Vertut, 1988). Some Solutrian spear points are so finely worked as to be translucent, and too fragile for any obvious use other than
Table 7.1. Earliest appearances of industries/cultures
ceremonial. Representations of imaginary beings such as the lion-headed man from Hohlenstein-Stadel appear in the Aurignacian; Gravettian ‘Venus figurines’ reveal a sophisticated sense of style; and the earliest cave art demonstrates extraordinary talent and skill. There is little doubt that, from the onset of the Upper Palaeolithic, an essentially modern type of human culture was established (Mellars, 1989).

But was this modern behaviour brought to Europe by anatomically modern immigrants, or was it an indigenous development? During the Upper Palaeolithic, Neanderthals coexisted with modern humans for some six to seven thousand years, and produced Upper Paleolithic traditions of their own - the Châtelperronian (France and Spain), the Olchevian (Croatia), and possibly the Uluzzian (Italy) and the Szeletian sensu lato (Central Europe: Straus, 2001). Various acculturation scenarios have been proposed, but Francesco d’Errico et al (1998) maintain that the Châtelperronian is actually older than the Aurignacian, the earliest Upper Palaeolithic culture associated with modern humans. ‘Symbolic culture’, they argue, developed independently and in parallel in Neanderthals and modern humans.

Paul Mellars (1999) has rejected this argument with a detailed examination of all available dates, recalibrated where necessary to a consistent standard. Whilst the earliest Châtelperronian predates Aurignacian sites in southwestern France, the neighbouring Aurignacian in northern Spain is older. He suggests that Neanderthals merely copied aspects of Aurignacian culture without insight into their function, much as cargo cultists in New Guinea built European ‘aeroplanes’. But Mellar’s chronology, according to Zilhão and d’Errico (1999), is based on "a large suite of errors of fact, method, and interpretation". It seems the dust is not yet settling on this dispute, although the ‘out of Africa’ model broadly favours Mellars rather than d’Errico.
Most importantly for a performance hypothesis, although one of the earliest engraved plaquettes from the Upper Palaeolithic is Châtelperronian, the design is geometric, and no convincing examples of iconic art have been attributed to Neanderthals (Bahn & Vertut, 1988). If Neanderthals copied Aurignacian culture, did they not also copy the iconic art, or were they simply unable to?

'Symbolic behaviour' and 'symbolic culture'

Although there is no basic controversy about the general character of the Upper Palaeolithic in Europe, not everyone agrees that the transition was revolutionary or abrupt, that other periods were not equally 'symbolic' or ritualized, that this was the only or even the major rubicon crossed by our ancestors, or if any rubicons were crossed at all.

Hayden (1993), for example, argues that there was no major transition in Europe until the last phases of the Upper Palaeolithic. Following Marshack (1991), he presents evidence for 'symbolic behaviour' in Mousterian and even late Acheulian contexts. The apparent absence of Neanderthal iconic art may simply reflect lack of incentive to paint deep inside caves, sheltered from the effects of weathering, or to train specialist artists, or a preference for perishable art forms such as body painting. The visual arts, in durable materials and on a monumental scale, did not really flourish until the Magdalenian (as was believed at the time Hayden wrote), suggesting a truly modern type of class stratification. The major European transition, for Hayden, was from 'generalized' to 'complex' hunting and gathering, reflecting food storage, transport, sedentary life-style, permanent property, and social inequality.

Schepartz (1993) likewise postulates a single major transition, but pushes this
far back in time, maintaining that ‘all the evidence’ points to an origin for language and other ‘symbolic behaviour’ in the earliest Homo. This is at the opposite pole from D’Errico et al (1998), for whom ‘all the evidence’ supports a recent revolutionary origin for ‘extensive symbolic repertoires’.

Few authors postulate more than two phases in the evolution of ‘symbolism’. D’Errico et al. (1998), for example, make a distinction between spontaneous ‘symbolic behaviour’ and conventionalized ‘symbolic culture’, though it is not clear to what extent they regard the transition to ‘symbolic behaviour’ as a major step. Paul Mellars (1999; Mellars & Stringer, 1989a), in contrast, stresses the difference between capacity and performance - ‘symbolic ability’ might precede ‘symbolic behaviour’, and especially overt evidence of such behaviour in the archaeological record. This creates a conundrum: what was the original function of ‘symbolic ability’ if not ‘symbolic behaviour’?

Mellars’s distinction between capacity and performance followed from an important meeting held in Cambridge in March 1987, which for the first time brought together specialists in palaeontology, archaeology, and palaeogenetics (Mellars & Stringer, 1989a). An important theme of the conference was that the emergence of modern human anatomy and modern human behaviour did not correlate with each other in any close or simple fashion.

This perceived problem simply reflects the distinction between social and genetic transmission. Tool making is socially transmitted behaviour even in apes (Joulian, 1996). We do not attribute the industrial revolution to the spread of ‘industrialization genes’, so why apply this kind of thinking to other historical changes?
It seems clear that culture and genotype have been dissociated in hominids from the earliest times. In this sense, conventional culture is not a recent phenomenon. Apes too have socially transmitted culture, including tool making (Savage & Wyman, 1843/44), pharmacy (Sears, 1990), and other local traditions (Nishida, 1987). So far as we know, ape culture differs from ours in that apes show no evidence of conventionalized social mirroring. This distinction, however, does not apply to other animal cultures. Chaffinch song very much depends on cultural transmission, so they have conventionalized social mirroring as surely as we do. The human difference is the typological and modal range of human social mirrors, and a ritually-constructed economico-moral order. My point, however, is not to define differences between human and non-human cultures, but to emphasize that these differences are no longer relevant to cultural definition. Once we grant conventional culture to animals, abandon the notion of 'symbolic culture' in ourselves, and replace 'symbolism' with clearly defined typologies of social-mirroring behaviour, we do not have to keep redefining 'symbol' and 'culture' every time we discover human-like abilities in other animals (cf. Foley, 1987).

Apart from the definitional vacuity of the term 'symbolic', a central problem in palaeoanthropology is that no one has any clear idea of how various types of data relate to each other and what they indicate in cognitive or cultural terms. So everyone can take up romantic 'symbolic' or kill-joy 'anti-symbolic' positions with relative impunity.

Those who attribute 'symbolism' to the earliest Homo species base their arguments on anatomy and a faith in the primacy of language which eclipses all other aspects of social mirroring. Those who find 'symbolism' during the second grade shift
are misreading the evidence. And those who deny 'symbolism' before the Upper Palaeolithic/Later Stone Age are discounting everything that is not ritualized. People have different notions of 'symbolism' and inevitably disagree.

It is in that middle period - between the Acheulian and the emergence of modern culture - that we especially need to re-interpret the data.

THE ARCHAEOLOGY OF SOCIAL DISPLAY

If the Laetoli footprints had shown a group of apiths line-dancing, we would have had direct evidence for social display around 3.5 mya. Unfortunately, song-and-dance is most unlikely to leave a lasting trace, and this is obviously true for any kind of display which does not involve durable objects or materials.

Richman (1976) notes that gelada baboons maintain a constant stream of vocal and gestural exchanges as they meet, greet, pass by, approach, remain near, or move away from each other. We ourselves consider individuals distinctly antisocial if they repeatedly pass us by without some token nod, wink, smile, grunt, or eyebrow flash. Such signals serve to reassure, avoid misunderstanding, maintain amicable relations, or stimulate more positive responses. Social mirroring, in group-living primates, is not something that happens every other day or even every twenty minutes or so. In a complex social primate, gesture-calling is likely to be a full-time waking activity (as role-play seems to be with us), and even song-and-dance displays (assuming they occur) part of a daily routine.

So, where social displays are concerned, when we say 'absence of evidence is not evidence of absence' this is at best an understatement. Displays are ubiquitous, whereas fossilized footprints are rare. In the human case, we can say with confidence
that there has been a spectacular proliferation of social mirrors during the evolution of
our species. If we find a single piece of evidence for a specific hominid display
(provided we can agree on its interpretation!) it would seem safer to infer a frequent
than a fluke event.

We should not be surprised to find that hominid displays did not leave any
overt traces during much of the Early Stone Age/Lower Palaeolithic (ESA/LP). The
earliest evidence clearly interpretable as display behaviour occurs in late Acheulian
contexts, associated with *Homo erectus*, and dating to just before or in the early stages
of the second grade shift.

Other indicators occur sporadically throughout the Middle Stone Age/Middle
Palaeolithic (MSA/MP). Some of these implicate no more than primary
intersubjectivity, others more strongly suggest secondary intersubjectivity. The earliest
putative iconic object is the Berekhat Ram ‘figurine’ (Israel), dated to before 270 kya,
and associated with late *Homo erectus*.

Plausible indicators of conventionalized display are not found before about 120
to 100 kya in Africa (marking the likely onset of the third grade shift), and
unequivocal works of art and musical instruments not until 50 to 40 kya in Africa and
Eurasia (Late Stone Age/Upper Palaeolithic: LSA/UP).

So we can now suggest a solution to the ‘problem’ noted in that historic
meeting in Cambridge (Mellars & Stringer, 1989a). The bulk of the archaeological
data is out of step with the fossil record because it reflects historic change and social
transmission. However, if we look for evidence of ‘play and display’, although the
data is inevitably scarce, it correlates closely with anatomical change (Table 7.2).
<table>
<thead>
<tr>
<th>Kya</th>
<th>Fossil record</th>
<th>Archaeological ages</th>
<th>Overt evidence of display</th>
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<tr>
<td>10</td>
<td></td>
<td>Later Stone Age</td>
<td>Unequivocal evidence of conventionalized/ritual display</td>
</tr>
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<td>20-50</td>
<td></td>
<td>Upper Palaeolithic</td>
<td></td>
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<td>50+</td>
<td>3rd grade shift</td>
<td></td>
<td>First ritual display? (Africa only)</td>
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<td>100+</td>
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<td>First Neanderthals/First anatom. modern humans</td>
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<td>125</td>
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<td>Middle Palaeolithic</td>
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<td>250</td>
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<td>Middle Stone Age</td>
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<td>300+</td>
<td>2nd grade shift</td>
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<td>Earliest putative iconic object (270+ kya)</td>
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<td>350</td>
<td></td>
<td>Early Stone Age</td>
<td>First overt evidence of display</td>
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<td>2nd plateau</td>
<td>Lower Palaeolithic</td>
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Table 7.2. Overt evidence of display behaviour in relation to grade shifts and archaeological ages
New forms of display appear just before or in the early stages of the second and third grade shifts, and this is consistent with the thesis that display is a major factor triggering anatomical change.

It might be useful at this point to recapitulate the social displays which I tabulated in Chapter 3:

1. *Implicit displays*, with the possible exception of mark-making, seem least likely to leave an enduring trace, because primary intersubjectivity does not refer beyond the immediate social exchange, and has limited need for artifacts.

2. *Mimesis* (secondary intersubjectivity) is more dependent on material items such as representational toys, and the subsequent emergence of self-value leads to increasing interest in numinous objects such as jewellery and collectibles.

3. *Conventionalized displays* are the most likely to involve durable artifacts, particularly where there is competitive gift exchange, social class, or monumental intent.

**EVIDENCE FROM EURASIA AND THE MIDDLE EAST**

**Collecting behaviour**

With these aspects of display in mind we can suggest a new interpretation of non-utilitarian objects discovered by archaeologists. The first items of this sort come from late *Homo erectus* sites, that is, before or early in the second grade shift. Decorative pebbles, shells, whale and seal teeth, fossils, and fossiliferous cherts are found, often transported great distances from their sites of origin (Oakley 1971, 1973, 1981).

