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Editor's Introduction

'You Do an Empirical Experiment and You Get an Empirical Result. What Can Any Anthropologist Tell Me That Could Change That?'

The 'Hard Problem' in Social Context

Do you think the quotation in my title is reasonable or unreasonable? I find it unreasonable, but I know that many will not. Two people can react to the same idea, opinion, or data in opposite ways, and the reasons for this are often ideological. Ideology always has a political origin — in this case perhaps reflecting turf wars, career promotion, self-legitimation, the privileged status of science in post-industrial societies, and the need to say the right things in order to get research funding. The very concept of 'hard science' is ideological, implying that one part of our experience is 'objective' (meaning that it confers authority on scientists) and the other part is 'subjective' (meaning that the opinions of non-scientists are of little worth). What we call 'objective' is of course a mental model built on the basis of experiences which we call 'subjective'. There are many possible ways of carving up experience, but none that leads to a useful or non-political distinction between 'objective' and 'subjective' (see discussion and Table 1 below). In *Making up the Mind* Chris Frith presents evidence that the distinction between the mental and the physical is a delusion created by the brain (2007, p. 17). 'Most of our interactions with other people,' he writes, 'are interactions between minds, not between bodies' (2007, p. 16). And my brain constructs models of my mind, your

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mind, and the physical world, in exactly the same way — by making predictions and amending the model when the predictions go wrong (Frith, 2007: *passim*). But our idea that mental models of the physical are somehow 'harder' than mental models of the mental is culturally idiosyncratic. For example, the Sanskrit word *Maya* — which embraces everything we call 'objective' — means 'illusion'.

I chose the above quotation as the title of my editorial, not because this special issue is mainly about anthropology, but because it will help me to explain why social approaches are necessary, and why 'hard scientists' perceive consciousness as a 'hard problem'. The quote, reported to me by someone who was present at the time, was the response of an eminent neuroscientist to my suggestion that social anthropology has an essential role to play in consciousness studies. I wish I had been there to point out to him that (1) the scientist's choice of empirical experiment, (2) the commonsensical assumptions the scientist brings to the empirical experiment, and (3) the scientist's interpretation of the empirical result, are not in the least empirical, but are culturally embedded, and subject not only to personal bias, but also conditioned by that taken-for-granted and never-critically-examined set of collective assumptions which frame the prevailing world view (Bourdieu, 1972).

Perhaps the first great discovery made in the early days of ethnographic research was the utter *strangeness* of other peoples — commonly referred to as 'the anthropological other' ('other' being a euphemism for everything that strikes an anthropologist as illogical, mad, or baffling. Another handy euphemism with similar meaning is 'symbolic').

People in cultures very different from our own, it was found, commonly had

1. anti-biological systems of kinship (everyone having multiple fathers, mothers, and non-consanguinial brothers and sisters);
2. economic systems which had nothing to do with biological needs or even 'luxuries' as understood (or rather not understood) by western economists[1] (i.e. systems devoted to the exchange of 'useless trade goods' such as items of adornment that were never worn, yams that were left to rot in conspicuous displays of non-consumption, or potlatch coppers whose only function was to be given away or 'killed' in orgies of wholesale wealth destruction);

[1] Rather, systems of exchange are concerned primarily, as Marcel Mauss (1925) put it, with the creation and destruction of social persons.

3. equally non-pragmatic, anti-biological, and apparently illogical ritual practices (such as supposed menstruation, child bearing, and breast feeding by men);
4. taboos and notions of 'pollution' that had little or nothing to do with hygiene (notably the idea that male blood is 'sacred' whereas female blood is 'polluting');
5. beliefs about the nature of reality that were self-contradictory, counter-intuitive, and counter-experiential (such as the belief that animals are really humans wearing animal suits, which persists in people who regularly butcher and dissect animal carcases);
6. understandings of selfhood that were as anti-biological as notions of kinship (the concept of the person being commonly extended to non-human or inanimate entities[2] such as yams grown in magical gardens, sumptuary trade goods, spirits, predator/prey animals, mountains, waterfalls, or the roof beams of houses); and
7. a sense of self with disrupted outer boundaries (the presumed result of classificatory kinship and collectivized identity), and fragmented by an excess of inner boundaries (attributed to multiple and potentially conflicting economic exchange relationships).

Thus, the 'anthropological other' lived in communities structured by anti-biological systems of kinship and reciprocity, associated with profound distortions of perception, understanding, and self/other awareness. During the early twentieth century, it became increasingly apparent that the convenient colonialist view of dominated peoples as 'primitive' could not be sustained, for the 'anthropological other' was as far — perhaps further — removed from a biological state of nature as any post-industrial city dweller.

In sum, the strangeness of 'other' peoples violated the expectations of any reasonable western observer, and proved those expectations false. The revealed *falsity* of western assumptions is, implicitly, a second important discovery, for it would seem fair to assume that our own world view may be fully as untrustworthy as those of peoples studied by early anthropologists. Indeed one of the simplest ways to make sense of ethnographic literature is to set out with the assumption that every human culture incorporates a whole pack of lies about human nature, the human condition, and the cosmos as a whole. What Durkheim called 'collective representations' (see Turner &

[2] This is known as 'animism'.

Whitehead, this volume) might just as well, as often as not, be termed 'collective deceptions' (Whitehead, also *cf*. Knight, this volume).

I have argued elsewhere (Whitehead, 2002; 2006) that modern science, despite the power and success of its empirical methodology, has not entirely extricated itself from the tangle of collective deceptions that are endemic in western culture — such as individualism, ethnocentrism, sexism, and the valuation of work over play — and has even invented new ones of its own, notably physicalism, cognitivism, logocentrism, and genocentrism, none of which stand up to rational scrutiny.

Galileo has been dubbed the 'father of modern science' and he undoubtedly had a foundational influence on physicalism as it is manifest in science today. Clearly, everything we know about the world is based on experience. However, Galileo maintained that science should not address the whole of experience, but only those things that can be counted, weighed, measured, and treated mathematically (Drake, 2001). For most of his contemporaries, this was not an obvious or even a rational step to take. David Bohm (1980), in *Wholeness and the Implicate Order*, pointed out that 'measure' derives from the same root as 'Maya' — the Sanskrit word for 'illusion'. In Eastern philosophy and other contemplative traditions, the *immeasurable* is the primary reality, concealed by the veil of our perceptions. Such ideas were not peculiar to Asia or even so-called 'higher religions': the famous inscription below a statue of the goddess Isis near Memphis read: 'I am everything that was, is, and shall be; nor has any mortal yet lifted the corner of my veil'.

It could be argued that Galileo made this choice for largely pragmatic reasons — to ensure that observations were truly reproducible and could be reliably compared by different researchers in different laboratories. But this would not explain why he would want to do such a thing, favouring the inaccuracies of measurement over the perfections of syllogistic logic taught by the professors of Aristotelian natural philosophy at that time. Nor would it explain why, in rapid succession, Francis Bacon in England, René Descartes in France, and Galileo in Italy, should launch equally cogent but quite different attacks on Aristotelian philosophy (Drake, 2001). Some cultural process seems to be involved, and one not entirely unrelated to the challenging of traditional authority that led to the rise of Protestantism and republicanism in northern Europe. Galileo's motives are still a matter of academic controversy. All I have space to suggest here is that he was not entirely innocent of political intent, however unconscious this may have been. He was certainly capable of polemic.

Galileo's mathematical approach to reality came to dominate the physical sciences and accounts in large part for their spectacular success. But it has not been without cost, for we have come to think of that which can be measured as 'objective' and 'physical', whereas the rest of experience is 'subjective' and 'non-physical' (Table 1).

And yet, at least according to Karl Popper (1934), our theories about the 'physical' world can never be proved — only disproved — and successive paradigms in science are discarded at a faster rate than in any other sphere of human belief (this is of course one of the strengths of science — but it seems nonsensical to refer to a body of intellectual constructs that are certainly or probably wrong as 'objective'). It would be presumptuous to assume that the prevailing world view will last longer, or be less erroneous, than all the preceding ones.

Paradoxically, it is the 'non-physical' world that furnishes robust proofs because 'subjective' phenomena are self-confirming. Descartes' *cogito ergo sum* is a weak example, to which one could add many others, such as *senso ergo sum.* It is easy, for example, to prove that pain hurts or that sugar tastes sweet. But we can push this argument further, because Descartes did not have the benefit of recent research, which implies that self-awareness is social, and that we become aware that we are aware *at the same time* that we become aware that others are aware. So Descartes' *cogito* cannot be known without a *cogitant*, and perhaps we should rephrase his pithy proof as *cogitatum ergo summus.* This makes the 'subjective' world the one more appropriately called 'third-person' (or rather 'first person plural') — whereas the 'objective' world, if we are to use such terms, becomes radically and self-evidently 'first person' (or 'first person singular'), since we cannot have 'third persons' unless we already have an 'objective' world (based on 'first person' experiences such as pain, pleasure, and resistance to muscular effort) in which to discover 'third persons'.

And out of all this muddle — created by western non-concepts such as 'subjective', 'objective', and 'physical' — comes the supposed 'hard problem' of consciousness, and the assumption that the 'hard sciences' are something more concrete than shared experiences.

Mind reflectively or insightfully observing mind				Sensory and perceptual inputs (not reflectively observed, though they can be, in which case they move to the left half of this table, making it even more complicated)		
Mind reflectively or in sightfully observing 'inner' processes		Mind reflectively observing 'outer' sensations and perceptions		Sensations and perceptions of 'me' or 'my body' (often extended to include clothes, tools, property, etc.)		Sensations and perceptions of 'not me' or 'other bodies' etc.
Processes in own mind	Processes in other minds	Qualities that cannot be measured	**Qualities that can be measured**	Perceived from the 'inside'	Perceived from the 'outside'	
Emotions	Emotions	Colour	**Size**	Pain	Vision	Vision
Beliefs	Beliefs	Smell	**Weight**	Pleasure	Hearing	Hearing
Thoughts	Thoughts	Taste	**Duration**	Kinaesthetic sensations	Touch	Touch
Intentions	Intentions	Feel	**Motion**		Smell	Smell
etc.	etc.	etc.	**etc.**	etc.	etc.	etc.

