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# Challenging Neuroscience and Evolutionary Explanations of Social and Psychological Processes

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In order to provide the context for this special issue of *Contemporary Social Science* a brief review of biological and evolutionary explanations of psychological and socio-cultural phenomena is presented. This distinguishes five separate aspects of what may be characterised as 'biologising' the social sciences; Darwinian theories, neuroscience explanations, genetic causation, pharmacological and hormonal causes, and the less fundamentalist use of evolutionary ideas as analogies or metaphors. The remarkable range of phenomena that these biologically oriented perspectives try to address is cause for some scepticism and concern, forming the basis for an overview of the growing groundswell of arguments that challenge attempts at biologising the social sciences. At the heart of these challenges is the recognition that human beings can talk and interact with each other, generating cultures and societies that have an existence that cannot be reduced to their mere mechanical parts.

## Introduction

Consider a Martian (as is usual in such discussions) but this time one from an intelligent but non-mechanical society, who cannot understand how a motor car works. Of course we would never let this alien take a car apart, but we will allow him to observe it in motion and to measure which components heat up when different pedals are pressed. We could even point out what happens to a car's motion when the clutch is not functioning or there is a blockage in the fuel pipe. Could these measurements and reports allow our alien to go back to Mars and build her own motorised vehicle, or even to explain to colleagues how the vehicle works? Even if we provided a list of the component parts and how they were connected, our curious alien would have a hard time reconstructing a working vehicle.

Furthermore, if we showed aliens a history of the motor car from the earliest horse drawn carriages, even with extended axonometric drawings of their elements, would this give them any better idea of how the modern Jaguar or Hyundai had come into existence, why they still use fossil fuels, and what made them so very different from their forerunners? Without knowing about the social and economic role of the motor vehicles and the development of roads for their use - their geographical and cultural context - just relying on the mechanics, it would be very difficult to appreciate how and why they had changed.

Yet it is commonly accepted that the present day human, who is the far more complex than any motorised vehicle, can be understood from assessments of what parts of the brain are active under different conditions and what happens when major faults are identified in brain regions. More recent, detailed examination of brain structure is also believed to be the route to understanding what it means to be human. In what Nelkin (2000) likens to a religious belief system, there is pervasive faith that speculations about humanity's evolutionary

origins, and associated biological substrates can throw light on just about every aspect of current behaviours and social processes.

The present paper briefly reviews these attempts at biological and evolutionary explanations of psychological and socio-cultural entities and overviews the growing scholarship that challenges these theories. Such challenges build on the problem of not being able to take a working person apart. They also go much further by recognising that, unlike motorised vehicles, it is fundamental to people that they have a rich and abstract communication system that allows complex interpersonal transactions out of which societies and cultures emerge which generate a reality that is more than its biological components.

## Five Aspects of Biologising

Tsuda (2011) characterises theories that 'biologise' as "the study of super-biotic entities—societies, cultures, detective stories— [which are the] inappropriate application of laws drawn from biotic processes to subjects which resist biological explanation" (page 81). The term often has a rather dismissive quality, but it helps to encapsulate a very wide range of theories which are typically reductionist in attempting to explain, model or understand fundamentally human processes as varied as consciousness, culture, courtship, contemporary art, or broader issues as for example, political or economic processes, in terms of biology. In overviewing these theories it is helpful to distinguish five different varieties of the biologising of the social sciences. I see these as sitting along a continuum from the most fundamentalist reductionist to the least.

*Neuroscience Reductionism*

The most radical, and curiously least challenged, are all those neuroscience explanations that seek to account for aspects of humanity such as the examples Tallis ( 2011) gives of " love, beauty, wisdom and (in the case of sub-prime mortgages) stupidity" (page 79). Typically these explanations are based on studies that use fMRI or other explorations of brain function to further the understanding of what people feel, think and do. Limbic circuits are proffered as the cause of human activity rather than merely crude correlates of it. The research paradigm is usually to have subjects engage in some simple activity such as watching an image, or thinking about a topic, or making a decision and then to record the brain activity while that is going on. The brain activity of a number of subjects is then amalgamated to provide an indication of which part of the brain is 'responsible' for the target activity.