This early evidence might be interpreted by invoking Zahavi's 'handicap
principle'. Collected objects, in that case, would represent (1) time-wasting behaviour that demonstrates 'spare capacity' and hence superior fitness; or (2) a grooming substitute whose high cost demonstrates social commitment. These two functions are inseparably intertwined in living humans, who use formal and informal gifts of food, hospitality, and sumptuary goods during courtship, marriage, and alliance formation. Among contemporary children (in contrast to bower birds or jackdaws) both boys and girls collect attractive objects, and swapping behaviour serves to secure friends and popularity (i.e. 'grooming' rather than courtship).

The 'handicap principle' is equally pertinent to all the behaviours that I defined as 'performance' in Chapter 3, but not to language (because language tends to economy of expression rather than excess) or play (because play, other than games-with-rules, is not goal-directed).

It is important to realise that Zahavi's principle is not an alternative to social mirror theory. The two ideas are not mutually exclusive, but represent different levels of explanation with somewhat different spans of reference. Sociobiological theories, of which Zahavi's principle is an example, address fitness strategies, and aim to explain why certain strategies are adaptive and others are not. They do not usually address 'proximate mechanisms' - the evolvable means whereby strategies are accomplished - and apply regardless of whether a strategy is genetically or socially transmitted. In contrast to social mirror theory, sociobiological reasoning applies equally to organisms with or without the capacity to represent self and others.

Collecting behaviour in modern children must have some ultimate genetic basis, but probably not in the literal sense of 'genes for collecting'. All we need to postulate is a sense of self-value and the ability to spot and exploit social opportunities. From
boyhood memory, observation of children, and ethnographic reports (for example, the way Trobrianders occasionally take out their *kula* shells to gloat over them: Malinowski, 1922), I would say that collectibles have a *luer* or numinous fascination dependent on perceptions of self-value. There is a close connection between numinous religious experience and self-esteem - the sense of being unconditionally loved. ‘Religious’, ‘peak’, and ‘exceptional’ experiences frequently enhance self-value, and reduce dependence on cultural wealth displays (James, 1902; Hardy, 1979; Maslow, 1971; White, 1994).

Since autistic children lack self-conscious emotions such as coyness and embarrassment, and do not display Piagetian ‘pride in mastery’ (Happé 1998), it would appear that pretend play, or at least ‘shared attention monitoring’ (Baron-Cohen, 1995), is as necessary for the development of self-value at 2 years as for ‘theory of mind’ at 3-4 years. Can we infer that collecting behaviour in late *Homo erectus* indicates an expansion of secondary intersubjectivity, or does collecting represent an archaic behaviour with no modern parallel?

First of all, pretend play has been observed in chimpanzees, and there is anecdotal evidence suggesting that chimps do perceive themselves in terms of social value (Whiten & Byrne, 1988; Savage-Rumbaugh & McDonald, 1988). Secondly, the collection of ‘useless objects’ continues through the Mousterian right into the Upper Palaeolithic. So placing *Homo erectus* on an unbroken line from ape-like to modern behaviour is not intrinsically problematic. The idea of an evolutionary U-turn, however, is highly problematic, since it bucks the general trend evidenced by modern behaviour. Competitive displays tend towards exaggeration and excess, like the peacock’s tail, being constrained only by extrasocial factors such as predation pressure
(Zahavi, 1987). If pre-modern hominids were able to sustain the costs of brain expansion and the costs of "time-wasting" displays, the argument for extinction by external constraints is weak.

Overall, the simplest and most plausible interpretation of collecting behaviour in *Homo erectus*, on the basis of current knowledge, is that it has functional parallels with modern collecting behaviour, and is a remote ancestor of cultural wealth displays. Oldowan butchery scatters, or even the first riverside tool sites at 2.7-2.4 mya, might have been earlier precedents. Taken together with other evidence discussed below, I suggest this implies increased pretend play in late *Homo erectus*, raising levels of self-perception in terms of social value and 'theory of mind'.

The resulting social selection pressures would explain the accelerating pace of brain expansion during the second grade shift. This does not require an 'arms race' in the sense of inter-group warfare as proposed by Alexander (1989). Rather, it implicates 'Machiavellian' individuals competing with each other for sexual and other opportunities. Note that the selection pressures here are twofold: the ability to *read* displays by others confers 'Machiavellian' insight, and the ability to *perform* them establishes social credentials as a desirable ally and/or sexual partner. Machiavellian theory applies to the first type of selection pressure, Zahavi's principle to the second, and social mirror theory unites the two (*reading* depends on *performing*).

Increasing reflectivity and mimetic communication would be expected to lead to more strategically effective hunting, lifting the nutritional 'lid' on brain expansion. Planned hunting prior to the UP has been contested on the basis of faunal studies (e.g. Binford, 1985, 1987) though others disagree (e.g. Chase, 1988, 1989). The fact remains that brain expansion occurred and the metabolic and nutritional costs must
Other objects with ‘added value’

Whether or not the ‘aesthetic’ form of Acheulian handaxes indicates a sense of value over and above utilitarian requirements (Oakley, 1981; Kohn, 1999), there is other evidence for ‘added value’ in the choice of "special attractive fossiliferous cherts or rock crystal" for tools (Hayden, 1993). Oakley also reports two Acheulian handaxes flaked so that a single fossil forms a central boss. Noble and Davidson (1996) deny any ‘symbolic’ significance to this, on the grounds that only two such items have been found, even though suitable cores with fossils “must have been common”. They argue that the central boss may simply result from the constraints on flaking created by the fossil. But if fossils prevent clean flaking, why did Homo erectus not choose more convenient cores? Since these hominids valued fossils enough to collect and transport them, it seems improbable that they attached no significance at all to fossils in tool cores. Kohn’s invocation of the ‘handicap principle’ even predicts a preference for inconvenient cores.

The significance of these objects, of course, has nothing to do with ‘symbolism’, and can hardly be divorced from the general interest in fossils and attractive materials shown by late Homo erectus. The bases of modern human social orders - moral and economic value - fundamentally depend on the prior evolution of self-value. We would expect this to first appear in the archaeological record as a preference for ‘valuable’ as opposed to merely useful materials. Since late Homo erectus shows an interest in ‘useless’ objects for their own sake, and in useful objects fashioned from inconvenient materials to an apparently impractical design, it would
It seems almost perverse to go looking for evidence of self-value somewhere else.

Items comparable with those collected or made by *Homo erectus* continue to appear during the Mousterian. There are fossils and iron pyrites - sometimes engraved - at Arcy-sur-Cure, and further pieces of iron pyrites at Combe Saunière, weighing two to three kilograms, and transported from sources 30 to 90 km away (Hayden, 1993). Such large pieces of 'fool's gold' led Hayden to suggest ritual usage rather than simple collection of attractive items. At Qafzeh, *Glycymeris* shells (a non-edible species) were transported from at least 50 km away. This Mousterian site is associated, not with Neanderthals, but with anatomically modern humans.

**Self adornment**

The strongest support for the importance of self-esteem in Neanderthal communities is provided by evidence of self adornment. Pendants of bone or teeth, though rare, occur throughout Neanderthal times (Marshack, 1990). A swan vertebra and a wolf foot-bone, with holes bored through the top to make either pendants or beads, were found at Bocksteinschmiede in Germany, and dated to about 110 kya (early Neanderthal). A bone fragment with a carved hole comes from Pech de l’Azé (Dordogne), and two animal tooth pendants from Bacho Kiro (Bulgaria). Other Mousterian items include a reindeer phalange with a hole drilled through one end, and a fox canine with an abandoned attempt at perforation, from La Quina (Charente).

From the evidence of UP burials, we know that at this later date perforated bones and teeth were used to trim caps and other garments, sometimes in enormous numbers. Use-wear studies indicate that Mousterian tools were used for skinning animals, presumably for clothing, which would seem mandatory in the colder regions.
occupied by Neanderthals. At Hortus, in Valflaunes (France), Neanderthals hunted and killed leopards and other felines, presumably for their hides. It seems unlikely that a hominid with an appreciation for attractive objects would fail to note the 'added value' of leopard versus bovine hide. The body parts representing one leopard suggested to the excavators that the skin was removed in one piece, perhaps for use as a 'costume'.

In modern children, self-adornment in the sense of dressing-up behaviour and fully theatrical performance appears between the ages of 5 and 11 years (Parker & Milbraith, 1994). But, by my own observation, 'self adornment' sensu lato begins much earlier. Even at the mark-making stage, when given felt-tipped pens and paper, children often mark their own bodies, and, by or soon after 24 months, take pleasure in nail varnish, make-up, face-painting, and play jewellery. Self-adornment at the level of 'finery' indicates perception of the self-as-value rather than fully epistemological 'theatre of mind'.

The interest taken by Neanderthals in finery as an aspect of self-display is a further reason to interpret non-utilitarian materials collected or used by Homo erectus as an early step in the continuous development of self-value and probably pretend play during the second grade shift.

Use of pigments

Painting the body, as an aspect of mark-making behaviour, was presumably within the potential capabilities of apiths and habilines. We do not know when our ancestors lost their body hair, but early Homo erectus was likely to be relatively hairless (for thermoregulatory reasons associated with bipedal locomotion in open savannah: Aiello & Wheeler, 1995). It is our bare skin that is so irresistibly tempting to modern
children armed with colouring materials. We might expect any *Homo erectus* infant, who happened to find a piece of ochre, charcoal, ash, mud, or faeces, to experiment with it, including marking her own skin. To leave an archaeological trace, however, body painting would require regular motivated gathering and processing of pigments, almost certainly by adults.

Pigment, especially haematite and red ochre, is common in sites associated with late *Homo erectus*. 'Crayons' and 'pencils' - pieces of natural pigment ground to shape either *for* or *by* use - and large quantities of powder, occur from at least 300 kya, frequently transported to the site from sources 25 km distant or more (Bordes, 1952: in Hayden, 1993). From the Acheulian rock shelter of Beeov (former Czechoslovakia), dated to 250 kya, came a piece of red ochre with vertical striations from use, a large quantity of scattered red powder, and abraded quartzite rubbing stones presumably used to grind the pigment (Bahn & Vertut, 1988: 69-71). At a much older site, Terra Amata (Nice), dated to around 350 kya, were found 75 pieces of pigment, ranging in colour from yellow to brown, red, and purple. These pieces show traces of artificial abrasion, indicating use, and must have been brought to the site, since none of these minerals occurs naturally in the vicinity (*ibid*).

Signs of systematic pigment use become increasingly frequent in occupation sites during the Neanderthal period (*circa* 125-34 kya). A particularly impressive find from Pech de l’Azé included 103 blocks of manganese dioxide (a black to blue-black pigment), and three blocks of iron oxide. Of these, 67 were rounded or polished into 'crayon' shapes as if by repeated rubbing onto a soft surface such as human skin or leather (*ibid*).

This is the period when we have the first evidence of human burials, and many
of these too are associated with ochre, such as the Neanderthal at Le Moustier, sprinkled with red powder, and another from La Chappelle aux Saints, with red pigment around the head \((ibid)\). In a cave shelter at Nahr Ibrahim (Lebanon), Mousterian hominids stacked the bones of a fallow deer, laying the skull cap neatly on the top. The bones were mingled with quantities of red ochre, and the fact that some were still articulated have led to suggestions that this could indicate a ‘ritual’ performance (Marshack, 1990). However, from a ‘play and display’ perspective, this arrangement is no more ritual-like than, for example, a modern child building a tower of bricks, and may represent a further example of the tidy way Neanderthals generally treated animal bones.