Table 1. Possible ways of subdividing experience in self/other-conscious humans. All experience, of course, could be termed 'subjective'. On the other hand, several quite dissimilar domains of experience might be dubbed 'objective' according to context, occasion, personal inclination, etc. **Bold type** indicates experience which became 'objective' after Galileo. (Spiritual and 'anomalous' experiences have been omitted from this table: cf. Cardeña, and Combs & Krippner, this volume).

Can We Truly *Know* That We Have Shared Experiences?

The way we build models of our own experience and the experience of others is equally indirect (Frith, 2007). Giacomo Rizzolatti and the Parma team who discovered mirror neurones (see Sinigaglia, this volume) found that when we observe another person smelling a foul odorant the same neurone populations in the anterior insula are activated as when we ourselves smell a foul odorant (Rizzolatti *et al.*, 2006, p. 60). Tanya Singer and colleagues at University College London showed that observing others in pain and feeling pain also activate common brain areas (anterior insula and anterior cingulate). 'When people use the expression 'I feel your pain,' they may not realise how literally it could be true' (Rizzolatti *et al.*, 2006, p. 59).

Of course there are also brain processes that tell us when something is happening to us or to someone else (though these can be fooled into getting it wrong: Wegner, 2002), and surely there is something private about the way we experience, say, the colour 'red'. Nevertheless, there is evidence suggesting that we would not know we were seeing 'red' unless others could at least distinguish the same colour (Whitehead, 2001). The experience of the colour red appears to be universal in people with structurally normal vision. For example, if you ask an Australian Aborigine to choose 'the best red' from a swatch of reds she will usually pick the same red as a London stockbroker or a Bushman forager. Such apparent universals, on the other hand, can be dramatically modified by social factors. An illustrative case comes from the Kwaio in the Solomon Islands, who use the same word to refer to colours that we call 'blue' and 'black' (Keesing, 1982). They traditionally paint their houses black, but when given some blue paint by the anthropologist, they started to paint their houses in an 'unsightly' patchwork of blue and black. When asked why, they denied this was so, asserting that their houses were uniformly and beautifully 'black'. Whilst the interpretation of this observation remains controversial, it would seem that we only experience our experiences when they are sharable. Perhaps this is little different from a Westerner who, when asked to count the colours in a rainbow, will 'see' seven — perhaps reciting 'Richard Of York Gained Battles In Vain' to make sure she gets it right. Optically, a rainbow in fact has no discrete stripes of colour but a seamless gradation of hues, for most of which we have no specific words (*cf*. Knight, this volume, on our 'digital world').

There are other cultural effects on visual experience. Anthony Forge (1970) found that Abelam children had no difficulty understanding photographs. But adult Abelam men, after a series of

initiation ceremonies in which they were exposed to highly abstracted images of 'spirits', lost their ability to make sense of photographs — their usual response being to turn the picture over and examine the back. The paper by Joan Chiao and colleagues in this volume presents experimental evidence of visual differences between western and eastern people.

I would question the pertinence here of philosophical thought-experiments (such as the possibility of inverted qualia) precisely because they are untestable and lack predictive utility, and are therefore not relevant to the domain of *knowledge*. If we cannot *know* that we have shared experiences then we cannot *know* anything in any scientific sense, because scientific knowledge presupposes that multiple observers have commensurate and mutually confirming experiences. Knowledge, whether scientific or not, comes from dissonance between predicted and actual outcomes (Frith, 2007). All there is to knowledge is the ability to make reliable predictions. Questions of *truth* are another matter, beyond the competence of science or logic, and should be referred, if anywhere, to other domains of experience.

The very idea of 'first', 'second', and 'third person' is itself an obfuscatory red herring, based on grammar, and having no ontological significance other than the difference between ourselves, people we are talking to, and people we are not talking to (and even then, we are such incorrigible individualists, we forget that all three 'persons' have plural forms, and that all physical or metaphysical discourse is, by definition, social).

Consciousness is the basic given datum of all experience and hence all knowledge, so it is no more a problem for science than existence itself — a metaphysical as opposed to a physical issue. It has never been the business of science to do more than study the patterns and principles that relate our experiences to each other, to predict future from past experience, and to learn from errors of prediction.

Why Social Approaches Now?

To date, there has been no concerted presentation on social approaches to consciousness, other than a pre-conference workshop[3] and concurrent session[4] at Tucson 2008. There have been many excellent individual papers with social themes over the years, and several

[3] 'New directions in brain research: Everything you need to know about the social brain and its implications for consciousness' David Craik and Charles Whitehead.

[4] C7: 'Social approaches to consciousness' (Combs & Krippner, 2008; Krippner, 2008; Sinigaglia, 2008; Whitehead, 2008; Craik & Whitehead, 2008).

special issues of *JCS* on social phenomena such as art,[5] morality,[6] intersubjectivity,[7,8] and trust (in subjective reports).[9] Otherwise, the field has been dominated by non-social approaches. To the best of my knowledge there have been no socially-oriented plenary sessions at consciousness conferences, and social science papers are commonly given poster slots. There have been other *JCS* special issues on topics which demand social analysis — such as the self,[10] embodiment,[11] and personhood[12] — but the social dimension, in my view, was under-appreciated by their respective editors. The classification of papers at Tucson, which is surely in need of revision, does not have a category for social approaches, and all five papers in this year's concurrent session were listed under 'Miscellaneous'. The order in which sections are mustered in *Consciousness Research Abstracts*, I suspect, reflects their value as perceived by the organizers. Top of the list is '1 Philosophy', followed by '2 Neuroscience', '3 Cognitive Science & Psychology', '4 Physical & biological science (*sic*)', and '5 Experiential approaches'. Last comes the oddly mismatched '6 Culture and the Humanities' — clearly a trashcan category whereby anthropology is consigned to the 'subjective' world of non-science.

Western individualism has long delayed scientific recognition of the essentially social nature of consciousness — or at least of the human mind and brain. Since the late 1950s cognitive neuroscience has focussed on very basic sensory processes especially vision (which we share with dogs, dogfish, horses, and horseflies); simple instrumental tasks such as reaching for and grasping objects (which we share with monkeys and koala bears); and supposed 'higher cognitive functions' enabling us to solve problems of the kind which cognitive researchers can set up in the laboratory. The approach has been largely non-social, treating people as stand-alone PCs. Even the burgeoning interest in the neural correlates of consciousness failed to change this (e.g. Crick & Koch, 1998, with its focus on the neuronal minutiae of vision). What was rarely or never looked at was WHAT MAKES US

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[5] *Art and the Brain* Part I, **6** (6/7) 1999; Part II, **7** (8/9) 2000; Part III, **11** (3/4) 2004.

[6] *Evolutionary Origins of Morality*, **7** (1/2) 2000.

[7] *Between Ourselves*, **8** (5/6/7) 2001.

[8] *Intersubjectivity and John Ziman's Legacy*, **13** (5) 2006.

[9] *Trusting the Subject* Part 1, **10** (9/10), 2003; Part 2, **11** (7/8), 2004.

[10] *Models of the Self* Part 1, **4** (5/6), 1997; Part 2, **5** (2), 1998; Part **3**, 5 (5/6), 1998; Part 4, **6** (4), 1999.

[11] *Reclaiming Cognition*, **6** (11/12) 1999.

[12] *Dimensions of Personhood*, **14** (5/6), 2007.

HUMAN. Which is hardly surprising, since the behavioural sciences are currently at war over this very issue (see Whitehead, this volume).

Consequently, it took cognitive neuroscience over thirty years to come up with the notion of the *social brain* (Brothers, 1990; 1997; Adolphs, 1999). However, this did lead to the productive union of cognitive neuroscience with social psychology, to create the new subdisciplines of *social cognitive neuroscience* (Singer, Wolpert & Frith, 2004) — represented in this issue by Corrado Sinigaglia's paper on mirror neurons — and *neural hermeneutics* (Frith, 2003). This collaboration proved fruitful, resulting in important theoretical developments and advances in knowledge (Adolphs, 2003; Frith & Wolpert, 2004; Frith, 2007).

The sub-discipline of *neural hermeneutics* is the brainchild of Chris Frith. The term 'hermeneutic' derives from the Greek *Hermes*, messenger of the gods. There has been a touch of wilful mischief in the choice of this term, since Frith is well aware that hermeneutic science, deriving from the Heidelberg School in the late 19th century (and continued in the more recent work of Clifford Geertz), denied that human behaviour could be *explained*, since it is dependent on meanings which are emergent phenomena open only to intuitive *interpretation* (Dilthey, 1883–1911; Simmel, 1968; Geertz, 1973). Frith, of course, intends the term differently, neural hermeneutics being

> concerned with the neural basis of social interaction. In particular we are trying to delineate the mechanisms underlying the human ability to share representations of the world...We think that there are two major processes involved. The first is an automatic form of priming (sometimes referred to as contagion or empathy), whereby our representations of the world become aligned with those of the person with whom we are interacting. The second is a form of forward modelling, analogous to that used in the control of our own actions. Such generative models enable us to predict the actions of others and use prediction errors to correct and refine our representations of the mental states of the person we are interacting with. (http://www.fil.ion.ucl.ac.uk/Frith/)

Research conducted by Frith and his team at the Wellcome Trust Centre for Neuroimaging at UCL, London, led him to conclude that consciousness is an evolved adaptation whose function is social — enabling us to share our collective representations of the world, this being the prerequisite for human culture (Frith & Frith, 2007; Frith, 2005; *cf*. Durkheim, 1912). More recently (Frith, in press), he writes: 'It is not just our experience of agency; all the contents of consciousness are the outcome of a social endeavour.'

Whilst cross-pollination between social psychology and neuroscience has certainly been fruitful, this is by no means the end of the story as far as neuroscience is concerned, for the concept of the social brain has older roots in many other disciplines. The concepts of *social intelligence* and *theory of mind* resulted from synergistic interactions between ethology (Jolly, 1966; Kummer, 1967), primatology (Premack & Woodruff, 1978; de Waal, 1982), psychology (Wimmer & Perner, 1983), psychology informed by primatology (Humphrey, 1976), biological anthropology (Seyfarth & Cheney, 1988), philosophy (Dennett, 1988), and even pharmacology (Chance & Mead, 1953).