In recognition of the vast complexity of the brain, often characterised as having about as many component cells as the Milky Way has stars, there are increasing attempts to move beyond just recording brain activity to model all the connections in the brain. This has been called the Human Connectome Project (cf. Seung, 2010). It seeks to identify all aspects of human experience in the myriad interconnections in the brain, rather like determining how a car works from knowing which bits are joined to each other. So although the Connectome may offer more insight than the cruder fMRI it still looks for the causes of human experience, and variations between people, in brain structure, rather than recognising that what is being mapped are rudimentary correlates.

*Geneticism*

A further aspect of these strongly biological explanations is the search for clear and relatively simple genetic bases to being human. The range of human activities and experiences that

have been claimed as having a genetic basis is legion. They include for example aggression (Warrior gene) homosexuality (e.g. Bancroft, 1994), female orgasm (Dunn et al, 2005) perfect pitch (Baharloo, 1998), and -to choose something at the end of the alphabet- Xenophobia (Flohr, 1987). The genetic argument has often been indirect, drawing on Darwinian possibilities to claim a genetic basis. But with the mapping out of the human genome more specific efforts to find particular genetic markers have been attempted. In their most sophisticated form these studies have attempted to unravel the ways in which the genetic constituents are likely to influence protein production and thus the phenomena that it causes, as illustrated by the claim for a genetic basis to alcoholism (e.g. Aktas et al, 2012).

*Biochemical Causation*

The neurological and genetic theories about the causes of personal and social processes are often linked to hormonal and pharmacological explanations. The effects of biochemical agents, such as psychotropic drugs and alcohol, as well as the vast and often well understood influences of many pharmacological agents, is not at issue here. Rather it is the attempts such as the pharmacological explanations of phenomena as varied as aggression (Campbell et al 1998), winning (reviewed by Robertson, 2012), and even pornography Reisman (2003), that is part of biologising that looks for causes within human biochemistry for the existence of many different aspects of being human. Even the collapse of the Roman Empire has been attributed to lead poisoning (Nriagu, 1983).

*Biological Evolutionism*

Somewhat different forms of biologizing, but conceptually linked to neuroscience and pharmacological explanations, are the Darwinian evolutionary explanations of many aspects of present day human activity. They presuppose that there will be neurological and genetic bases to a person's actions and experiences, but in the absence of any evidence for these biotic underpinnings they focus on presumed roots in humanity's evolutionary past. An illustration is the claim, admittedly by an advertising executive, that great art is directly analogous to the peacock's tail (Wight, 2007). The argument is that artists and their sponsors are proclaiming their genetic fitness and thereby increasing their chances of mating with the opposite sex; or more specifically advertising the health of their company. The important point is that this explanation, and the many other similar ones covering everything from the appropriate size of organisations (Dunbar, 1992) to rape (Thornhill & Palmer, 2000), jealousy (Buss at al,1992) and many aspects of violence reviewed by Blum and Dess (2003) seek causes in humanity's evolutionary past.

These claims, most often under the heading of 'evolutionary psychology' are not presented as rich metaphors that garner power from their link to dramatic animal displays, but from the assumption that the evolutionary origins elucidate the human process under consideration, being their *cause*. Mate selection and survival of some human characteristics over others, or in some sets of people more than others, are deemed to be part of the same Darwinian process that enabled hominids to evolve from other primates, and microorganisms to emerge from primeval sludge.

*Selectionism*

A fifth strand of biologizing, although not as fundamentalist as neuroscience explanations and evolutionary psychology is what Tsuda (2011) in a masterly review calls 'selectionist'. This seeks "to explain historical phenomena not as the manifestation of the *natural selection* or organisms, but as the variation, selection and retention of autonomous cultural entities"

(page 81, italics in original). This is an explanation that is "autonomous from, though structurally similar to, Darwinian biotic evolution. While the two are not mutually exclusive, they are conceptually distinct." (page 81). These theories are less reductionist in that they do not presuppose any genetic, neurological or evolutionary history as the cause for what people do. Instead they attempt to harness a Darwinian model to social processes.

The clearest, early articulation of these ideas was expressed by the psychologist Campbell (1960), but Runciman has elaborated this perspective calling it 'neo-Darwinism' (Gough et al, 2008). He distinguishes this clearly from 19th Century 'Social Darwinism', out of which eugenics emerged, and the 'sociobiology' of the 1970's that is the sociological wing of evolutionary psychology. Runciman (1989) eschews any claims that culture and society can be derived from knowledge of animal origins and the organic make up of human beings. Instead he uses evolutionary theory by analogy as a general model of how social development and change comes about. Runciman (1989) and his followers see the theory of natural selection as providing a model for theories of cultural and social selection 'which have both significant analogies and disanalogies with it' (Gough et al 2008, page 68).