Kill-joy theorists, of course, have presented numerous utilitarian explanations for pigment use by pre-modern hominids (Bahn & Vertut, 1988: 69-71). Ochre is (allegedly: Watts, 1999) an effective preservative for leather, and this could explain traces of pigment on specific tools such as scrapers. Association with burials might indicate the use of pigment to preserve or deodorize the dead, not to mention the animal bone refuse which Neanderthals stacked in habitation caves, where ochre might also deter the predations of rodents. Contemporary peoples have variously used ochre - as an antiseptic, to clean injuries, cauterise bleeding wounds, and protect the body from cold, rain, sun, wind, or insects. Bahn and Vertut suggest that any of these pragmatic uses may have been adopted by pre-human hominids, subsequently leading to an appreciation of body painting for display.

I concur that hominids might have discovered utilitarian applications for pigments, but then why is it that collections of attractive objects, and pigment use, \textit{precede} the technological innovations of the Mousterian by 200,000 years or more?
Materials suggesting new display behaviours are out of step with purely technological change, but in step with brain expansion. The ‘play and display’ hypothesis predicts that pragmatic applications are likely to follow, rather than precede, playful ones. Terracotta (Bahn & Vertut, 1988) and gunpowder (Parkinson, 1963) were used for social displays (sculpture and fireworks) long before the invention of crockery and guns. How would one discover a pragmatic use for anything, other than by playing around with it? Where else does the scientific impulse come from? If we define play as ‘exploratory behaviour’, there can be no technology without play.

Mark-making behaviour, especially in juveniles, is sufficient to account for spontaneous experiments with pigments, including body-painting. The development of pretend play, leading to perception of the self-as-value, would promote a ready appreciation of self adornment and its potential for ‘added value’, especially in the context of song-and-dance display. Body paint, bone pendants, animal teeth, and perhaps less durable adornments such as feathers or animal hides, could all add to the visual excitement and vibrancy of dance, as they do in human communities today.

The vast majority of pigments consumed by modern humans serve functions of display, whether for ritual, personal adornment, ‘art’, or domestic decoration. In particular, red dies and pigments have a prestigious place in many cultural systems, and it is surely no coincidence that modern kings and cardinals wear red on ceremonial occasions. A Dogon myth on ‘The origin of the royal red of kings’ attributes this to the world’s first menstruation, following an act of incest between the Earth and her son (Knight, 1987).

Hayden (1993) notes that Neanderthals regularly used significant quantities of red, yellow, and black pigment, pointing out that these are also the main colours used
in Upper Palaeolithic cave painting. To some extent this restricted palette must reflect the limited range of durable earth colours, but it may be worth noting that, along with white, these appear to be the first named colours in world languages (Berlin & Kay, 1969; D’Andrade, 1995: 104-15). They also dominate numerous systems of classification, including native American medicine wheels (Sun Bear, pers. comm.) and the four humours of classical Indian and European medicine (blood, yellow bile, black bile, and phlegm: Singer & Underwood, 1962).

By the Upper Palaeolithic, the procurement, processing, and use of pigments, especially red ochre, became a veritable industry. Ochre was transported in tens of kilos, and some French occupation floors are reddened to a depth of 20 cm. Of some hundred known burial sites, over twenty-five have pigment (Bahn & Vertut, 1988: 70). Chase and Dibble (1987) note that, whereas in Neanderthal burial sites pigment appears to be sprinkled around in a haphazard manner, UP burials have a more organized and consistent appearance. Quite apart from the obvious case of rock art, it is impossible to explain all of this intensive pigment use in pragmatic terms. Bahn and Vertut themselves note that yellow ochre turns red as it is oxidized by fire, and cite examples of ochre, associated with hearths, at different stages of colour transformation. They infer artistic rather than pragmatic intentions.

**Mark-making and geometric designs**

The occurrence of engraved items adds a further dimension to evidence for social display. There are examples of rudimentary engravings or marks from pre-Neanderthal and Neanderthal times, including cup marks, random dots, pendants, ‘churingas’, zigzags, parallel lines, and ‘symbolic female figures’ (Marshack, 1990). Hayden
(1993) suggests that some of these may be the equivalent of ‘Palaeolithic doodles’ (i.e. simple mark-making behaviour). However, modern children do not create geometric patterns until after the emergence of representational drawing. One of the notched bones associated with the Mousterian burials and engraved ‘capstone’ at La Ferrasie (Peyrony, 1934: 21) has three main sets of parallel lines, crossing the bone at different angles, and engraved with considerable regularity and skill. Such accomplished precision, in the context of a geometric pattern, might suggest another feature of modern two-year-olds - Piagetian ‘pride in mastery’. As Happé (1998) has pointed out, though autistic children may show pleasure at a task successfully completed, they do not show this distinctive self-conscious emotion.

Besides zigzags, parallel lines, and regular notches, there is an engraved cross on a late Mousterian limestone slab from Tsonskaïa cave in the Caucasus, and an earlier one from Tata in Hungary (c. 100 kya) - a round fossil nummulite, bisected by a natural crack across one diameter, to which a Neanderthal ‘artist’ has added an engraved line at right angles (Marshack, 1990). Also from Tata, around the same date, we have evidence of something much more systematic than contingent mark-making behaviour: a segment of enamel from a mammoth molar, carved to form an oval plaque, and ‘painted’ with red ochre (Marshack, 1976). The object is usually interpreted as a palette for mixing pigment with a suitable medium. One edge of the plaque is polished, as if by regular handling and long-term use (Marshack, 1990). Apparently some Neanderthals took their mark-making seriously.

**Iconic representation**

Apes understand, but do not create, iconic images, whereas occasional autistic
prodigies show an astonishing talent for graphic representation. I have inferred an innate representational ability in humans, presumably evolved in the context of projective play. The abrupt appearance of iconic objects in the Aurignacian hardly allows time for the emergence of a dedicated ‘module’ for plastic or graphic representation, and suggests at least that children had been modelling or drawing animal and human figures for some time before that.

Many of the allegedly ‘symbolic’ objects from late Acheulian or Mousterian sites may be explained by natural processes, but even sceptics such as Noble and Davidson (1996: 210) acknowledge that not all of them can. However, they are particularly dismissive of what might be the earliest known example of iconic representation, from the Late Acheulian site of Berekhat Ram, in the Golan Heights, Israel. The site itself was occupied by late Homo erectus before 233 kya. A scoria pebble, dated to more than 270 kya (Feraud et al., 1983), has been ‘artificially modified’ (Goren-Inbar, 1986), apparently to enhance its resemblance to a ‘Venus figurine’, of a type which ought not to appear until 250,000 years later. Noble and Davidson assert that there is ‘no evidence’ that the object was formed by human agency, and deny that iconic representation is ever self-evident, being rather the result of socially conditioned ‘recognition’ by the observer. Archaeologists, they argue, are conditioned to ‘recognise’ the pebble by their familiarity with Venus figurines.

From the onset of projective play, by definition, children find iconic resemblances in almost any convenient object. Four-year-olds need minimal encouragement to report ‘pictures’ formed by clouds, flames, or random cracks in crazed tiles. I showed Schepartz’s (1993: 118) drawings of the Berekhat Ram object to my three-year-old son. When I first presented the drawings upside down, he said it
was "a stone", but when I turned it the 'right' way up, he had no hesitation in saying it was "a snow man". His older sisters thought it looked like "a person" - and when pressed further, either a woman (age 5) or a boy (age 7). My wife thought it could be an owl. Clearly Noble and Davidson have a point, and there is every reason to think of this object as not a 'Venus figurine'. But it does have a 'head' and 'body', and the separation of the two is enhanced by a well-defined groove. Whether or not the pebble was artificially modified, it seems to have been deliberately brought to the site, because there is no natural source of scoria in the vicinity, and it is the only specimen of this material so far found here (Marshack, 1990). It is this point, ignored by Noble and Davidson, which is evidential.

Both romantic and kill-joy commentators debate this item from a perspective conditioned by modern notions of 'art', but a 'play' interpretation is more plausible. I am not suggesting that an individual hominid made or procured this specific object for use as a child’s doll, but rather that no one could think of objects as representations unless toys were in regular use. It is most unlikely that artifactual toys would be made from durable and difficult material such as stone. Leather, wood, sand, clay, or even snow, is better suited to the impromptu nature of play. For that reason, we should not expect to find 'transitional objects' in the early archaeological record. The Berekhat Ram pebble is the only putative iconic representation so far discovered prior to the Mousterian, but I concur with Hayden that durable art would imply political motives of an essentially modern type.

If late Homo erectus children were using 'transitional objects', then role-play was certainly present throughout most of the second grade shift. This is hardly surprising - modern role-play abilities must have evolved at some time before the
emergence of ritual culture, if not in *H. erectus*, then certainly in archaic or early modern *H. sapiens*. As occasional role-play has been observed in apes, there may have been some expansion of role-play abilities even in *H. habilis*.

**Intentional burial of the dead**

Neanderthal burial practices have been inferred in part from the increased frequency of intact fossil hominids in the Mousterian. It is very unusual to find even partially complete hominid skeletons prior to this, simply because any dead creature, left on the surface, is usually dismembered and devoured by carnivores. But in the MP fairly complete hominid fossils are relatively common, suggesting that they were buried soon after death. Predictably, many authors regard burial as evidence of 'symbolism'. Most Neanderthal burials, however, are in caves, and some have been crushed by roof-falls, so the sceptics can argue that they were killed and buried accidentally (Gargett, 1989). Most bodies have missing parts: perhaps they rotted and dropped off prior to burial. Some alleged 'graves' have been infilled by more recent sediments and could not be intentional burials (*ibid*).

Burial, the sceptics insist, can only be regarded as 'symbolic' if accompanied by grave goods or other evidence of ritual. Those who believe in early symbolism then point to Neanderthals in foetal positions, suggesting rebirth beliefs or 'symbolic' arrangement of the dead. The sceptics say no, they were cold or in pain and crawled into depressions to die (*ibid*). A Neanderthal buried in Shanidar Cave was apparently laid on pine branches and covered with large quantities of pollen and anthers (Leroi-Gourhan, 1975) - the so called 'flower burial', surely indicative of ritual. But no - perhaps the workmen hired for the excavation tramped the pollen in on their boots.
Individual graves with evidence of 'bear ritual', circles of stones, or 'grave goods' such as antlers, jaw bones, or elephant's tusks, are met with equally dismissive counter-explanations. Arguments both ways get 'refuted' repeatedly (Hayden, 1993; contra Davidson & Noble, 2001). However, the negative arguments do not explain every case (Riel-Salvatore & Clark, 2001), and we might wonder why we do not find crushed hominids in South African caves, or crushed hyenas anywhere (Krantz, 2001).