The social or 'Machiavellian' intelligence hypothesis (Byrne & Whiten, 1988) holds that brain expansion in primates was driven primarily by selection pressure for social intelligence. This requires more brain power than object intelligence for the simple reason that, if you want to push an inanimate object around, it doesn't try to push you back. The need to out-manipulate other manipulators creates a competitive 'arms-race' situation, with the most Machiavellian individuals generating most offspring. This is currently the dominant hypothesis of brain expansion in primates. However in this issue Whitehead argues that the hypothesis, though convincing, is insufficient to explain human brain expansion, and proposes a complementary 'play and display' hypothesis.

For those not familiar with the term, 'theory of mind' or 'mindreading' is shorthand for the ability to interpret other people's (and your own) behaviour in terms of 'epistemological mental states' — that is, states such as knowing, believing, imagining, and pretending. Indeed pretending may be the first epistemological mental state recognised by human infants (Baron-Cohen, 1995; *contra* Lillard, 1993). The litmus test for theory of mind (or 'ToM') is the ability to understand false beliefs, assessed by 'Sally and Ann' tasks (Wimmer and Perner, 1983). Children develop this ability around the age of 3½ years. It has been hypothesised that impaired ToM is the core deficit in autistic spectrum disorder (Happé & Frith, 1996).

Two other theories which might be helpful to readers not familiar with this area of science, especially when reading the papers in this issue by Sinigaglia (on mirror neurones) and by Bates *et al*. (on empathy in elephants), are *simulation theory* (Harris, 1991) and *'theory theory'* (Gopnik & Meltzoff, 1994). Both theories claim to explain how children acquire ToM.

Simulation theory assumes that we are first of all self-aware, and infer that others are also self-aware by 'mentally simulating' their behaviour. This would seem to be assuming what it purports to

explain, since reflective access to one's own mental states is conventionally equated with ToM. It even seems to assume some measure of 'theatre of mind' (or 'ThoM') — the ability to run social scenarios in imagination, with a cast of toy actors who behave as though they have minds, knowledge, beliefs, emotions, and intentions of their own (and so are probably dissociated personalities: Whitehead, 2001).

'Theory theory' holds that children must develop a concept or 'theory' of mental states in order to acquire ToM. This concept, Gopnik and Meltzoff maintain, is inferred from 'all the available evidence' — that is, from their own and others' collective behaviour — and specifically depends on *mimicry*. The acquisition of a mental-states concept confers reflective insight into one's own mind *and* the ability to read other minds *at the same time*. They claim to have demonstrated this — so disproving simulation theory — by innovative variants of 'Sally and Ann' tasks. For example, in one typical task, a child is shown an M&M box (or Smarties in the UK), and asked what she thinks is in the box. The child replies 'M&Ms'. Then the box is opened to reveal that it is filled with pencils. In the standard false belief task, the box would then be closed, and Sally — played by a doll — would enter. The child is then asked 'What does Sally think is in the box?' A child without ToM will reply 'Pencils'. Such a child has no concept of mental states as something that can be different from reality (i.e. false beliefs). In their version of this task, Sally was dispensed with. Instead, the child was simply asked 'Why did you just now tell me that the box contained M&Ms?' They found that a child without ToM would *deny having ever said such a thing*. Apparently, such children have no reflective awareness of their own (very recent) false beliefs.

Theory theory is in fact a variant of the much older 'social mirror theory' (see Whitehead, this volume), according to which reflective access to one's own mental states, and the ability to read other people's mental states, depends on our formidable armamentarium of social displays — that is, very much more than simple mimicry as proposed by Gopnik and Meltzoff.

Some of the most exciting current research in neuroscience is coming from collaborations with social scientists. In addition to *social cognitive neuroscience* and *neural hermeneutics*, we also have *anthropological neuroscience* (Turner & Whitehead, and Whitehead, this volume) and *cultural neuroscience* (Chiao *et al.*, this volume), resulting from cross-pollination between neuroscience and, respectively, social anthropology in Europe and cultural psychology in the USA.

Some cognitive scientists, such as the one quoted in my title, do not see the relevance of social anthropology to their discipline. I can think of several reasons why everyone should know at least some social anthropology, but two which are particularly pertinent to neuroscience — as well as other disciplines including consciousness studies — are:

1. cross-cultural data are necessary to establish true universals of human mentation and behaviour, and
2. cultural analysis of scientific practice can help to minimize socio-political bias in theoretical work and maximise the return from research funding.

Social anthropology sets up a self-other mirror which is essential to self-understanding as well as other-understanding.

Core Themes in This Book

If I am right in claiming that consciousness *per se* is not a problem for science, you might wonder why I bother to be involved in consciousness studies at all. However, the difference between our mental maps of mental experience and our mental maps of the world we live in is real enough, and I remain as convinced as anyone that there really is a world 'out there', and our models of that world, though we can make no claims of absolute truth for them, nevertheless make more or less useful predictions and have at least the potential to help us live our lives more commodiously, hopefully for the improved well-being of the world in general. So I personally see a science of consciousness as one which makes models of how mental experience and the world 'out there' interact with each other.

I happen to know that at least two of the authors in this issue are materialists, and others may have their own reasons for disagreeing with my view. I have made no attempt to find any consensus of opinion. If anything I am a little disappointed that there is not more conflict between authors, for I see conflict as a source of advancement and discovery. The papers that follow fall roughly into three groups, which I have arranged (as nearly as possible) in the same order as the sections in *Consciousness Research Abstracts.* So, in accord with the currently dominant if dubious reductionism, Part 1 deals with the Social Brain. Part 2 — Social Mirrors — concerns the ways in which our social brains enable us to share experience and cooperate with each other. Part 3 — Collective Consciousness and Reality — is perhaps the most contentious (and so arguably the most useful) section, since it deals with 'super-social' or transpersonal issues, including evidence that

minds are permeable and have other powers that appear to contradict mainstream scientific opinion. Which in my view has to be a Good Thing — and at least will provide determined sceptics with the satisfaction of not reading it.

Running through this special issue are several recurring themes which crosscut the division into parts. I will discuss three which I consider especially important: *1. Shared experience*, which is the central issue in all the papers presented here; *2. Beliefs about reality* which as I have already suggested are subject to gross cultural distortions; and *3. The nature of reality* which is of course the fundamental issue if we are to have a science of consciousness.

1. Shared Experience

Shared experience is what social approaches to consciousness are all about — intersubjectivity and the death of solipsism. The way we share experience — from the perspective of mainstream science — is by means of social displays of many different kinds, ranging from facial expressions and body language to highly sophisticated forms such as music, dance, mime, and visual imagery. Conventionalized displays which serve to unify experience within cultural groups are often referred to as 'collective representations' — these include language, ritual, wealth displays, and all the cultural 'Arts'. 'Shared experience' incorporates several sub-themes:

A. Instrumental Versus Social Action

Ever since the discovery of mirror neurones, cognitive neuroscientists have paid a lot of attention to grasping behaviour, object manipulation, and tool-use. But, apart from a great deal of research on language and music (mainly classical of course), the great wealth of human displays has been neglected or entirely ignored. Indeed instrumental actions are often conflated with these more expressive forms of shared behaviour under the rubric of 'biological motion'. Perhaps social displays are so omnipresent that we fail to notice them, much as we do not generally pay attention to the feel of our clothes. However we also have strong political motives which make prestigious displays such as language and music appear salient, whilst equally important human universals are dismissed as 'ecological phenomena' or seemingly not even perceived at all. The paper by Whitehead in this volume notes that western culture values work over play, object intelligence over social intelligence, logic over imagination, and science and technology over the arts. Hence the emphasis on instrumental actions, and the

tendency to ignore anything which we merely do for 'fun', in our 'idle' moments — when it should be self-evident that things people are forced to do under the pressures of an industrial or even agricultural system cannot be biological universals, since foraging peoples have never 'worked' in this sense.

The contrast between instrumental actions and playful behaviours — with the latter playing the more important role in human self-consciousness and socialization — is a recurring *motif* in this volume, notably in papers by Gratier & Trevarthen, Apter, Knight, and Whitehead. With it comes an implied critique of cognitive science.

Colwyn Trevarthen is one of the world's major authorities on intersubjectivity. He began pioneering research on infants at the Center for Cognitive Studies, Harvard, in 1967 and 1968, and subsequently at Edinburgh from 1971 until the present. An early study with Martin Richards, using frame-by-frame film analysis of 16 children from the day after birth to the age of 3 months, suggested two distinct modes of purposeful action: 'doing' with objects and 'communicating' with persons. Further research showed that the desire for conversation-like communication developed before exploratory behaviours with objects. A few years later, Trevarthen published his *theory of innate intersubjectivity* (1974; 1979):

> The claim made, while not questioning that development involves learning, or that infants depend on care, underlined that a child is born with motives to find and use the motives of other persons in 'conversational' negotiation of purposes, emotions, experiences and meaning. The efficiency of sympathetic engagement between persons signals the ability of each to 'model' or 'mirror' the motivations and purposes of companions, immediately. It requires a 'virtual other' representation of the kind that Bråten (1988; 1992) has described. Infants evidently have this (Trevarthen, 1998).

Part 2 opens with a paper by Maya Gratier and Colwyn Trevarthen on 'musical narrative' and motives for culture, including research by Gratier using video and audio recordings of mothers and two- to three-month-old infants from France, the USA, and India, whilst they engaged in musical and other vocal interactions. Specialized software was used to analyse the acoustic data. Her work dovetails with Trevarthen's analyses of the 'proto-narrative' structure which gives meaning to exchanges with pre-verbal infants and is vital to the development of self/other-awareness and the acquisition of culture. Gratier, Trevarthen, and others of this school demonstrate that psychology can be rigorously based on research without losing its grasp of the

richness of real human living — what D.H. Lawrence meant by 'man alive' — the lack of which social anthropologists find so frustrating in other areas of behavioural science.

The following paper by Max Weisbuch and Nalini Ambady continues the theme of non-verbal social behaviour, this time examining gesture-call signals such as facial expressions and body language, mainly in adults, rather than the more 'artistic' performative displays studied by Gratier and Trevarthen. Anthropologists — especially those influenced by Durkheim — have long believed that ritual-based human culture is older than language, and that language is not the primary vehicle of cultural transmission. The psychological mechanisms involved, however, have never been specified nor tested against empirical data, and the importance of nonverbal behaviour in building human culture has been largely ignored outside the cultural sciences. Nalini Ambady has pioneered a number of exciting developments including cultural neuroscience and — providing the theme of this paper — non-verbal social psychology. Weisbuch and Ambady present a model of non-verbal cultural transmission, and explain how even our most basic and unconscious gesture-call signals shape attitudes and beliefs. On this basis alone, human culture would seem to be not essentially dependent on language. Hopefully the above papers, together with that by Knight in this volume, will help to speed the overdue demise of the logoparadigm — the belief that everything 'interesting' about the human mind has something to do with language (Premack, 1988).