But, regardless of who is right, what can burials tell us about cognitive abilities or cultural practices? Grief, mourning, sympathy, and concern, are expressions of primary intersubjectivity, observed in chimpanzees and even Congo grey parrots. It would seem likely that any hominid group, utilizing a permanent or seasonal home-base such as a cave for longer than a generation, and sooner or later mourning the death of a group member, would take care over the disposal of the body. Neanderthals stacked bones from the animals they ate at the backs of caves or in recesses, and it is unlikely that they would treat a group member's remains with less ceremony or in an identical way. There is no theoretical reason to continue doubting the evidence for Mousterian burials or at least intentional disposal in caves, or to think of such behaviour as 'symbolic' in any specifically modern sense. The likeliest conditions for burial might be the ability to compete for occupation sites with bears and other cave-dwelling carnivores, and the possession of fire to protect such occupations.

Instances of 'symbolic behaviour', including burial, are infrequent, sporadic, and highly diverse prior to the UP (Chase & Dibble, 1987; White, 1989a; Davidson & Noble, 1989; d'Errico et al., 1998). They have every appearance of being isolated and spontaneous acts, rather than scripted ritual conventions. If Neanderthals did indeed make 'gifts' of elephant tusks to deceased kin, or lay flowers on their graves, these
could be spontaneous expressions continuous with such gestures towards the living. ‘Grave goods’ include animal bones which might represent cuts of meat that would have been the deceased’s share in life, or a metonymic token of the meat. This would not prove much more than primary intersubjectivity, which I have already suggested is likely to have been a particular forté of Neanderthals, though gifts of attractive but inedible objects are more suggestive of collecting and ‘swapping’ behaviour.

*Ritual burial* is another matter entirely. Mortuary ritual serves functions over and above the expression of grief and consolation of the bereaved, and aims to repair the network of exchange relationships torn by the death of a member (Battaglia, 1992). This economico-moral function is partially secularised in western societies, with the certification of death, formal obituary, notification of creditors, probate, execution of the will, etc. Those who suggest ‘ritual’ in the Mousterian are simply unaware of the economico-moral implications.

**EVIDENCE FROM AFRICA**

It is clear that many aspects of the ‘cultural explosion’ in Europe, particularly its earliest Aurignacian stages, were anticipated, however sparsely, by examples of Neanderthal and late *Homo erectus* behaviour. This might lend some credence to d’Errico’s position - that ‘symbolic culture’ was independently developed by Neanderthals - rather than an ‘out of Africa’ hypothesis. Is there evidence of an earlier ‘cultural explosion’, suggesting that modern behaviour, like modern humans, originated in Africa?

Early archaeologists assumed that Africa was a ‘primitive’ continent, and African Stone Ages, modelled on Eurasian Palaeolithic ones, were assumed to be more
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**Table 7.3. Hominids and archaeological ages**
recent. Improved dating methods revealed the vast antiquity of the African record but, despite the growing ascendency of ‘out of Africa’ hypotheses, archaeologists continue to impose a Eurocentric template. The MSA and LSA are still commonly thought of as homologues of the MP and UP, despite numerous important differences. Table 7.3 compares archaeological and evolutionary sequences in Africa and Europe.

The MSA/LSA transition

The transition from the Middle to Late Stone Age in Africa is "even less well defined and more poorly dated", than that from the Middle to Upper Palaeolithic in Europe (Klein, 1989). One problem in South Africa is that many living-sites were abandoned in the critical period between 60 kya and 30 kya, probably because of hyperaridity. In North Africa we have evidence of gradualistic change, but this is based on stone tool technology. Across large areas of sub-Saharan Africa, the MSA/LSA transition does not occur until around 25 to 20 kya (Watts, 1999). A conventional interpretation would imply that ‘modern culture’ arrived in parts of Africa 20,000 years later than in Europe. But we have no reason to accept that interpretation: the material culture of the Koi-San peoples in South Africa today is essentially continuous with the MSA (Deacon, 1989), and yet they undoubtedly possess modern culture. The function of human culture is cooperation, not ‘progress’. The relentless accumulation of ‘improvements’ associated with industrialization, which conditions our expectations, reflects economico-moral competition, and not the mere fact of enculturation.

As is the case for Europe, there are authors who deny any significant behavioural change across the MSA/LSA transition in Africa. Deacon (1989), for example, regards items such as leather clothes, shell ornaments, bone tools, and rock
art at Boomplaas Cave as ‘epiphenomenal’, and argues that anatomically modern humans were behaviourally modern from 100 kya. From this date or earlier, at the Southern Cape and elsewhere, he believes hominids were using social mechanisms - stylistic shifts - to cope with environmental stress. He is primarily addressing the appearance of LSA-like technology (the Howiesons Poort), around 70 kya, during a glacial period of climatic cooling and aridity. Hominids in the Southern Cape, for example, were consuming geophytes (plants with most of their biomass underground). As a slowly renewing resource (Deacon argues), geophytes require controlled burning to maintain an adequate supply. Constructed hearths at this period suggest that these African hominids could make fire. To illustrate his suggestion that the MSA/LSA transition was an ‘epiphenomenon’, Deacon cites an equally dramatic switch from microliths to prepared cores, in the Ord River region of Western Australia, less than 2,000 years ago. The Aboriginals responsible were, of course, ‘behaviourally modern’ before and after this technological change, which made no apparent difference to their social order or mode of subsistence.

The first anatomically modern humans

One difference between Eurasia and Africa seems to be inarguable: the UP is marked by the arrival of modern humans, whereas in Africa modern humans antedate the LSA by a hundred thousand years or more. From Florisbad, in South Africa, we have a partial cranium with distinctly modern features, more than 130,000 years old, and early moderns are found in Northern and Eastern Africa from 130 kya (Klein, 1989). The oldest anatomically modern person comes from Klasies River Mouth (Singer & Wymer, 1982), occupied by Homo sapiens sapiens between 125 and 50-60 kya.
(Deacon, 1989). Hominid fossils from Die Kelders Cave and Equus Cave, also in South Africa, are indistinguishable from modern Africans, although the fossils are too fragmentary to rule out possible differences. Based on comparative stratigraphy, these modern-looking humans were contemporaneous with the Klasies River Mouth people (Klein, 1989).

The earliest evidence for gracilization is also found in Africa. I have already mentioned that early moderns at Qafzeh and Skhul appear to have been leading more leisurely lives than their Neanderthal neighbours. At Klasies River Mouth the fossils are too fragmentary to assess the pace of gracilization, but it was certainly present. Deacon (1989) notes that if the super-gracile mandible 16424 were the same age as, for example, the robust mandible 13400, this would indicate an extremely dimorphic population. If so, Deacon argues, the explanation would probably be social. For example, a hunting and gathering division of labour would be expected to lead to earlier gracilization in females.

**Variability in the MSA**

The early appearance of modern humans in Africa is consistent with the finding that genetic distances between African populations today are greater than those between all other populations. Variability among MSA *Homo sapiens* fossils is also greater than in Europe during the MP, and there are none with sure Neanderthal features (Klein, 1989). But were anatomically modern humans also *behaviourally* modern? Deacon thinks so - in his view the Howiesons Poort is continuous with present day Koi-San culture in the same area. Klein’s answer is a more guarded "Not clearly".

The ESA, as in Europe, is characterized by sameness: the dual traditions of the
Developed Oldowan and the Acheulian persist side by side, in varying proportions, and virtually regardless of time, place, or environmental conditions. MSA tools are much more varied, not only in their range of types, but also at different times and places. Though they are not essentially different from Mousterian tools - Klein says that, if found in Europe, most MSA assemblages would be designated ‘Mousterian’ without hesitation - overall, the temporal and regional diversity of MSA industries is greater than in Europe.

Of particular interest are the Mugharan or Amudian Tradition in the Near East, the Aterian in North Africa, and the Howiesons Poort, south of the Zambesi river (Klein, 1989). All these show significant changes, coinciding with the first Wurm glaciation, when high aridity, particularly in the Sahara, would be likely to drive hominids out of increasingly desert areas. Clark (1989) regards the Mugharan (which he calls Pre-Aurignacian) and Howiesons Poort as the most striking examples of technological change to occur anywhere during the MP or the MSA. At Haua Fteah, he reports evidence that the Pre-Aurignacian, between 80 and 75 kya, directly derived from the evolved Acheulian Tradition - normally associated with late Homo erectus. And, just as the Howiesons Poort is subsequently overlaid by typical MSA assemblages, the Pre-Aurignacian is superseded by Lavellois-Mousterian technology more typical of the south east Mediterranean region.

At Klasies River Mouth, Singer & Wymer (1982) were able to identify a sequence of technological changes which they designated MSA I, MSA II, Howiesons Poort, MSA III, and MSA IV. All five levels are associated with anatomically modern humans. The Howiesons Poort Tradition is defined by a dramatic increase in well-made ‘backed pieces’ (i.e. one edge of the tool deliberately blunted, to allow
application of manual force during cutting or sawing) - mainly 'crescents' and
'trapezoids' - among otherwise typical MSA tools. These modern humans were also
particular about the stone they used, transporting most of it from several kilometres
away. The backed pieces closely resemble similarly named LSA tools, although, on
average, they are much larger.

A few modern-looking tools, however, do not amount to a 'symbolic
revolution'. From comparative faunal analyses, Klein (1989) argued that, in contrast to
LSA peoples, the Howiesons Poort hominids at Klasies River Mouth were much more
dependent on the docile eland, and much less capable of hunting dangerous animals
like Cape buffalo and bushpig, indicating that they almost certainly lacked bows and
arrows. Klein's claim, however, is contradicted by evidence from pan-margin sites
(Watts, 1999) and by Klein's own data from Border Cave (1977).

**Objects with 'added value'**

Singer & Wymer (1982) found facetted ochre pencils at Howiesons Poort levels, but
no bone tools or ornaments. It is generally true that, in Africa, we do not find many
of the behavioural signs that, in Europe and Western Asia, anticipate the UP. Clark
(1989) notes a very short list of bone and ivory items: one bone point from the
Howiesons Poort levels at Klasies River Mouth; a few notched, minimally modified,
opportunistic bone pieces from Klasies and the Apollo II Shelter in Namibia; seven
apparently shaped 'daggers' of split and ground boar tusk from Border Cave in South
Africa; and a bone point and utilized ivory pieces from Broken Hill (Kabwe).

As for engraved or ornamental objects, his list is even shorter: one *Conus* shell,
associated with an infant burial, and a fragment of a notched rib, from Border Cave
(Beaumont, 1973); also some notched bone splinters and pieces of incised ostrich eggshell, from the Apollo II Shelter (Wendt, 1976). Beaumont, cited by Marshack (1990), also reports a number of decorated wooden and bone rods from Border Cave, "stylistically similar to marked and decorated points and bones from the European Upper Palaeolithic."

Burials

Clark (1989) mentions apparently cached human remains, within piled stones against the cave wall, in MSA levels at Mumbwa Cave (Dart & del Grande, 1930-31), as possible evidence that anatomically modern humans cared for their dead. But, apart from the child burial at Border Cave, he notes few apparent burials in sub-Saharan Africa, and none at all during the Aterian in North Africa. "In my opinion," he concludes, "the African evidence does not show any highly innovative, technological breakthrough such as might be expected from the handiwork of Modern Man."

The difference between Africa and Eurasia

So, in Africa, in contrast to Europe and Western Asia, we do not see such a dramatic transition to the LSA; there is little to compare with the Aurignacian; there is no grand succession of artistically impressive traditions such as the Gravettian and Magdalenian; and, in the MSA, there are few anticipations of future glories, such as those associated with late Homo erectus and Neanderthals in Europe. Must we infer that d'Errico et al were right, that UP 'symbolic inventories' were a spontaneous Eurasian development, and that, although our modern genes came 'out of Africa', our modern culture did not?
I submit that all this data strongly supports an African origin for modern culture. Clark's disappointed conclusion reflects his post-industrial expectation of a 'technological breakthrough'. First of all, the rarity of the African items described is not informative. A single piece of engraved eggshell testifies to an accomplishment, whereas absence of evidence tells us nothing. We can only guess what objects MSA people may have made from perishable materials such as wood, leather, or basketry. If MSA Africans resembled present day San foragers, they would have had few possessions beyond their stone tools. Pendants and engraved objects are extremely rare in Europe also, and though I have given a longish list, various authors repeat the same list with the occasional addition of a new find. If personal ornaments were more common among Neanderthals, this might simply reflect their need for complex clothing, which renders body paint impractical, other than for the face.

We should also remember that Africa is a very big place. Whereas Europe has been intensively excavated throughout the past century, archaeological sites in Africa, apart from the Mediterranean strip, tend to cluster along the eastern side of the continent and in the Southern Cape. This eastern/southern bias reflects previous discoveries of ESA hominids - and the consequent locations of specialized university departments, museums, and other research centres. It seems fair to say that archaeologists have not yet done enough digging in Africa, and probably not yet in the right place.

But most importantly, if a 'cultural revolution' occurred in a small population of African moderns, which subsequently expanded, we would expect a range of African acculturation scenarios - like the Châtelperronian in Europe but involving other anatomically modern groups. Such cultural spread in Africa would create a
different pattern from that created by a diasporic spread in Eurasia: a mosaic versus a unity.

How could this be recognized in the archaeological record? Stone tools, faunal analyses, and the like, are, of necessity, the archaeologist's bread and butter. Bones and stones are the things that survive. But in social anthropology, tools and subsistence are seldom major foci of study, and if they are, it is usually because of their 'symbolic' significance. In understanding any modern society, it is often the things which leave no trace, or are manifest in art rather than technology, that are of paramount importance. So what did ritualized culture create that was not present in previous hominid societies?

One conventional answer to this question is 'language' (the position taken by those who deny 'symbolic behaviour' before the LSA/UP). I have no wish to downplay the importance of language, or its undoubted cognitive impact, but the effect of language on human mentation may be less than commonly supposed. Merlin Donald (1991) reports the case of 'Brother John', who experienced temporal lobe seizures, periodically depriving him of all use and comprehension of spoken or written language. But this did not in any way diminish the essential humanity of his thought. On one occasion, he lost the use of language whilst travelling; yet he could still negotiate a railway journey, hire a taxi, find a suitable hotel, and order food in a restaurant. He could communicate his basic needs and intentions, and make requests, using mime and iconic gesture-calls. Of course, language loss in an educated and literate monk is not strictly comparable with language absence in anatomically modern humans, but the case does demonstrate the versatility of mimetic communication, and the rationality of thought without language.
The emergence of language alone cannot explain the success of modern culture, relative to the mimetic culture which presumably preceded it, and which must have been adequate to meet pragmatic social and subsistence needs across a hundred millennia or more. If we accept a Durkheimian view, language would not even have been present at the time of the first world-changing ritual. This implies a further difference between cultural origins in Africa and the transition to the UP - language would have developed more gradually in Africa, whereas the European immigrants would have possessed fully developed speech on arrival, and possibly a common language.

What was crucial, as we can see from modern ethnography, was not language, but a revolutionary re-ordering of kin-based and reciprocal altruism. To achieve this, the biological family, the biological individual, and the biological in-group/out-group distinction, had to be effectively erased from consciousness, and buried beneath layers of ritually-constructed obfuscation. Kin became conflated with clan, individual with age-group, and new social divisions, radiating to the imagined ends of the earth, cut across territorial boundaries - dividing ‘natural’ groups from within, and uniting them from without. At the base of this system had to be the incest and own-kill taboos, enforcing marital and meat exchange between clans.

What distinguishes the UP from the LSA is the extraordinary uniformity of its artistic traditions, suggesting economico-moral networks of prodigious geographical extent and ‘the endless interchangeability of its human units’ (Gamble, 1982: in Knight, 1991: 370). For example, during (or usually ascribed to) the Gravettian period, ‘Venus figurines’ were produced across a vast area - stretching from the Pyrenees to the Ukraine and beyond. All conform to a remarkably uniform template:
No matter where found...they are practically interchangeable, apart from their proportions. The most complete figures have the same treatment of the head, the same small arms folded over the breast or pointing towards the belly, the same low breasts dropping like sacks to far below the waist, and the same legs ending in miniscule or non-existent feet (Leroi-Gourhan, 1968: 96, cited in Knight, 1991).

These are portraits of bellies, buttocks, and breasts - of that which all women have in common - whilst everything that might reveal clues to personality or individual volition - faces, hands, and feet - is denied or obliterated. That most sensitive and expressive instrument of human communication, the face - which individualistic westerners obsessively draw, paint, and photograph - is turned aside (Venus of Laussel); swathed with hair (Willendorf, Lespugue); or omitted altogether (Bahn & Vertut, 1988: 99, 139; Leroi-Gourhan, 1968: 92; Knight, 1991: 364, 369; Noble & Davidson, 1996: 76).

Such conservatism, however, is utterly unlike the monotony of Acheulian handaxes, for the Venus figurines were an archaeologically brief fashion, mostly made within a period of two thousand years (25-23 kya). They were preceded, across a similarly broad geographical range, by carved images of vulvas (or hoofprints!) in the Aurignacian, and followed by rows of dancing buttocks and breasts in the Solutrian or Magdalenian (Bahn & Vertut, 1988: 88, 140, 141).

The UP is an age of accelerated change, and this cannot be explained by invoking biologically new ‘cognitive’ abilities: how could some ‘macromutation’ produce such drastic but coherent re-ordering of human society in so short a time? This is counter to the common principle that behavioural change precedes genetic change. It also seems unlikely that the succession of UP traditions served any ‘adaptive’ function in a strictly biological sense. If they did, we would expect them to
correlate more closely with environmental change. The UP begins at the tail end of the Wurm II glacial phase, and there are two interstadials (relatively warm intervals during an ice age) within this period, roughly 12,000 years apart (Clark & Lindly, 1989). Major 'techno-complexes', however, succeed each other at intervals of around 5,000 years, and there is a great deal of temporal and regional variation within them.

A likely motivation for the rate of innovation may be gift and marital exchange on a vast and far-flung scale - a new and systematic need for 'added value', and objects made 'special' to achieve social leverage. Language, too, must have been a factor, but not for the reasons commonly assumed. Judy Dunn (1991) has shown that language is a powerful aid in the development of social insight, not only as a supplementary medium for social mirroring, but also as a direct instrument of intellectual exploration in its own right. Children who discuss the feelings, needs, and thoughts of others with their mothers also perform better on false-belief and other mindreading tasks at a later age. The role of language in gossip, dispute, conciliation, litigation, and social dramas generally (Turner, 1982) indicates its importance in collective self-scrutiny. Such public reflectivity would be expected to enhance sensitivity to political contingencies, and create a society more capable of self-generated change.

Ethnographic evidence suggests a further utility of language. It is widely reported that hunting and gathering people gain new ideas - new songs, dances, rituals, modes of dress, customs, and even specific inventions such as fish traps - almost entirely from dream or trance experience (Stewart, 1935; Domhoff, 1985; Bieseie, 1993; Luna, 2000). It seems unlikely that anything so radical and widespread should be a recent historic development, and UP foragers may well have done the same.
Perhaps the real potency of language, the telling difference from mimetic communication alone, is the ability to communicate dreams, fantasies, and other subjective experiences in unambiguous and vivid detail.

*The Mugharan as an acculturation scenario*

Bar-Yosef (1989), reviewing the Levantine Middle Palaeolithic, notes that during this period there were three major technocomplexes - the Mousterian and the Mugharan in the north and central Levant, and late Acheulian in the south. The Mugharan is variously named, by different authors, as the Amūdian or Pre-Aurignacian, and its history is equally confusing. Until 1975, it was regarded as a Lower Palaeolithic (Acheulian) complex, but is now recognized as having Upper Palaeolithic features. At Haua Fteah, Clark (1989) finds evidence that the Mugharan, despite its 'modern' character, developed directly from a late Acheulian tradition. It is tempting to consider this untypical transition as evidence of acculturation, possibly due to displacement of behaviourally modern people from increasingly arid regions of North Africa.

From Mugharan levels at Haua Fteah Cave comes an isolated find which, because of its unicity and location - midway between Africa and Europe - is as tantalizing as the Berekhat Ram 'figurine'. The item consists of a very small bone, hollowed out to form a tube, into which its maker began to carve two holes, but abandoned the attempt (McBurney, 1967). So far no one has suggested any interpretation of this object other than as an uncompleted bone flute, of a type associated with the Eurasian UP.

The presence of a flute dated to 45 kya - preceding the earliest UP in western Asia by 5,000 years - points to an African origin for ritual culture, unless it is argued
that musical instruments could have developed before the conventionalization of mimetic display. Although evidence for music, art, and ritual appears simultaneously in Eurasia, the African record is too sparse to settle this issue.

Use of pigments in Africa

Despite the rarity of ornaments so far found in the African MSA, one item of probable self adornment - red pigment - is no less strikingly present than in Eurasia. In fact, the pattern of ochre use across time may be a major indicator of behavioural difference between the MSA and the MP, and further supports an origin for modern culture in Africa (Watts, 1998, 1999). I have mentioned that ochre and other pigments were in use in Europe from Homo erectus times, but at the outset of the UP, procurement and use of red ochre reached ‘industrial’ proportions. It would seem that anatomically and behaviourally modern humans brought this high usage with them from Africa.

Well before the commonly accepted transition to the LSA, from around 50 to 45 kya, a large iron oxide mine, which also produced copious quantities of specularite, was being quarried at Lion Cave, Swaziland (Beaumont, 1973). Regular use of red pigment, in Zimbabwe, dates back at least to 125 kya, roughly contemporaneous with the first modern humans (and the first Neanderthals). FACETTED CRAYONS OF HAEMATITE and ochre are found at sites as far apart as Qafzeh, in Israel; Klasies River Mouth, South Africa; Bambata Cave, Zimbabwe (Armstrong, 1931); and Porc Epic Cave, Ethiopia, where faceted pieces include a fossil ammonite, which had been altered to haematite (Clark, 1989). In this case, at least, it seems the fossil was less valued than its substance.

Since no evidence for painted art has been found prior to the LSA, the pigment
was presumably used for painting the human body, animal skins, or implements (Clark, 1989). But the kind of heavy usage found in the UP in Eurasia, and in the later MSA in Africa, suggests systematic ritual use.

Ian Watts (1998) has attempted to date the emergence of conventionalized ritual culture by assaying pigment remains in South African sites. Haematite and ochre crayons occur quite early in the South African record - some may be as old as 400 thousand years, produced by late *Homo erectus*. The use of pigments, particularly red ochre, increased during the MSA. Ochre is present in around half of the known MSA 2a assemblages (n = 9), virtually all the Map Cave/rockshelter assemblages (n = 24), and in 41 of 44 reported later sites. Finds include ochre crayons and grinding stones with ochre traces. The rate of expanding usage, however, is not constant. Watts showed that, in South African sites, there is a relatively abrupt tenfold increase in ochre specimens, dated between 120 and 100 kya.