The links between psychology and culture are further explored in the paper on ritual experience by Michael Apter. Apter is the originator of the *theory of psychological reversals* (1982) which, among other things, stresses the functional distinction between instrumental and playful thinking. Apter calls goal directed mental processes *telic* and playful ones *paratelic*, and switching from one to the other is one of the 'reversals' described by the theory. According to Apter, all creativity requires playful thinking — allowing thoughts to drift or tossing them around without much concern for sense. Playful thinking often makes use of what reversal theory calls 'cognitive synergies' — entities which are experienced as having logically incompatible properties. These commonly occur also in mystical and other 'altered states' of consciousness. Goal-directed thinking, on the other hand, remains trapped within its own premises, or involves categorical analysis of what is already known.

The opposition between goal-directed and playful thought has a striking anthropological parallel in Victor Turner's *theory of*

anti-structure (1982). Turner held that social life alternates between the structured behaviour of work-a-day life (which he too calls *telic*) and the anti-structural behaviour of ritual, carnival, play, entertainment, recreation, and artistic performance (which he calls *autotelic*, meaning self-motivated or engaged in 'just for fun'). In anti-structural activities the normative rules of society are temporarily suspended or inverted. Turner held that all new culture is created in anti-structural states. Because Turner's theory derived from Van Gennep's research on rites of passage, Apter explores the possibility of a synthesis of the two theories as a means of understanding the experiences of participants in rituals, whether sacred or secular.

Both anti-structure and reversal theories may owe something to the notion of 'creative chaos', dating back at least to Charles Cooley (1902). But whereas Cooley regarded environmental chaos as occurring naturally and sporadically, the two more recent theories hold that states of 'creative chaos' are systematically generated and exploited by enculturated human societies (Turner) and by human minds (Apter).

B. Emotions as Social Acts

Psychologists have long treated emotion as an individualistic affair, serving to motivate individual behaviour. But then the 'zombie argument' (Moody, 1994; *JCS*, 1995) has been used to question why emotions need to be experiential to accomplish this function (would a self-repairing machine need to feel pain?) and Dennet (1991) likewise asked why pain needs to hurt because, in his view, this could not have material consequences. These problems have arisen because people have ignored the social function of emotions. How, for example, could we develop compassion (or cruelty) unless pain *hurts*? Why should anyone read a novel or watch a movie unless we feel the grief or joy experienced by others — even when those others are fictitious? Why else should most human speech be devoted to gossip (Dunbar, 1996)?

Conscious sensations, perceptions, and emotions do not motivate spontaneous actions. We become aware of pain *after* we have withdrawn our hand from the flame; we perceive danger *after* preconscious processes have directed our attention to it (Mack & Rock, 1998) and even after we are already in flight (LeDoux, 1993). More than a century ago William James observed that 'we feel fear because we flee, and grief because we weep' (James, 1884). Emotions (and other mental phenomena) appear to be post-event construals arising after the behavioural response is already underway (Bem, 1972;

Zillman & Bryant, 1974; Zillman, 1984; Brown, 1991) — just as, in Libet's famous experiment, the experience of consciously willing an action occurred after the action had already been initiated (Libet *et al*, 1983).

According to Damasio's (1994) *somatic marker hypothesis*, pain and pleasure are necessary to give experiential value to options and so enable rational decision making for future action. Rationality, however, implies reflectivity — we know, for example, that autistic children cannot plan because they do not have reflective access to their own epistemological mental states (Happé & Frith, 1996). Nevertheless, they are capable of conditioned learning — a more primitive process which does not require reflectivity. However, experiential pleasure and pain do not seem to be necessary here either. Animals as primitive as the flatworm are capable of classical conditioning (Jacobson *et al*., 1967); decorticalized rats and rabbits are, if anything, better than intact animals at operant learning tasks involving electric shocks and food rewards, and even *in vitro* slices of brain stem demonstrate significant learning abilities (Oakley, 1979, 1983; Goldstein & Oakley, 1985). If conditioned learning can occur in the absence of the higher cortical structures necessary for emotional construals, we are forced to infer either that implicit processes (not accessible to reflective consciousness) are sentient, or that sentience is not necessary for punishment and reward to be effective. If we are going to extend sentience to *in vitro* slices of tissue, why not even simple mechanisms such as domestic thermostats? Where are we going to draw the line? We seem to be heading towards a choice between panpsychism or denial of causal efficacy to sentience.

What individualistic psychology fails to take account of is the fact that emotions and affect-laden sensations such as pleasure and pain are associated with largely involuntary signals. Indeed it requires a self-conscious (and other-conscious) effort of will to suppress affective expressions. So autonomic states are construed as emotions not only by the individual experiencing them, but also by those who 'read' the accompanying displays. This means that emotions are social acts. They are also socially conditioned. Horrific injuries sustained in battle where immediate help is not available may be entirely painless, whereas a relatively minor injury during a football game can have a player writhing in agony (Brown, 1991). When a toddler has a tumble, she will check the reaction of an observing parent. If the parent laughs, the toddler will often laugh; but if the parent looks alarmed, the toddler will cry. Emotions appear to be part of our inborn system for intersubjectivity (Trevarthen, 1974, 1979; Gratier & Trevarthen,

this volume). Their utility as 'somatic markers' — assuming social mirror theory is correct — has to be secondary because rational decision-making is reflective, and reflectivity, according to the theory, depends on intersubjectivity

The social nature of emotion is implicit throughout social approaches to consciousness, and six papers in this volume deal with this issue overtly — Gratier and Trevarthen, Weisbuch and Ambady, Cardeña, Combs and Krippner, Whitehead, and — in a most interesting way — Bates *et al*. The last mentioned is the work of a team of biologists led by Richard Byrne, who is perhaps best known to non-biologists as co-editor of the definitive book on *Machiavellian Intelligence* (Byrne & Whiten, 1988). Byrne is an internationally recognised authority on social cognition in humans and non-humans and co-pioneer of *evolutionary psychology* (a term which has since been hijacked by persons with a very different political agenda, as noted by Knight, this volume).

Some readers of this journal seem to be interested in elephants — at least, between 2007 and 2008, jcs-online carried a spate of correspondence discussing whether or not an elephant can paint a self-portrait. According to the Asian Elephant Art & Conservation Project website, they cannot — they are simply executing 'a learned series of brushstrokes'. However, this is not to say that they are entirely lacking in human-like abilities: One website author comments: 'What is amazing is the level of control and focus that the elephant embodies in order to create these compositions'. Watching the videos of elephants painting is certainly thought-provoking; they seem to derive considerable satisfaction, and the abstract paintings are spontaneous works.

What is particularly interesting about the paper by Bates *et al*. is that it reports for the first time thirty five years of observations of 'strange behaviour' in African elephants. Biologists associated with the Amboseli Trust for Elephants have been recording such observations since 1972 but have never published them because of their contentious nature and the reluctance of the biological community to attribute self/other-consciousness to non-humans or at least non-primates. One reason for this appears to be a mistaken notion of 'parsimony' — not so much Occam's as Scrooge's razor. Clearly if an animal signals affective states then other animals are reading them. But, as the authors note:

> human abilities go beyond simply reading and responding to an emotional display in the present: we can also model emotional states and desired goals that influence others' behaviour in the past and future, and use this to plan our own actions (Bates *et al*., this volume).

If elephants have some degree of such higher-level empathy, as the Amboseli evidence suggests, this has far-reaching implications for the evolution of self/other awareness in humans as well as other animals.

C. The Neural Correlates of Social Action

The concept of the social brain (Brothers, 1990) remained distinctly cognocentric for more than a decade (*cf. JCS*, 1999). In emphasizing cognition as opposed to performance, even quite distinguished scientists have assumed an input ? processing ? output model of cognition, so ignoring a great deal of research which suggests that you have to act before you can perceive (Gregory, 1966, 1970) or conceive (Lillard, 2001). This linear one-way model was first criticized by John Dewey (1896), who pointed out the circular way in which output changes input. Brains clearly cannot evolve in animals without muscles — behaviour is an evolutionary precondition for having a brain in the first place. Further, during foetal development, the brain puts out efferent fibres to muscles before it receives afferent fibres from sense organs (Trevarthen, 1985). So, in both phylogeny and ontogeny, output comes before input. Two papers in Part 1 address the effects of output on cognition and the brain, from developmental (Turner & Whitehead) and evolutionary (Whitehead) perspectives. Both papers reflect the union of neuroscience with social anthropology.

Anthropological interest in the brain as a social organ began with the work of Victor and Edie Turner (Turner & Turner, 1983). Their investigations into what was then known of brain structures that might underlie human sociality influenced Robert Turner (2002) who, between 1986 and 1988, developed ultra-fast echo-planar imaging to record changes in cerebral blood flow (Turner, 1988). The new technology — now the mainstay of much brain research worldwide — led to a number of studies and publications motivated by anthropological as well as neuroscientific concerns (e.g. Karni *et al.*, 1995; Neville *et al.*, 1998; Turner, 2002; 2005; Stewart *et al.*, 2003a; 2003b; Turner & Joannides, 2006). In particular, these studies provided evidence for the pervasive influence of culture on functional brain anatomy (Turner, 2002). Some of this research is reviewed in this issue by Turner and Whitehead, who infer that cultural differences in brain structure are likely to be consistent within populations. Indeed, dyslexias associated with brain lesions, and brain imaging research, indicate that, in literate societies, the same brain structures are regularly involved in reading and writing (though American sign language

— equally a cultural invention — uses a more extensive set of structures, mainly in the right hemisphere: Neville *et al.*, 1998).

The converse question, however, is also of anthropological interest: How does the brain support those universals of behaviour that make human culture possible? The answer to this question may also help to explain why humans have such large brains, and why certain brain structures were expanded more than others — and at different times — during hominid evolution. This is the theme taken up by Whitehead in this issue, who presents a 'play and display' hypothesis of brain expansion, supporting his case with recent imaging research that focuses on performance rather than cognition, and emphasizing the brain as a 'doing organ' rather than a 'thinking organ'.