*The significance of ochre usage*

This explosive increase in ochre may well be a marker for the advent of ritual and economico-moral behaviour, for it coincides with expansion of a small African population, ancestral to all contemporary humans, as inferred from mitochondrial DNA analysis (Harpending et al., 1993).

Just as geneticists construct phylogenetic or diasporic trees of human populations, so do 'palaeolinguisticians' construct trees of relatedness between human languages. A problem with these studies is that modern languages change relatively quickly, and we do not have a reliable 'genetic clock' as we have for mitochondrial DNA. However, all language studies converge on a single African ancestor, with
estimated origins dating between 50,000 and 200,000 years ago (Donald, 1991; Noble & Davidson, 1996).

Cavalli-Sforza et al. (1988) combined genetic, archaeological, and linguistic data and found a high order of agreement between them. They showed that speakers from common language phyla are also genetically related, with a few easily explained exceptions. Those most closely related genetically are also most closely related linguistically. The genetic distances between linguistic groups also correlate with archaeological estimates of dispersion times, with the exception of Native American data, about which there is archaeological disagreement. They conclude that the first major phyletic division separated African from non-African languages, probably around 92 kya, implying an origin for language sometime before that.

The genetic methodology in this study has been criticized by Nei and Roychoudhury (1993), who estimate that the first split between Africans and non-Africans occurred around 115 kya, a date more in line with the conclusions of Harpending et al (1993) and Watts (1998). Even the second split - between Caucasoids and other non-Africans - occurred around 55 kya. Although these estimates are certainly rough, there is at least a possibility that three distinct language groups emerged in Africa, before 50 kya, whereas the Eurasian immigrants themselves may have been united by a common language, or may have spoken closely related dialects.

So we have several lines of evidence - genetic, linguistic, and archaeological - pointing to an origin for modern humans, syntactical language, and intensive use of ochre (suggesting ritual) in Africa before 110 kya. This is broadly consistent with the Durkheimian theory that language did not originate before ritual.

In his investigation of ochre in Africa, Watts was testing a specific prediction
of one hypothesis of cultural origins, originating with Chris Knight (1991). Red pigment is a fairly obvious potential visual metaphor for blood (the reason why iron ore is called 'haematite'). Ethnographic evidence bears this out - red ochre in present day cultural contexts regularly represents blood, and blood is the common thread running through the venatic ideologies of foraging peoples. The menstrual, incest, and own-kill taboos are all 'blood' prohibitions, fundamentally implicated in the grand equations of women with meat and incest with cannibalism. These are the essential conflations required to 'explode' kin-based and reciprocal altruism, so generating a whole new order of social cooperation.

Knight (1987, 1991) proposed that the first ritual was staged by collectively menstruating females, signalling a very simple message to males: 'No sex unless you bring the meat home.' The simplest way of doing this, he suggested, is by impersonating wounded and bleeding game animals, and perhaps brandishing male hunting weapons (early South African rock art appears to portray such scenarios). This effectively turns sexual 'yes' into 'no' signals (wrong species, wrong gender, wrong time), and would be sufficient to establish a set of taboos against all things bloody - menstruating females, 'blood' relations, and raw meat. Subsequently, Power (1993; Power & Watts, 1997) pointed out that Knight's theory, logically, requires pregnant and lactating women to fake menstruation using red pigment. Hence the prediction of a dramatic increase in ochre usage with the emergence of ritual culture, and Watts's research which confirmed such an increase at 120 to 100 kya in South Africa (Knight, Power & Watts, 1995).

The reason why the first ritual became necessary, according to Knight, was increasing aridity during the last ice age: hunting ranges were extended, and females
needed to pressure males into ‘bringing the meat home’, rather than consuming the choicest portions at the kill site. Watts’s finding, between 120 and 100 kya, conflicts with Knight’s original theory. These dates span the tail end of the Riss III ice age and the early Riss/Wurm interglacial period. To satisfy Knight’s rationale, there would have to be an earlier origin for ritual culture, presumably during Riss III, before 120 kya. Because of the paucity of data from West and Central Africa, Watts’s study cannot resolve this question.

Watts (1999) concludes that it is time to abandon our habit of equating Stone Ages with Palaeolithic periods. The LSA is not comparable to the UP. If anything, according to Watts, it more closely parallels the Epipalaeolithic (a brief transitional period between the UP and Neolithic in the Middle East and North Africa). The MSA is a much less homogenous entity than the Mousterian, and incorporates several transitions across time and important regional differences. South of the Limpopo, Volman (1981, 1984) has identified five MSA stages - 1, 2a, 2b, Howieson’s Poort, and 3 - which have achieved widespread acceptance by archaeologists (refs. in Watts, 1998: 65-6). In South Africa, the transition to ritual culture, Watts suggests, occurred with the onset of MSA 2b, making subsequent MSA stages the nearest South African equivalent to the Eurasian UP.

The tenfold increase in ochre use marking the onset of MSA 2b, in the context of Knight’s theory, suggests increased use of collective deception. However, there was some increase in pigment use during MSA 2a, contemporaneous with the earliest known anatomically modern humans. Pigment appears more sporadically than during MSA 2b, and Watts considers it consistent with the ‘proto-ritual’ hypothesis of Power and Aiello (1995). This has no Palaeolithic equivalent.
Table 7.4. Stone Age/Palaeolithic analogues according to Watts (1999)
MSA 1, associated with archaic *Homo sapiens*, is the only period which is strictly comparable to the Mousterian. Watts's view is summarized in Table 7.4.

**SUMMARY AND CONCLUSION**

One reason for the differences between Africa and Eurasia, I have suggested, might have been the development of a hunter-gatherer lifestyle in Africa, sustained by a menstrual signal of infertility. In more northern climes, clothing would obscure such a signal, and lesser arridity during glaciations would not require such extended foraging ranges. This might favour a more baboon-like strategy in Neanderthals, with consequently less leisure in which children could develop pretend play, for which I presented evidence from late *Homo erectus* times. If Neanderthals, during the Châtelperronian, were able to copy aspects of Aurignacian culture, but not the iconic art, this would imply that pretend play was less elaborated in Neanderthals than in modern humans. They may have lacked some modern aspect of self/other awareness, perhaps ‘theatre of mind’.

In these last two chapters I have presented a re-interpretation of the fossil and archaeological records up to about 10 kya, using social mirror theory and a 'play and display' hypothesis of brain expansion. In doing so I have shown, firstly, that the data is *not inconsistent* with the hypothesis and, secondly, that the hypothesis allows a more coherent story to be told about hominid evolution. Many previous accounts treat specific behaviours - such as intentional burial of the dead - as discreet entities without known relationships between them. This allows behaviours to evolve in a mosaic manner in an arbitrary sequence. Social mirror theory provides a theoretical framework which makes clear the functional and evolutionary relationships between
I have suggested that the first grade shift was triggered and driven primarily by the emergence of song-and-dance display, possibly with some increase in pretend play. Further elaboration of song-and-dance occurred during the second grade shift, perhaps more so in Eurasia than in Africa. But the important triggering factor here was an expansion of pretend play, leading to perceptions of the self in terms of social value and mental states. Extended childhood and fully theatrical role-play also emerged during this period, certainly in modern humans, but less certainly in Neanderthals. The evolution of social displays in Africa favoured the origin of ritual culture on that continent.

The above interpretation does not make exceptional use of untestable assumptions, since it is based on the most salient features of modern behaviour. Also, I submit that it tells the right kind of story. That is, it recognizes that the development of conventionalized human culture requires a history as well as a phylogeny; that there are at least three major 'rubicons' - primary, secondary, and conventionalized intersubjectivity - which must be crossed in the correct sequence; that play and performance are of central importance in understanding human social dynamics; and that collective display, rather than communication, is the key to understanding the emergence of modern culture and reflective consciousness.

What we can be certain of is that the emergence of modern culture depended on an explosive proliferation of social-mirroring abilities during hominid evolution, along with the anatomical and physiological scaffolding that sustains them (extended childhood, brain enlargement, complex facial musculature, a tunable pharynx, possibly menstruation and the menopause, etc). With the advent of modern culture, this
formidable armamentarium of abilities was subjected to systematic social control, creating a whole new order of cooperation and adaptive flexibility. With this change, our ancestors became fully committed to make-believe as a way of life. Until we acknowledge this, I suggest, we cannot hope to arrive at a right reading of the fossil, archaeological, and ethnographic records, or an adequate understanding of contemporary social processes such as economic exchange and armed conflict.

Until neuroscientists can tell us how modern brains handle social mirroring functions, the 'play and display' hypothesis of brain expansion remains speculative. In particular, dance has not yet been studied and my own pilot study of role-play reveals a need for further research.

The price we have paid for enculturation is the scrambling of our Plio-Pleistocene cognitive heritage, the inversion of universal ontological intuitions, and the manifest dangers of living in imaginary worlds. This may be more than a two-edged sword, for, as Victor Turner has pointed out, it is in these imaginary worlds that so many of us find experiential truth, which I suspect is linked to our need for self-value, and the perception of our place in a universe fundamentally committed to emergent cooperation.
CONCLUSIONS
Conclusions

The main argument

This essay set out to bridge the conceptual gulf dividing biological from social anthropology. Here are the main findings and conclusions:

- It is the job of culture to obfuscate our views of ourselves, each other, and the world

Our lack of self-understanding is the real reason for the conceptual abyss dividing biological from social anthropology. There has been enormous progress in the human sciences, but often concerning generic issues - functions and malfunctions we share with other animals. And there is a persistent blindness to what is central, to what is most distinctive and interesting about human beings, to what human self-consciousness implies, and to what human culture is and how it works. I attribute this to a universal phenomenon of self-ignorance which we ourselves actively generate in creating collectivized identities. Human culture makes our most aberrant notions and habits masquerade as biological universals. That is how Lewis Henry Morgan perceived the nuclear family, and that is how Australian aborigines perceive their dual moiety system.

Consequently, other cultures violate our unspoken assumptions about ourselves, revealing them to be false. It follows that we cannot understand others until we understand ourselves, and vice versa. Self and other awareness are simultaneous achievements, as Gopnik and Melzoff (1994) demonstrated in children.
'Symbolism' is a confabulatory concept without heuristic value

One easily exposed example of cultural deception is the notion of 'symbolism' in the human sciences. It functions to patch over our incomprehension of the 'anthropological other' (and hence the 'anthropological us'), to maintain the fictive opposition of 'nature' and 'culture', and ultimately to legitimate our own social order and false understanding of ourselves.

Anthropological approaches to 'other' cultures represent generic confabulatory responses to anomaly

Because we are duped by our own collective deceptions, mistaking them for reality, other people's views of reality appear anomalous. Anthropological approaches readily divide themselves into the three possible responses to anomaly: either the informant is irrational, or the observed is not what it appears to be, or the observed is truly 'out of this world'. The last, which one might think ought to provoke paradigmatic change, has led only to theoretical nihilism and the abandonment of science. Kuhn (1962: 77) claimed that what scientists never do is take anomalies as counter examples disproving the paradigm. The response in 'otherworld' social anthropology has been to abandon the whole idea of paradigms, which is to overtly reject the paradigm whilst covertly hanging onto it - implying that it has no viable alternative. Hermeneutic and postmodern anthropologists, in fact, live in the same disembodied world as their reductionist counterparts.