Cultural neuroscience differs from anthropological neuroscience in uniting brain science with *genetics* and *cultural psychology.* Pioneered in the USA by Nalini Ambady and Joan Chiao (Chiao & Ambady, 2007) — both of whom have contributed to this collection — cultural neuroscience inherits a rich research background. Chiao and Ambady (2007) comment:

> Contemporary cultural psychologists have made considerable progress in documenting cultural variation in human thought and action. The mutual constitution of culture and mind has been demonstrated in a variety of fundamental psychological processes. These processes include the way people conceive of the self (Markus & Kitayama, 1991; Markus, Kitayama, & Heiman, 1996), how they make causal attributions (Morris & Peng, 1994), how they attend to and remember objects in their environment (Miyamoto & Kitayama, 2005; Kitayama, Duffy, Kawamura, & Larsen, 2003; Masuda & Nisbett, 2001); and how they perceive, experience, respond to, and predict their own and others' emotions (Elfenbein & Ambady, 2002; Lam, Buehler, McFarland, Ross, & Cheung, 2005; Mesquita & Frijda, 1992). A fundamental assumption of this research is that the human mind is intimately linked with its social world or cultural context, and that culture is continuously created through the actions and products of the individual minds that comprise it.

In this issue, the paper by Joan Chiao, Zhang Li, and Tokiko Harada begins by noting that a social understanding of selfhood — dating back to Lao Tzu, Confucius, and others — has a much longer history in the east than in the west. They go on to review psychological and cultural neuroscientific research which demonstrate how east–west (collectivist-individualist) cultural differences influence the ways the mind and brain process visual perception, self-knowledge, and self-awareness. This cross-cultural perspective has enabled cultural neuroscience to provide empirical support to some of the theoretical

inferences drawn by anthropological neuroscientists who, for the most part, have investigated mainly western subjects.

Interest in the social brain gathered momentum following the discovery of mirror neurones in macaques (di Pellegrino *et al.*, 1992; Rizzolatti *et al.*, 1996) and subsequent research suggesting the presence of a similar 'mirror system' in humans (Decety & Grèzes, 1999; Rizzolatti *et al.*, 2006; Buccino *et al.*, 2001). Mirror neurones fire when a monkey performs an instrumental goal-directed action, such as grasping a raisin to eat it, and also fire when the monkey sees another individual (whether monkey or human) perform the same action *with the same intention*. The first mirror neurones investigated were found in motor cortex for grasping, and parietal areas involved in action plans and navigational maps of space centred on various parts of the body. Such action-oriented brain areas at least raised the possibility of regarding the brain as a performative organ and so stepping outside an exclusively cognitivist paradigm.

Corrado Sinigaglia is a philosopher who has been closely involved with the award-winning team which discovered mirror neurones at the University of Parma. He has also co-authored the latest book on mirror neurones with the leader of the Parma team, Giacomo Rizzolatti (Sinigaglia & Rizzolatti, 2007). Recently in *JCS*, Emma Borg (2007) attacked the hypothesis that mirror neurones are the basis of action-and-intention understanding in primates, and in this issue Sinigaglia uses his comprehensive knowledge of the research to set the story straight.

D. The Human Revolution

The last paper in Part 2, by Chris Knight, concerns the most contentious of all social displays — language. This is the only paper in this volume which addresses the nature of the human revolution — the cultural 'big bang' that turned an ancient primate social order on its head, created all those anti-biological features of human culture which I have listed above, led to an explosion of creative art and technology in the Upper Palaeolithic, and transformed our pre-cultural ancestors into *persons* who can speak, share their dreams, and create (literally) fantastic systems of belief and social order. This is such an important — perhaps the most important — issue addressed in this collection, that it deserves to be treated as a major theme in its own right. That is reason number one why I decided that Knight's paper should have its own editorial introduction.

Chris Knight is well known in anthropological circles for his *menstrual sex strike theory* (1991), which ruffled a great many anthropological feathers because, as I shall explain, there is an unspoken taboo among anthropologists against theories of this kind (and in some circles even theories of *any* kind). Knight's theory is in my view the only plausible current explanation of cultural origins, but, in his present paper he modestly fails to discuss it, which is reason number two for providing a special introduction.

Knight's paper is also one of the shortest in this issue. But its very brevity belies the vast background of anthropological, palaeoanthropological, biological, and linguistic theory and research on which it builds Further, this background appears to be largely unknown even to some of the most distinguished contributors to consciousness studies. Whilst Knight's paper is a free-standing piece, and it is not strictly necessary for readers to know about its background, I believe it would be a serious omission if this important material is not drawn to the attention of the consciousness community. I am also quite sure that the reader, armed with some background knowledge, will find Knight's paper all the more enjoyable and easy to follow. This is reason number three for the all-too-brief introduction which appears before Knight's paper.

In summary, I will just note that major progress in consciousness studies seems unlikely until we sort out the relations between experience, social displays, and cultural representations — and the ways in which culture shapes our beliefs about consciousness and reality: the second major theme of this volume, to which I now turn.

2. Beliefs About Reality

I have given the honour of being last to the paper by Imants Barušs. I did consider reversing the order of parts and putting his paper first, because it strikes to the core of consciousness studies. Barušs reviews psychological research which shows that beliefs about consciousness are inseparable from beliefs about reality in general. And since such fundamental beliefs seem impervious to contrary evidence and reason, there can be no immediate solution to the current conflicts within consciousness science. This may sound like a council of despair but I am encouraged by the knowledge that scientists, like other mortals, eventually die, and that new thinking usually originates with or is embraced by the youngest scientists, or those newly entering a discipline, some of whom will eventually rise to positions of professional dominance (Kuhn, 1962). In particular, Barušs explores a

materialist-transcendent spectrum, and shows that those with the most transcendentalist beliefs have the most enquiring minds and even (based on a rather small study!) somewhat higher IQs. He also shows that far more scientists than one would suppose — based on what they say and write — have transcendental beliefs. If all these 'closet transcendentalists' were encouraged to be more open about their beliefs we might well see an accelerated change in scientific attitudes.

The theme of belief, and the extent to which it is culturally conditioned, runs through all three parts of this volume, at least by implication. In Part 1, Turner & Whitehead consider the mutual interdependence of collective representations — which of course include beliefs about reality — and cortical representations, whereas Chiao *et al*. review evidence that culture shapes self-knowledge, self-awareness, and even more basic processes such as visual perception. The last paper in Part 1, by Whitehead, extends the notion of collective representations to collective deceptions, and touches on the reasons why human cultures necessarily falsify our beliefs about and perceptions of ourselves, others, and the world we live in.

The paper co-authored by Maya Gratier and Colwyn Trevarthen (Part 2) explores the extraordinary sophistication of interactive performances whereby human infants are pre-adapted for cultural engagement and the acquisition of cultural skills, attitudes, values, beliefs, and ways of living. Max Weisbuch and Nalini Ambady also show how communal attitudes and beliefs can be transmitted non-verbally and acquired by individuals, often for grossly illogical reasons and/or without conscious examination. Finally, in Part 3, Etzel Cardeña examines the emotional systems and relationships that bind us together, noting the non-rational processes — such as conformity and suggestibility — that shape our beliefs to a communal template. The non-rational and unconscious processes involved in the transmission of beliefs should give everyone pause for thought, especially those of us who regard ourselves as scientists.

The means people use to maintain and defend beliefs in the face of contrary evidence — such as confabulation, dissociation, and self-deception — perhaps deserve more detailed attention than they have received in this collection. Many authors, however, have addressed such topics. Michael Gazzaniga, based on his split-brain research, declared that our sense of individuality is a delusion created by confabulation (Gazzaniga, 1988). The human mind, however, regularly splits itself without the aid of surgery. Robert Mitchell (1994), from a survey of research on child development and self-awareness in animals and humans, concluded that adult humans differ from other

species in having 'multiple selves' created by dissociation. Other authors discussing multiple selfhood and dissociation in humans include Janet (1889), Oakley & Eames (1985), Hilgard (1986), Bliss (1986), Brown (1991), Laughlin *et al*. (1992), Castillo (1994), and Krippner (1999). Robert Trivers — whose theories of *reciprocal altruism* (1971), *parental investment* (1972), and *parent-offspring conflict* (1974) were major sources for Dawkins' *Selfish Gene* (1989) — has also investigated the adaptive advantages and costs of self-deception. He writes:

> An evolutionary theory of self-deception—the active misrepresentation of reality to the conscious mind—suggests that there may be multiple sources of self-deception in our own species, with important interactions between them. Self-deception (along with internal conflict and fragmentation) may serve to improve deception of others; this may include denial of ongoing deception, self-inflation, ego-biased social theory, false narratives of intention, and a conscious mind that operates via denial and projection to create a selfserving world. Self-deception may also result from internal representations of the voices of significant others, including parents, and may come from internal genetic conflict, the most important for our species arising from differentially imprinted maternal and paternal genes. Selection also favors suppressing negative phenotypic traits. Finally, a positive form of self-deception may serve to orient the organism favorably toward the future (Trivers, 2000).

In this volume, confabulation and self-deception are implicated in the paper by Barušs; and Cardeña reports remarkable dissociative phenomena in Post-Traumatic Stress Disorder. Something I have not seen reported is the strength of emotion — the anger and sense of moral outrage — associated with quite abstract differences of opinion, and the humiliation commonly experienced when a cherished belief is threatened or disproved. It seems that our beliefs become part of our self-image, such that a threat to our beliefs acts like a threat to our very existence — rousing similar agonic responses, and adding greatly to the complexities of human politics.

3. The Nature of Reality

As beliefs are conditioned by culture, it follows that what is perceived as 'anomalous' will also vary across cultures. Social approaches to consciousness employ a diversity of means to demonstrate the extent to which our own beliefs are culturally determined and politically falsified. So when people react to supposedly 'anomalous' phenomena with such retorts as 'Extraordinary claims require extraordinary proofs' (which assumes there *can* be proofs in science), we should

consider how and by whom the 'extraordinary' is defined, and what obfuscatory and confabulatory processes are involved in its definition.

Part 3 opens with a paper by Etzel Cardeña, who is Thorsen Professor of Psychology at Lund University, Sweden, and also President Elect of the Parapsychological Association. He has received a number of awards for psychological research, and there are few more credible sources for his discussion of emotions as not only private but social and transpersonal systems. Cardeña argues that conscious experience is porous — that minds have non-local access to each other, and that we may be part of transpersonal systems that are very much dependent on emotional valence and intensity of emotions and relationships.

Allan Combs and Stanley Krippner take up the related theme of collective consciousness and consider the possible role of mirror neurones in 'tuning us in' to a shared field of consciousness. Some of their evidence comes from Bradford Keeney, a cultural anthropologist who is recognized among the Kalahari Bushmen as a *n/om- kxao* — or owner of *n/om*, the 'boiling energy' (Katz, 1982) that enables human beings to enter trance, heal the sick, and ascend to the sky to visit the High God. Keeney is accepted by the Bushmen as a 'Heart of Spears' — the highest level of spiritual practitioner — since receiving from the Sky God, in a 'visitation' or realistic dream, the gift of a sacred ostrich egg containing the tools of the healer's art — needles filled with *n/om*, songs, dances, and ropes for ascending to the sky (Keeney, 2007). As has been noted in other parts of the world, the Bushmen acquire their songs and other cultural innovations from dreams, visions, 'visitations', and trance experiences. Keeney claims they obtain much of their cultural knowledge this way. Combs and Krippner suggest that such alternate states access a transpersonal realm. Ethnography, including that of the Bushmen (e.g. Katz, 1982) is littered with suggestive and unexplained observations which look very much like psi phenomena, though I know of no research specifically testing this.

The issues discussed in both the above papers challenge the conventional view that consciousness 'arises' from 'physical' processes, suggesting rather — to borrow a phrase from David Chalmers (1995) — that consciousness is 'part of the basic furniture of the universe'. There are other (sometimes contradictory) arguments that point to the same conclusion. For example Steven Pinker (2004) claimed that consciousness

> is almost certainly not an adaptation, not because it is a by-product or spandrel (like, say, music or religion) but because it has no causal consequences and hence cannot have been selected for such consequences.
>
> This would seem to conflict with evidence of direct mental influence on living and non-living systems (DMILS and psychokinesis respectively). It also contradicts what Pinker wrote in How the Mind Works: 'We do not just experience a toothache; we complain about it and head to the dentist' (1997: 145). I think many of us find it hard to believe that, without experiential pain, we would be equally motivated to take remedial action.

The Copenhagen interpretation of quantum mechanics implicates conscious observation in quantum reduction (Bohr, 1934: 54), suggesting that consciousness may be a 'brute fact' rather than an emergent phenomenon. John Wheeler (1975) derived his *participatory anthropic principle* from the role of the observer in quantum events. According to Wheeler (1979):

> we could not even imagine a universe that did not somewhere and for some stretch of time contain observers because the very building materials of the universe are these acts of observer-participancy. You wouldn't have the stuff out of which to build the universe otherwise. This participatory principle takes for its foundation the absolutely central point of the quantum: No elementary phenomenon is a phenomenon until it is an observed (or registered) phenomenon.

Wheeler theorised that observations in the present cause past events to become fixed via quantum reduction (George Herbert Mead [1934] argued in similar vein that the past is no more fixed than the future, and that emergent events in the present require constant 're-editing' of the past to maintain causal coherence). So the 'big bang' which originated the universe may simply represent the intersection point of all observer histories. Wheeler's version of the anthropic principle is of course speculative, but the so-called 'weak' version is not — it refers to the empirical discovery that all the constants of nature are not arbitrary, but correspond with a remarkable degree of precision to the requirements of the evolution of life as it has occurred on Earth (Barrow & Tipler, 1986). This is beyond coincidence to a spectacular degree — rather like tossing a coin a thousand times and finding each time that it lands on its edge. Many might infer that the universe itself is fundamentally social — or at least providentially biocentric.

A comparable direction has been pursued by quantum approaches to consciousness. Stuart Hameroff, for example, argues for 'quantum vitalism' — the idea that the macro-phenomena of the observed

universe are rooted in a timeless quantum world in which the physical and experiential are inseparably entangled.

However there are more mundane arguments favouring the possibility that consciousness is a fundamental aspect of reality. I have argued elsewhere that physicalism is a collective deception (Whitehead, 2006). The political roots of concepts such as 'subjective', 'objective' and 'physical' is sufficient to undermine their credibility, perhaps fatally. Further, our ideas of the 'physical' are self-contradictory — since the term simultaneously implies 'everything real' and 'everything except consciousness'. No wonder Dennett gave himself a headache wondering why pain hurts — having somehow convinced himself that consciousness (and hence, presumably, pain) does not exist. Physicalism assumes a closed system which can, at least in principle, be entirely explained without reference to consciousness. So the adaptive efficacy of pain and pleasure can be entirely explained without reference to the fact that they are painful and pleasurable. If even Dennett has to admit that pain hurts, it would seem unparsimonious to claim this has no function — that something so remarkable as consciousness just sits around experiencing (and suffering!) a world on which it is powerless to act.

Either way this creates a problem for physicalism. If consciousness has no causal consequences then, as Pinker notes, it cannot have evolved. So, either the physical world created it and can push it around with no expenditure of energy and no equal and opposite reaction, which implies some fundamental level of causality (as assumed, for example, in 'quantum vitalism'); or consciousness was there from the beginning of time, which makes it a fundamental feature of reality. On the other hand if consciousness does exert causal effects, then it must do so without violating conservation laws — which again implies a fundamental level of interaction. All three options violate physicalist assumptions.

Physicalism simply cannot accommodate consciousness. Because Dennett does not want to let go of physicalism, he is forced to argue that consciousness does not exist even though he knows that pain hurts. In early Tucson conferences, speaker after speaker acknowledged the inadequacy of a physicalist world-view. In his first keynote article in *JCS*, David Chalmers (1995) explained that the 'hard problem' is hard because there is no conceivable way, even in principle, that the scientific method could lead to a physicalist explanation of consciousness, and no assurance that we would even recognise such an explanation if we had one. If it cannot accommodate consciousness, *ipso facto*, physicalism is false.

The demise of physicalism and the implied fundamental nature of interactions involving consciousness makes so-called 'paranormal' or 'parapsychological' phenomena all the more plausible. In this case, the truly 'hard' question may be: Why are we not *drowning* in paranormal phenomena? How do sentient bodies (or dissociated neural networks) manage to *contain* their share of consciousness? If consciousness did not evolve, then maybe the ability to divide consciousness did. Perhaps, in line with Wheeler's self-reference cosmology, consciousness imposes lawfulness on the material world, and the material world imposes structure on consciousness. Without space and time, nothing could happen; and without division, consciousness could never become self-aware. As one Islamic *hadith*[13] puts it: 'I was a hidden treasure, but I wanted to be known. So I created the creation in order to be known'.

Of course this is all highly speculative, though we already have suggestive evidence that seems to point in some such direction. I suspect that all scientists, in their 'idle' moments (when, according to Michael Apter, real creativity occurs) may entertain some fairly wild ideas. It also does little to account for the workings of consciousness in the mundane events of day-to-day living. Like Pinker (in 1997), I do believe that a toothache would motivate me to go to the dentist. I also see a causal role for consciousness in the joyful (and sorrowful) exchanges recorded by Gratier and Trevarthen. Consciousness is that which binds us together, as the etymology of the word implies. Even a toothache binds me to my dentist, and if you do nothing when a child is in pain then you lose some of your humanity. William Blake's *Auguries of Innocence* (c. 1803) is a pounding series of couplets reminding us of the power of shared consciousness: 'Each outcry of the hunted Hare/A fibre from the Brain does tear'. John Wheeler (1979) said: 'The greatest discoveries are yet to come.' But sometimes I think the greatest discoveries have simply been forgotten.

References

Adolphs, R. (1999), 'Social cognition and the human brain', *Trends in Cognitive Sciences*, **3** (12), pp. 469–79.

Adolphs, R. (2003), 'Cognitive neuroscience of human social behaviour', *Nature Reviews Neuroscience*, **4**, pp. 165–78.

Apter, M.J. (1982), *The Experience of Motivation: The Theory of Psychological Reversals* (London and New York: Academic Press).

[13] *Hadiths* are sayings or actions attributed to the Prophet Muhammad, as opposed to the Qur'an.

Baron-Cohen, S. (1995), *Mindblindness: An Essay on Autism and Theory of Mind* (Cambridge MA: MIT Press).
Barrow, J.D. & Tipler, F.J. (1986), *The Anthropic Cosmological Principle* (Oxford: Clarendon).
Bem, D.J. (1972), 'Self-perception theory', in *Advances in Experimental Social Psychology: Vol. 6*, (Ed.) L. Berkowitz (London: Academic Press).
Bliss, E.L. (1986), *Multiple Personality, Allied disorders, and Hypnosis* (Oxford: Oxford University Press).
Bohm, D. (1980), *Wholeness and the Implicate Order* (London: Routledge & Kegan Paul).
Bohr, N. (1934), *Atomic Theory and the Description of Nature* (Cambridge: Cambridge University Press).
Borg, E. (2007), 'If mirror neurons are the answer, what was the question?', *Journal of Consciousness Studies*, **14** (8), pp. 5–19.
Bourdieu, P. (1972), *Outline of a Theory of Practice*, trans. R. Nice (1977), (Cambridge: Cambridge University Press).
Bråten, S. (1988), 'Dialogic mind: The infant and adult in protoconversation', in M. Cavallo (Ed.) *Nature, Cognition and System*, (Dordrecht: Kluwer Academic Publications), pp. 187–205.
Bråten, S. (1992), 'The virtual other in infant's minds and social feelings', in A. H. Wold (Ed.) *The Dialogical Alternative (Festschrift for Ragnar Rommetveit)*, pp. 77–97, (Oslo/Oxford: Scandanavian University Press/Oxford University Press).
Brothers, L. (1990), 'The social brain: A project for integrating primate behavior and neurophysiology in a new domain', *Concepts in Neuroscience*, **1**, pp. 27–51.
Brothers, L. (1997), *Friday's Footprint: How Society shapes the Human Mind* (New York: Oxford University Press).
Brown, P. (1991), *The Hypnotic Brain: Hypnotherapy and Social Communication* (New Haven: Yale University Press).
Buccino, G., Binkofski, F., Fink, G. R., Fadiga L., Fogassi L., *et al*. (2001), 'Action observation activates premotor and parietal areas in a somatotopic manner: an fMRI study', *European Journal of Neuroscience*, **13**, pp. 400–4.
Byrne, R. & Whiten, A. (Eds.), (1988), *Machiavellian Intelligence: Social Expertise and the Evolution of Intellect in Monkeys, Apes, and Humans* (Oxford: Oxford University Press).
Castillo, R.J. (1994), 'Spirit possession in south Asia, dissociation or hysteria?', *Culture, Medicine and Psychiatry*, **18**, pp. 1–21 and 141–62.
Cavalli-Sforza, L.L., Piazza, A., Menozzi, P. & Mountain, J. (1988), 'Reconstruction of human evolution: bringing together genetic, archaeological, and linguistic data', *Proceedings of the National Academy of Sciences, USA*, **85**, pp. 6002–6.
Chalmers, D. (1995), 'Facing up to the problem of consciousness', *Journal of Consciousness Studies*, **2** (3), pp. 200–19.
Chance, M.R.A. & Mead A.P. (1953), 'Social behaviour and primate evolution', *Symposia of the Society for Experimental Biology*, **7**, pp. 395–439.
Chiao, J.Y. & Ambady, N. (2007), 'Cultural neuroscience: Parsing universality and diversity across levels of analysis', in S. Kitayama and D. Cohen (Eds.), *Handbook of Cultural Psychology*, pp. 237–54, (New York: Guilford Press).
Combs, A. & Krippner, S. (2008), 'Collective consciousness and the social brain', *Toward a Science of Consciousness: Tucson 2008: Consciousness Research Abstracts*, Abstract 365, p. 219.
Cooley, C.H. (1902), *Human Nature and the Social Order* (New York: Scribner).