To counter absolute relativism in social anthropology we need to ground human 'meanings' in embodied experience
The polar extremes in anthropology - reductionist and anti-reductionist - reflect the two horns of the dilemma created by Enlightenment dualism. Our tendency to divorce meaning from embodied experience is one consequence of Enlightenment thought, accounting, for example, for the ‘frame’ or ‘grounding’ problem in artificial intelligence research. Fortunately, social anthropology has a ‘middle horn’ which attempts to resolve the dilemma - real-world approaches which ground religious cosmology in embodied experience. But even here there is a polarization: historical materialists ground ‘false consciousness’ in economic experience, ignoring childhood play (everything that makes us human), whereas theatrical theorists ground religious cosmology in ritual play, neglecting the world of political and economic competition (everything that makes us monsters). Victor Turner attempted to unite these partially embodied views, proposing a circular relationship between the structural world of work and the anti-structural world of play. He also proposed a programme of anthropological brain research. It is on Turner’s thinking, and this middle-road tradition more generally, that my own work is based.

We cannot have social science unless we ground human ‘meanings’ in embodied experience. As part of this grounding process we need to establish the universal substrates of human culture. Only with such a basis can we attempt an etic cross-cultural understanding. Emic approaches are in any case an empty posture - cross-cultural observation or report is necessarily etic - and only through etic approaches can anthropology aspire to the metacultural goals of science. The notion that ‘emic’ accounts are more ‘respectful’ towards cultural others is another consequence of disembodifying collective deceptions. Emic accounts deny to others the respect of honest reporting.
It is no coincidence that (1) according to current theory, there are two kinds of intraspecific cooperation which can evolve by genetic change—kin-based and reciprocal—and (2) all human societies are structured by systems of expanded kinship and reciprocity.

Human cooperation transcends the limitations of selfish-gene strategies by ‘exploding’ or otherwise subverting them, scrambling our Plio-Pleistocene cognitive heritage in the process. This is my basic solution to the conflict between biological and social anthropology: human behaviour is indeed determined by selfish genes, but selfish-gene strategies are overturned by ‘anti-biological’ cultural institutions.

Expanded systems of kinship and exchange bring other consequences in their train, since they require the obfuscation of ‘selfish’ bodies and desires. Hence the counter-intuitive and counter-experiential beliefs and self/other perceptions that we find in all cultures including our own.

Animism and science share disembodied self-perceptions

Perspectival beliefs void the body of essential substance, contrary to innate intuitions which appear to be universal in children. Animism inverts a range of ontological intuitions, including the difference between appearance and reality, dreams and reality, and make-believe and reality. Animism creates multiple parallel worlds, makes culture prior to nature, and holds that reality is created by the perspective of the observer. Western science is the result of a series of reactions against animism. We have rejected a vitalistic world-view, but in mechanizing the body, we void it of functional sentience. Computers do not have bodies, but we think our minds and brains function like computers. Other disembodied views include ‘culture as communication’,

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'symbolism' as divorced from embodied experience, and 'meaning' as a Platonic abstraction unrelated to lived experience. When we use our disembodied views to try to understand other people's, the result is inevitable frustration, and a hundred years of counter-productive denials.

Emergent processes involve anti-structural transitions

The entire complex of 'anti-biological' institutions and inverted intuitions has its likeliest origin in the anti-structural world of ritual liminality. Anti-structure is not an exclusively anthropological notion. The same idea occurs in the alternation of telic and paratelic thought in the theory of psychological reversals (Apter, 1982). Sleep and daydreaming could be interpreted as the 'sparagmos' or antistructural disruption of normative consciousness, on which flexible behaviour depends.

There is a simple logic to this. If you want to build a new railway through London, you will have to knock down some buildings to do it. Biological processes obey the same logic: the emergence of the butterfly requires the demolition of the caterpillar. Just as a new game of cards demands that you shuffle the deck, the creation of a novel individual demands that you shuffle the genotype. Cloning experiments repeatedly failed until it was realised that mature cells are not just featureless bags of genes, but have structural commitments that determine how the genetic code will be read out. Successful cloning must begin with a cell in its 'quiescent phase' - not structurally committed to life as a liver, muscle, or other specialized cell.

What distinguishes humans from other apes is not primarily 'intelligence' or
language, but a formidable armamentarium of social displays which make
human self-consciousness (hence intelligence) and culture (hence language)
possible

Social mirror theory is not new, but it has attracted new recognition in the light of
research into autism and ‘theory of mind’. Current exponents of social mirror theory,
however, have an impoverished view of human behaviour. The ‘theory theory’, for
example, assumes ‘imitation’ as a sufficient source of self-awareness. Such theorists
fail to remark the extraordinary range of social displays which distinguish humans
from apes both quantitatively (for example, we have many more facial expressions)
and qualitatively (we have unique expressions such as pride, contempt, and surprise).

Human social displays can be usefully classified into three types with at least three
modes

Communication (as understood by linguists), play (as understood by
psychologists) and performance (as understood in the liberal arts), are three distinct
types of social display with functional and evolutionary links between them. Our entire
armamentarium of social displays needs to be understood as a whole, not simply left to
fragmentary study in different disciplines. All three types of display occur in three
modes: implicit, mimetic, and conventional (four if you divide mimesis into projective
and introjective sub-modes). All human displays can be classified using this three-by-
four grid, with heuristically useful implications which I have explored at length.

Performance generates emergent orders

Of our three types of display, performance is the one least well understood in the
behavioural sciences (where music, for example, is assumed to be a form of
'communication'). Performance is continuous with play, but unlike play, and in
common with communication, it is socially manipulative. Performance subserves at
least three distinct functions:

1. Communication - sometimes agonic towards out-groups
2. Grooming - cementing coalitions and alliances within potentially very large
groups
3. Entrainment - achieving physiological rapport and unified intent (implicit
mode), epistemological cohesion (mimetic mode), and collectivized identities
(conventional mode)

The entrainment function turns two or more selfish individuals into one great big
selfish individual. That is, it generates emergent orders of cooperation, transcending
lower-order selfish strategies.

*Social mirrors correlate with levels of self-awareness*

According to social mirror theory, our own use of social mirrors can be inferred from
introspection. 'Theatre of mind' implies that we live in a theatre. Conversely, levels of
self-awareness (in animals or preverbal children) can be inferred from their available
modes of social display. Comparison across animal taxa and child development
literature are consistent with a hypothesis of phylogenetic co-evolution and ontogenetic
coopdevelopment of social mirroring and self/other-awareness.
Song-and-dance is the prerequisite for dramatic ability

Durkheim's theory that ritual pantomime is the prerequisite for language can be extended to a general hypothesis of social mirroring viz: performance in one mode generates the necessary preconditions (self/other-awareness and social trust) for the emergence of communication in a higher mode. So implicit performance is the precondition for mimetic communication, and mimetic performance is the precondition for conventional communication (ape data, however, suggests that implicit play rather than performance is sufficient to support some mimetic ability).

There are other reasons for regarding song-and-dance as a precursor of role-play. Song-and-dance, by promoting physiological and behavioural cohesion, is a likely first step enabling individuals to 'put themselves in the shoes of others'. Song-and-dance would also be expected to expand cortical areas necessary for role-play: notably inferior parietal, premotor, and possibly ventromedial and dorsolateral prefrontal.

Social mirror theory implies an evolutionary spiral with at least three 'rubicons'

during hominid evolution

It seems clear that communication is older than play, and play is older than performance. It seems equally clear that implicit mode is older than mimesis, and mimetic than conventional mode. All-in-all, a spiral co-evolution of social displays and self/other-awareness is implied, starting with implicit communication and self-awareness, and 'ending' with conventional performance and economico-moral personae.

This is broadly supported by a comparison across animal taxa and child
development literature, with some suggestive findings in functional brain anatomy and palaeoanthropology.

Dramatic ability, not language, is the primary prerequisite for human culture

This is implicit in Durkheim's theory of the origins of culture (including language) in ritual pantomime. His concept of 'collective representations' demonstrates his belief in the importance of social displays for social reflectivity. However, his somewhat doctrinaire commitment to the idea that *sui generis* social orders are irreducible to psychology prevented him from considering individual reflectivity and the universal substrates of culture. Though he was unable to avoid *ad hoc* psychological terms such as 'sentiment', 'stress', and 'emotional effervescence', he did not explore the psychological implications of social display.

*Human culture involves wholly-believed-in make-believe*

I have argued that pretend play is necessary for 'theory of mind', and that ToM enables physiological rapport to be extended to epistemological rapport - in other words, human suggestibility and our tendency to believe what our social peers believe.

If culture is to constrain the behaviour of selfish individuals, its workings cannot be transparent, and it is necessary that we should be duped by our own collective deceptions. In the case of perspectival belief systems, I argued that the essential ontological inversion was of the distinction between make-believe and reality, and, using further evidence from foraging ideology, argued that human culture began with rituals in which people pretended to be animals and fully believed the pretence. I do not claim that everyone who participates in a ritual today necessarily believes that
they are thereby transformed into an animal or spirit, and cynical acts of deception have been reported. But even here, collectivized identities and economico-moral *persona* imply that the roles we play in everyday life are wholly believed in: we spend much of our adult lives pretending to be us.

**Children are realists who generally know the difference between make-believe and reality, whereas adults are representationalists who frequently conflate the two**

Pretend play involves two representations of reality - the perceived and the imagined - and it is a survival imperative that children should not confuse one with the other. The two versions of reality must be 'decoupled' (Leslie, 1987). In that sense children are 'realists', whereas enculturated adults frequently reify representations, accept fictive collectivized identities and economico-moral role-plays as realities, and may even go to war on the basis of fantasized assumptions such as collectivized responsibility and blame.

**Collectivized identities are the root of most political evils**

Agonistic practices ranging from discrimination and verbal abuse to terrorism and military rape camps clearly depend on collectivized identities such as social class, ethnicity, nationality, or religious affiliation.

On the other hand, collectivized identities are also part of the original basis of generalized human cooperation. However, we do have an innate ability to identify with others, and have now learned the value of morality. It is possible that, as we increase our understanding of what culture is and how it works, we may become more able to choose between those aspects of culture which we wish to foster, and those we might
profitably discard. Such changes are already under way. Feminism, for example, has exposed the fictive nature of gender stereotyping, and we are learning to change habitual behaviours relating to gender.

'Play and display' explains hominid brain expansion more comprehensively than cognitivist or logocentric hypotheses

The entire suite of expansions in human relative to chimp brains cannot be explained as due to 'intelligence' or language without distortion of the facts. Premotor and secondary sensory cortices in all modalities are around three times larger than in chimps, and areas of cortical integration six times larger (prefrontal) or even 'infinitely' expanded (inferior parietal being unique to humans). Only a 'play and display' hypothesis seems sufficient to explain all these expansions, as well as being most likely if one accepts that social display is the most salient difference between human and ape behaviour.

'Theatre of mind' implies a chimerical brain - adapted to running multiple minds in parallel

I suggested four reasons why play and performance would be expected to select for larger brains: multimodal integration, timing precision, skill, and - in the case of role-play and social imagination - running multiple minds in parallel. This 'chimerical brain' hypothesis is supported by the phenomenology of 'theatre of mind', the intrinsic demands of drama and story-telling, and evidence from hypnosis and dissociated identity disorder.
Role-play may be a full-time activity of the awake adult human brain

Our pilot imaging study of role-play produced apparently ‘wrong way round’ findings. More brain activity was seen in the ‘easy’ control tasks than in the ‘difficult’ role-play tasks, and cortical areas that role-play would be expected to activate were only apparent when ‘switching off’ role-play. Of various possible explanations, the most likely is that role-play is a full-time activity in awake adults. Further research is needed to test this hypothesis. What our study showed with more certainty is that functional magnetic resonance imaging is a promising tool for investigating the social brain.