Craik, D. & Whitehead, C. (2008), 'Spiritual experience and the theory of anti-structure', *Toward a Science of Consciousness: Tucson 2008: Consciousness Research Abstracts*, Abstract 366, p. 219.
Crick, F. & Koch, C. (1998), 'Consciousness and neuroscience', *Cerebral Cortex*, **8** (2), pp. 97–107.
Damasio, A.R. (1994), *Descartes' Error: Emotion, Rationality and the Human Brain* (New York: Grosset Books/Putnam).
Dawkins, R. (1989), *The Selfish Gene* (Oxford: Oxford University Press).
Decety, J. & Grezes J. (1999), 'Neural mechanisms subserving the perception of human actions', *Trends in Cognitive Science*, **3**, pp. 172–8.
Dennett, D.C. (1988), *The Intentional Stance in Theory and Practice* (New York: Oxford University Press).
Dennett, D.C. (1991), *Consciousness Explained* (London: Allen Lane/Penguin).
De Waal, F.B. (1982), *Chimpanzee Politics* (London: Jonathan Cape).
Dewey, J. (1896), 'The reflex arc concept in psychology', *Psychological Review*, **3**, pp. 357–70.
Dilthey, W. (1883-1911), in H.P. Rickman (Ed.) (1976), *Selected Writings* (Cambridge: Cambridge University Press).
di Pellegrino, G., Fadiga, L., Fogassi, L., Gallese, V. & Rizzolatti, G. (1992), 'Understanding motor events: a neurophysiological study', *Experimental Brain Research*, **91**, pp. 176–80.
Drake, S. (2001), *Galileo: A Very Short Introduction* (Oxford: Oxford University Press).
Dunbar, R. (1996), *Grooming, Gossip, and the Evolution of Language* (London: Faber & Faber).
Durkheim, E. (1912), *The Elementary Forms of the Religious Life* (London: Allen & Unwin, 1964).
Elfenbein, H.A. & Ambady, N. (2002), 'On the universality and cultural specificity of emotion recognition: A meta-analysis', *Psychological Bulletin*, **128**, pp. 203–35.
Forge, A. (1970), 'Learning to see in New Guinea' in P. Mayer (Ed.), *Socialization: The View from Anthropology* (London: Tavistock).
Frith, C.D. (2003), 'Neural hermeneutics: How brains interpret minds' Keynote Lecture, *9th Annual Meeting of the Organization of Human Brain Mapping*, New York.
Frith, C.D. (2005), 'The quest for consciousness: a neurobiological approach. By Christof Koch', *American Journal of Psychiatry*, **162** (2), p. 407.
Frith, C.D. (2007), *Making up the Mind: How the Brain Creates our Mental World* (Oxford: Blackwell).
Frith, C.D. (in press), 'The social functions of consciousness' in Weiskrantz, Davies & Parker (Eds.) *Frontiers of Consciousness: Chichele Lectures, 2006.*
Frith, C.D. & Frith, U. (2007), 'Social cognition in humans', *Current Biology*, **17**, pp. R724–R732.
Frith, C.D. & Wolpert, D.M. (Eds.), (2004), *The Neuroscience of Social Interaction: Decoding, Imitating, and Influencing the Actions of Others* (Oxford: Oxford University Press).
Gazzaniga, M.S. (1988), 'Brain modularity: towards a philosophy of conscious experience', in A.J. Marcel & E. Bisiach (Eds.) *Consciousness in Contemporary Science* (Oxford: Clarendon).
Geertz, C. (1973), *The Interpretation of Cultures* (London: Hutchinson).
Goldstein, L.H. & Oakley, D.A. (1985), 'Expected and actual behavioural capacity after diffuse reduction in cerebral cortex: a review and suggestions for rehabilitative techniques with the mentally handicapped and head injured', *British Journal of Clinical Psychology*, **24**, pp. 13–24.

Gopnik, A. & Meltzoff, A.N. (1994), 'Minds, bodies and persons: young children's understanding of the self and others as reflected in imitation and theory of mind research' in S.T. Parker, R.W. Mitchell & M.L. Boccia (Eds.), *Self-awareness in Animals and Humans* (Cambridge: Cambridge University Press) pp. 166 ff.

Gregory, R.L. (1966), *Eye and Brain: The Psychology of Seeing* (London: Weidenfeld & Nicolson).

Gregory, R.L. (1970), *The Intelligent Eye* (London: Weidenfield & Nicolson).

Happé, F.G.E. & Frith, U. (1996), 'Theory of mind in autism', in E. Schopler & G.B. Mesibov (Eds.), *Learning and Cognition in Autism* (New York: Plenum).

Harris, P. (1991), 'The work of the imagination', in A.Whiten (Ed.), *Natural Theories of Mind: Evolution, Development and Simulation of Everyday Mindreading* (Oxford: Blackwell).

Hilgard, E.R. (1986), *Divided Consciousness: Multiple Controls in Human Thought and Action* (New York: Wiley).

Humphrey, N.K. (1976), 'The social function of intellect', in P.P.G. Bateson & R.A. Hinde (Eds.), *Growing Points in Ethology*, pp.303–17, (Cambridge: Cambridge University Press).

Jacobson, A.L., Fried, C. & Horowitz, S.D. (1967), 'Classical conditioning, pseudoconditioning, or sensitization in the planarian' *Journal of Comparative and Physiological Psychology*, **64**, pp.73–9.

James, W. (1884), 'What is an emotion?', *Mind*, **9**, pp. 188–205.

Janet, P. (1889), *L'Automisme Psychologique* (Paris: Felix Alcan).

JCS (1995), 'Zombie earth: a symposium', *Journal of Consciousness Studies*, **2** (4), pp. 312–72.

JCS (1999), 'Reclaiming cognition: the primacy of action, intention and emotion', special issue of the *Journal of Consciousness Studies*, **6** (11–12).

Jolly, A. (1966), 'Lemur social behavior and primate intelligence', *Science*, **153**, pp. 501–6.

Karni, A., Meyer, G., Jezzard, P., Adams, M.M., Turner, R. & Ungerleider, L.G. (1995), 'Functional MRI evidence for adult motor cortex plasticity during motor skill learning', *Nature*, **377**, pp. 155–8.

Katz, R. (1982), *Boiling Energy: Community Healing among the Kalahari !Kung* (Cambridge MA: Harvard University Press).

Keeney, B. (2007), 'Batesonian epistemology, Bushman n/om-kxaosi, and rock art', *Kybernetes*, **36** (7/8), pp. 884–904.

Keesing, R.M. (1982), *Kwaio Religion: The Living and the Dead in a Solomon Island Society* (New York: Columbia University Press).

Kitayama, S., Duffy, S., Kawamura, R. & Larsen, J.T. (2003), 'Perceiving an object and its context in different cultures: A cultural look at new look', *Psychological Science*, **14**, pp. 201–206.

Knight, C. (1991), *Blood Relations: Menstruation and the Origins of Culture* (New Haven and London: Yale University Press).

Koch, C. (2004), *The Quest for Consciousness: A Neurobiological Approach* (Englewood, Colorado: Roberts and Co).

Krippner, S. (1999), 'The varieties of dissociative experience: a transpersonal, postmodern model', *The International Journal of Transpersonal Studies*, **18** (2), pp. 81–101.

Krippner, S. (2008), 'Transpersonal phenomenological parameters of human sexual experience', *Toward a Science of Consciousness: Tucson 2008: Consciousness Research Abstracts*, Abstract 328, p. 201.

Kuhn, T.S. (1962), *The Structure of Scientific Revolutions* (Chicago: University of Chicago Press, 1970).

Kummer, H. (1967), 'Tripartite relations in hamadryas baboons', in S.A. Altmann (Ed.), *Social Communication among Primates*, pp. 63–71, (Chicago: University of Chicago Press).
Lam, K.C., Buehler, R., McFarland, C., Ross, M. & Cheung, I. (2005), 'Cultural differences in affective forecasting: the role of focalism'. *Personality and Social Psychological Bulletin*, **31** (9), pp. 1296–309.
Laughlin, C.D., McManus, J. & d'Aquili, E.G. (1992), *Brain, Symbol and Experience: Toward a Neurophenomenology of Human Consciousness* (New York: Columbia University Press).
LeDoux, J. E. (1993), 'Emotional memory: in search of systems and synapses', *Annals of the New York Academy of Sciences*, **702**, pp. 149–157.
Libet, B., Gleason, C.A., Wright, E.W. & Pearl, D.K. (1983), 'Time of conscious intention to act in relation to onset of cerebral activity (readiness potential): the unconscious initiation of a freely voluntary act', *Brain*, **106** (3), pp. 623–42.
Lillard, A.S. (1993), 'Young children's conceptualization of pretense: action or mental representational state?', *Child Development*, **6** (4), pp. 372–86.
Lillard, A.S. (2001), 'Pretend play as twin earth: A social-cognitive analysis', *Developmental Review*, **21** (4), pp. 495–531.
Mack, A. & Rock, I. (1998), *Inattentional Blindness* (Cambridge MA: MIT Press).
Markus, H. & Kitayama, S. (1991), 'Culture and the self: Implications for cognition, emotion and motivation', *Psychological Review*, **98**, pp. 224–253.
Markus, H., Kitayama, S. & Heiman, R. (1996), 'Culture and 'basic' psychological principles', in E.T. Higgins & A.W. Kruglanski (Eds.), *Social Psychology: Handbook of Basic Principles* (New York: Guilford Press).
Masuda, T. & Nisbett, R.E. (2001), 'Attending holistically vs. analytically: Comparing the context sensitivity of Japanese and Americans', *Journal of Personality and Social Psychology*, **81**, pp. 922–34.
Mauss, M. (1925), *The Gift: Forms and Functions of Exchange in Archaic Societies*, trans. W.D. Halls, (London: Norton/Routledge, 1967).
Mead, G.H. (1934), *Mind, Self and Society*, (Ed.) C.W. Morris (Chicago: University of Chicago Press, 1974).
Miller, G.A. (1956), 'The magical number seven, plus or minus two: Some limits on our capacity for processing information', *Psychological Review*, **63**, pp. 81–97.
Mitchell, R.W. (1994), 'Multiplicities of self', in S.T. Parker, R.W. Mitchell & M.L. Boccia (Eds.), *Self-awareness in Animals and Humans*, pp. 81–107, (Cambridge: Cambridge University Press).
Moody, T. (1994), 'Conversations with zombies', *Journal of Consciousness Studies*, **1** (2), pp. 196–200.
Morris, M. & Peng, K. (1994), 'Culture and cause: American and Chinese attributions for social and physical events', *Journal of Personality and Social Psychology*, **67**, pp. 949–71.
Neville, H.J., Bavelier, D., Corina, D., Rauschecker, J., Karni A. *et al*. (1998), 'Cerebral organization for language in deaf and hearing subjects: biological constraints and effects of experience', *Proc. Natl. Acad. Sci. USA*, **95**, pp. 922–9.
Oakley, D.A. (1979), 'Learning with food reward and shock avoidance in neodecorticate rats', *Experimental Neurology*, **63**, pp. 627–42.
Oakley, D.A. (1983), 'Learning capacity outside neocortex in animals and man: implications for therapy after brain injury' in G.C.L. Davey (Ed.), *Animal Models of Human Behaviour: Conceptual, Evolutionary and Neurobiological Perspectives* (Chichester: Wiley).
Oakley, D.A. & Eames, L.C. (1985), 'The plurality of consciousness', in D.A. Oakley (Ed.), *Brain and Mind*, pp.217–51 (London: Methuen).
Pinker, S. (1997), *How the Mind Works* (London: Penguin).

Pinker, S. (2004), 'Is consciousness an evolutionary adaptation?', *Toward a Science of Consciousness: Tucson 2004: Consciousness Research Abstracts*, Abstract 208, p. 84.
Popper, K. (1934), *All Life is Problem Solving* (London: Routledge, 2001).
Premack, D. (1988), ''Does the chimpanzee have a theory of mind?' revisited', in R. Byrne & A. Whiten (Eds.), *Machiavellian Intelligence: Social Expertise and the Evolution of Intellect in Monkeys, Apes, and Humans*, pp. 160–79, (Oxford: Oxford University Press).
Premack, D. & Woodruff, G. (1978), 'Does the chimpanzee have a theory of mind?', *Behavioural and Brain Sciences*, **4**, pp. 515–26.
Rizzolatti, G., Fadiga, L., Gallese, V. & Fogassi, L. (1996), 'Premotor cortex and the recognition of motor actions', *Brain Res. Cogn. Brain Res.*, **3**, pp. 131–41.
Rizzolatti, G., Fogassi, L. & Gallese, V. (2006), 'Mirrors in the Mind', *Scientific American*, **295** (5), pp. 54–61.
Seyfarth, R.M. & Cheney, D.L. (1988), 'Do monkeys understand their relations?', in R.W. Byrne & A. Whiten (Eds.), *Machiavellian Intelligence: Social Expertise and the Evolution of Intellect in Monkeys, Apes, and Humans,* pp. 69–84, (Oxford: Oxford University Press).
Simmel, G. (1968), *The Conflict in Modern Culture and Other Essays*, (Ed.) F.P. Etzfern (New York).
Singer, T., Wolpert, D.M. & Frith, C.D. (2004), 'Introduction: the study of social interactions', in C. Frith & D. Wolpert (Eds.) *The Neuroscience of Social Interaction: Decoding, Imitating, and Influencing the Actions of Others*, pp. xiii-xxvii, (Oxford: Oxford University Press).
Sinigaglia, C. (2008), 'Mirror neurons: What we can and cannot say' *Toward a Science of Consciousness: Tucson 2008: Consciousness Research Abstracts*, Abstract 147, p. 109.
Sinigaglia, C. & Rizzolatti, G. (2007), *Mirrors in the Brain: How our minds share actions and emotions* (Oxford: Oxford University Press).
Stewart, L., Henson, R., Kampe, K., Walsh, V., Turner, R. & Frith U. (2003a), 'Becoming a pianist. An fMRI study of musical literacy acquisition', *Ann. N Y Acad. Sci.*, **999**, pp. 204–8.
Stewart, L., Henson, R., Kampe, K., Walsh, V., Turner, R. & Frith, U. (2003b), 'Brain changes after learning to read and play music', *Neuroimage*, **20**, pp. 71–83.
Trevarthen, C. (1974), 'The psychobiology of speech development', in E.H. Lenneberg (Ed.), *Language and Brain: Developmental Aspects. Neurosciences Research Program Bulletin*, **12**, pp. 570–85.
Trevarthen, C. (1979), 'Communication and cooperation in early infancy. A description of primary intersubjectivity', in M. Bullowa (Ed.), *Before Speech: The Beginning of Human Communication*, pp.321–47, (London: Cambridge University Press).
Trevarthen, C. (1985), 'Neuroembryology and the development of perceptual mechanisms', in F. Falkner & J.M. Tanner (Eds.), *Human Growth (Second Edition)*, pp. 301–83, (New York: Plenum).
Trevarthen, C. (1998), 'The concept and foundations of infant intersubjectivity', in S. Bråten (Ed.), *Intersubjective Communication and Emotion in Early Ontogeny*, pp. 15–46, (Cambridge: Cambridge University Press).
Trivers, R.L. (1971), 'The evolution of reciprocal altruism', *Quarterly Review of Biology*, **46**, pp. 35–57.
Trivers, R.L. (1972), 'Parental investment and sexual selection', in B. Campbell (Ed.), *Sexual selection and the descent of man*, *1871–1971*, pp. 136–79, (Chicago: Aldine).

Trivers, R.L. (1974), 'Parent-offspring conflict', *American Zoologist*, **14**, pp. 249–64.
Trivers, R.L. (2000), 'The elements of a scientific theory of self-deception', *Annals of the New York Academy of Sciences*, **907**, pp. 114–31.
Turner, R. (1988), 'Perfusion studies and fast imaging', in A. Rescigno & A. Boicelli (Eds.), *Cerebral Blood Flow: Mathematical Models, Instrumentation, and Imaging Techniques*, pp. 245–58, (L'Aquila, Italy: Proceedings of NATO ASI).
Turner R. (2002), 'Culture and the human brain', *Anthropology and Humanism*, **26**, pp. 1–6.
Turner R. (2005), 'Brain Images of Collective Representations', in A. Ioannides (Ed.), *Brain, Mind and Culture*.
Turner, R. & Ioannides, A. (2006), 'Brain and musicality: inferences from neuroImaging', in S. Malloch & C Trevarthen (Eds.), *Communicative Musicality: Narratives of Expressive Gesture and Being Human*, (Oxford: Oxford University Press).
Turner, V. (1969), *The Ritual Process* (London: Penguin).
Turner, V. (1982), *From Ritual to Theatre: the Human Seriousness of Play* (New York: Performing Arts Journal Publications).
Turner, V. & Turner, E.L.B. (1983), *On the Edge of the Bush: Anthropology as Experience* (Tucson: University of Arizona Press).
Wegner, D.M. (2002), *The illusion of conscious wil*. (Cambridge, MA: MIT Press).
Wheeler, J.A. (1975). 'The participatory anthropic principle' in O. Gingerich (Ed.), *The Nature of Scientific Discovery*, pp. 261–96 and 575–87, (Washington: Smithsonian Press).
Wheeler, J.A. (1979), 'FORUM: John A. Wheeler. From the Big Bang to the Big Crunch', *Cosmic Search*, **1** (4), http://www.bigear.org/vol1no4/wheeler.htm.
Whitehead, C. (2001), 'Social mirrors and shared experiential worlds', *Journal of Consciousness Studies*, **8** (4), pp. 3–36.
Whitehead, C. (2002), 'Political origins of the 'hard problem'', *Toward a Science of Consciousness: Tucson 2002*, Centre for Consciousness Studies, University of Arizona, Tucson, USA, 6–13 April.
Whitehead, C. (2006), 'Collective deceptions in western science', *Toward a Science of Consciousness: Tucson 2006*, Centre for Consciousness Studies, University of Arizona, Tucson, USA. 4–8 April.
Whitehead, C. (2008), 'The neural correlates of having fun: Recent imaging research, social mirror theory, and some implications for the evolution of self-consciousness', *Toward a Science of Consciousness: Tucson 2008: Consciousness Research Abstracts*, Abstract 148, p. 110.
Wimmer, H. & Perner J. (1983), 'Beliefs about beliefs: representation and constraining function of wrong beliefs in young children's understanding of deception', *Cognition*, **13**, pp. 103–28.
Zillman, D. (1984), *Connections Between Sex and Aggression* (Hillsdale NJ: Erlbaum).
Zillman, D. & Bryant, J. (1974), 'Effect of residual excitation on the emotional response to provocation and delayed aggressive behavior', *Journal of Personality and Social Psychology*, **30**, pp. 782–91.