The three grade shifts in hominid evolution are likely to represent the three ‘rubicons’ implied by social mirror theory

Absolute cranial capacity doubled during the habiline radiation between 2.5 and 2 mya, doubled again in late Homo erectus/Homo sapiens species after 500 kya, then lost about half this gain after 100 kya. I presented fossil and archaeological evidence compatible with the emergence of song-and-dance display during the first grade shift, and pretend play - more so in Homo sapiens than in Neanderthals - during the second (with further elaboration of song-and-dance display). Genetic, linguistic, and archaeological evidence suggests that the final decline in brain size followed the advent of economico-moral culture.

Archaeological evidence for display correlates with the fossil record whereas technological change does not

A ‘problem’ recognized in palaeoanthropology is that behavioural change does not
correlate in any obvious way with anatomical change during hominid evolution. This is not surprising since the evidence for ‘behavioural change’ is dominated by stone tools, butchered bones, etc. Technological change is historic rather than genetic even in chimpanzees. Social change, as premised by the social intelligence hypothesis, and social display, as premised by the ‘play and display’ hypothesis, would not be expected to leave many archaeological traces.

Where we do have overt evidence of social display - after 400 kya - changes occur at or around the beginning of grade-shifts. The first grade shift is associated with haematite use, collection of ‘attractive’ but non-utilitarian materials, and tools made from difficult and impractical materials. Pendants, and even the first putative iconic object, are of later date, but the latter is associated with a *Homo erectus* site. The second grade shift is marked by a tenfold increase in haematite use, and early appearances of modern-looking technologies at sites widely dispersed across Africa.

Even the first unequivocal stone-tools, from 2.7 mya, occur at river- or lakeside sites - areas of high predation risk. This suggests that the first stone tool makers - diminutive australopiths or early habilines - were socially well organized. So even the first grade shift appears to be preceded by social change.

*The archaeological record suggests acculturational spread of modern culture in Africa followed by diasporic spread in Europe*

The transition to culture of modern type is so dramatic in Europe, and so un-dramatic in Africa, that some authors question whether the ‘cultural revolution’ was an indigenous European development, perhaps even initiated by Neanderthals, or whether modern behaviour, along with modern humans, originated in Africa. But the African
record, especially after 100 kya, is much more varied than that in Europe. Genetic
diversity is greater in Africa today than in the rest of the world, and linguistic
evidence suggests different language phyla originated in Africa before language arrived
anywhere else. The Middle Stone Age mosaic suggests acculturational spread, or at
least diversification, in Africa before culture reached other parts of the world. The
European record, on the other hand, suggests a single culture-bearing immigrant
population, possibly speaking a common language, and maintaining cultural contact
with far-flung exchange relationships across a vast area. Since cultural change is rapid
relative to precultural change, quite early in the Upper Palaeolithic we are indeed
seeing indigenous cultural innovation, conceivably influenced by contact with
Neanderthals.

Overall, the summarized evidence is consistent with a revolutionary origin of
modern culture in a small African population, which then had a competitive edge over
all other hominid populations, including other anatomically modern humans, who may
have copied the new culture just as Neanderthals did. This revolution is the origin of
all the anomalous ‘others’ who challenge scientific understanding today, and all the
‘collective deceptions’ from which western science still has not entirely emancipated
itself.

Some final thoughts

Play and education

The history of western thought is not so much one of increasing rationality as
increasing literalism. We value logic over imagination, object over social skills,
technology over the arts, and work over play. Such social blindness suggests
Actively constraining social make-believe in children may well induce symptoms analogous to autism. Modern children are sometimes given electronic toys which hijack the child's imagination, replacing spontaneous creativity with stereotyped responses. Television, though increasingly attempting to be interactive, is still very much a one-way social mirror, and a poor substitute for social play. Computers and computer games are interactive, but they are still machines. Children will role-play anything that moves, and the industrial revolution has provided plenty of mechanical role-models. Thomas the Tank Engine and Larry the Aeroplane are animistic - they humanize machines - but the mechanized world more generally is unlikely to counter our mechanistic self-image.

Many western parents, because of fears of traffic and child abduction, are reluctant to let their children play in the street. The nuclear family has become a gaol sentence for many urban children. Ironically, at this time when we most need to send our children to school to meet and play with their peers, the drive towards universal autism is at work here too. Modern educators know that children must play to develop into healthy adults, but they still think that 'work' is the opposite of 'play', and the sooner children start 'working' the better. In Britain, the Office for Standards in Education (OFSTED, 1999) is currently demanding that 'the three Rs' should be introduced even in the nursery. But all effective learning implies exploratory play. Around the age of six or seven, when most children are beginning to enjoy games-with-rules, they are probably ready to turn formal 'work' into fun, and to take pride in well-executed formal tasks. The government drive to out-compete our economic rivals by earlier 'learning', with the introduction of literacy hour and consequent cancellation
of afternoon play, seems likely to be counter-productive. If we decide that what we really want is economic supremacy and insatiable consumption, then we will need mature, self-confident, and sociable adults to achieve it with. Fortunately for us, children persist in imaginative social play even under the most hostile conditions.

**Science and religious experience**

The spectacular success of post-Enlightenment science is not primarily due to its physicalist premises, but to its revolutionary method, which sets first-hand discovery in place of tradition as sole authority for 'truth'. Whereas traditional ritual imposes a cultural 'script' on play, science is fully continuous with it, restoring to play its unfettered experimental birthright. This is what makes science, at least potentially, a metacultural project.

However, whereas science is primarily an extension of embodied play, ritual makes use of all modes of play and performance, including theatre and make-believe. So ritual too has exploratory potential, and with broader experiential reference. Mysticism, shamanism, and vision questing are exploratory extensions of ritual. The arts, too, make claim to an exploratory quest for 'truth', and do so using make-believe and other kinds of play. Any activity that allows freedom to play, including sport and gambling (Csikszentmihalyi, 1974, 1976), has the potential to become a metacultural project.

Victor Turner (1982) pointed out the paradox that artists and mystics claim to find 'truth' in the anti-structural world of artifice and pretence, and 'falsity' in the structurally 'real' world of everyday life, including the formal world of science. He was led to this line of thought by a phenomenon he first observed in Ndembu initiation.
rituals (Turner, 1969). Ndembu novitiates, having been stripped of all marks of rank or social distinction, and subjected to a series of painful and humbling ordeals, enter a state which Turner dubbed *communitas*: a collective experience of fellowship and unity. Cross-culturally, there is a tendency to generalize *communitas* to all humankind, all life, or even the entire universe. Turner (1982), from a range of ethnographic data, infers that ‘goodwill to all humankind’ has considerable cross-cultural appeal. St. Francis of Assisi was not the only one to use phrases like ‘my brother the Sun’ or ‘my sister the Moon’. All ‘sacred speech’ shares this animistic tendency to universalized kinship. Native Americans, for example, use very similar phrases (Brown, 1970; Miller, 1995).

Turner denies that this can represent the resurgence of some primordial ‘herd instinct’ in ritual, since *communitas* can only exist in contrast to *societas*, and biologists would agree that generalized altruism cannot evolve by familiar Darwinian mechanisms. But it is equally difficult to explain this as a simple consequence of cultural order, since *communitas* only occurs in anti-structural contexts where all cultural ascriptions have been obliterated. People in religious orders, who dedicate their lives to the service of some spiritual principle (not necessarily ‘God’), stand outside the system of marital and economic exchange on which human cooperation is founded, and yet they are frequently the most cooperative of people - the Mother Theresas of this world.

Mystical techniques are also anti-structural. They aim to ‘silence’ habitual structures of thought and arrive at an experience of ‘pure consciousness’, and this too is characterized by oceanic feelings of love or unity. Mystical experiences are simultaneously numinous (i.e. have a transcendent ‘heavenly’ fascination) and noetic
In Chapter 3, I argued that collective performance has an entraining function, fusing two or more individuals into a single experiential unity. This may be sufficient to explain why experiences of unity can be rewarding, but it cannot explain the universalizing tendency, or the efficacy of solitary techniques as in mysticism. Performance unites its participants, but does not unite a solitary performer with others, or performing groups with potential competitors. Yet many human beings, not only those with religious convictions, frequently help strangers - people with whom they have never sung, danced, or performed any collective act.

So long as we spend our lives 'pretending to be us', we live in a world of prescribed roles and static paradigms, abstracted from the here-and-now immediacy of first-hand experience and spontaneous response. Anti-structural states may be revitalizing because they allow respite from the effort of abstraction and obfuscation, and can readjust everyday structure to conform more closely with current needs (Wallace, 1956; Sutton-Smith, 1972; Csikszentmihalyi, 1974; Burridge, 1979; Turner, 1982). This too may help to explain why anti-structural states are experienced as rewarding and revelatory. An experience of being unconditionally loved must also be the ultimate 'high' for our sense of self-value.

We have remarkable powers of living vicariously. Simply by watching television, we identify with a multitude of human and non-human agents, from the Swamp Monster to Tom and Jerry, and from 'good guys' to 'bad guys'. Our powers of role-play promote such identification, and we want stories to have happy endings because we imagine ourselves in the protagonists' shoes. It follows that our own self-value will be affected by the value we perceive in others, and if we want to feel
unconditionally loved, it is a good idea to unconditionally love others (however difficult to achieve in practice). This is the basic message of Christianity, but it appears to have some general recognition. A leaflet I picked up from my GP, on ‘Stress Management’, recommends voluntary work in the community because valuing others raises self-esteem.

It seems clear to me that our ability to care unconditionally for others is innate, but that this ability is a ‘spandrel’ - an evolutionary side-effect of Machiavellian or Zahavian selection pressures. There is no way that selfish hominids could have discovered this potential in themselves without the kick-start of ritual culture, and exploded systems of kinship and reciprocity. Even then, most of us find it virtually impossible to turn ourselves into Mother Theresas, because our need for self-value creates competing urges, from moral indignation and revenge, to political ambition and the desire for wealth. Over and above such wants, there is the realistic need to defend ourselves from the effects of similar wants in others.

Economico-moral systems have the curious property of being make-believe and real at the same time. The penalty of living in worlds of reified make-believe is that we make them real by believing in them. They really do appropriate resources, their make-believe appetites really are insatiable, and they really do set out to destroy each other. The very existence of armoured States makes armoured States a necessity. Any provident territory which is not under State control will be swiftly incorporated by its neighbours. Our wants and fears, make-believe and real at the same time, serve to keep us inside an economico-moral prison which is not in itself altruistic, but calculating and competitive - dedicated to the creation and destruction of social persons. As long as we stay inside the prison, we will spend our lives pretending to be us.
As traditional beliefs and religious practices have gone into decline, there has been a growing interest in spontaneous ecstatic, religious, or mystical experiences, generally characterized by a sense of unity: with God, Nature, the universe, all life, or something too ineffable to describe (James, 1902; Deikman, 1969; Ludwig, 1969; Maslow, 1971; Hardy, 1979). Some 60 to 70 per cent of American and British people report having had at least one experience of this type, most commonly in conditions of solitude rather than collective religious practice, and often in conflict with the subject's prior beliefs (Hay & Morisy, 1978; White, 1994). It strikes me as just possible that these rare experiences allow us a glimpse, however brief, of who we really are.
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