The analogy is couched in terms of cultures being formed by the information that affects behaviour being transmitted between people, through imitation and learning. This information is 'heritably variable and competitively selected' in much the same way as propensity for survival gives rise to the origin of species. At its heart this theory is 'a repudiation of teleology'. It is presented as a fundamental challenge to all those sociological theories, most notably Marxist and Weberian, which argue for an inevitable progression towards some sort of definable outcome. Neo-Darwinism is evolutionary because it sees existing states of culture and society as being a natural outcome of earlier states through the process of the selection of the fittest ideas, norms and habits.

**The Range and Fervour of Biologising Applications**

In his remarkably wide-ranging exploration of what he calls 'Neuromania' and Darwinitis' Tallis (2011) reviews many aspects of biologising theories. He shows that, besides the example mentioned above, just about every other aspect of human enterprise and experience has been subjected to explanations drawn from biology. It is now perfectly acceptable to claim that murder, the poetry of Donne, Mondrian's paintings, teenage pregnancy, belief in God, financial planning, to list just a few examples, are all open to explanations drawn from biology.

Importantly, it is not just that these claims are intriguing speculations presented with a cautious consideration of their strengths and weaknesses; rather it is often the case that they are made with a fervour that would be more usual in a religious fanatic. An illustration of the vehemence with which these claims are made is the comment by Konner (2004) "Sociobiology and evolutionary psychology have triumphed over their academic enemies; they are successful not only because of the power of theory but because of the relentless pursuit of relevant evidence". The notion of 'enemies' and a 'relentless pursuit' of what is believed to be the truth, emerges time and again in relation to any challenge to biological beliefs. Tallis (2011) gives a number of examples of the disdain with which his carefully formulated, evidence based challenges to biologising had been dismissed.

Nelkin (2000) explores the fervour of the biologisers as reflecting a religious impulse. She outlines a number of aspects that are common to both religious faith and biologising:

- A belief that the central biological theories, especially evolution, will explain everything about humanity, including the meaning (or meaninglessness) of life itself.
- The forms of rhetoric used, for example geneticists often draw on Biblical imagery, such as the genome being called 'The Book of Man' and 'The Holy Grail'. There is even speculation that DNA is God (Henderson, 1988).
- The explanations provide a basis for morality and social order, being directly converted into policy agendas (Walker, 2007).

As part of this process the insights that emerge from biological explanations are given primacy over any other evidence that may be available. A typical example of this is the much quoted 'discovery' by evolutionary psychologists that the human brain has evolved to support social interaction (Dunbar & Shultz, 2007), based on correlations between brain size and location in the evolutionary pecking order. This is presented as a discovery that humans are fundamentally social animals. Two hundred and more years of social science is dismissed as irrelevant against the 'evidence' that comes from these studies of relatively weak correlations between animal group size and average brain size.

The spread of the faith in biological explanations reaches out to areas where none of the five the aspects listed above are apparently present at all. Possibly the most notable of these is in the area of linguistics. Chomsky's claim of a Universal Grammar shared by all human beings; the proposal that all languages have the same essential components whether the speaker is Bob Hope or Mao Tse Tung, is taken to imply that our brains are 'hard-wired' (as it is often called) to develop language. The evidence for this is based on the claim that there exist analogous aspects of language syntax in all known languages, despite the fact that there are many features of being human that do not require an innate brain structure but do require similar forms of communication.

The belief in the biological basis of language is held so fervently that when Chomsky himself is quoted as saying that human language did not evolve from any previous animal communication system, and that 'hard-wiring' or any other neurological determinant is not an essential basis for development of human languages, he is regarded as a heretic to his own cause. Debates about how 'universal' language syntax is (e.g. Everett, 2012) are seen as challenges to the biological basis of language and thus shaking the faith of contemporary linguists, rather than an interesting contribution to the fascinating discussion of how languages vary.

These five aspects of biologising psychological and social matters and the examples mentioned cover only the smallest tip of a vast literature that is growing by the hour. Indeed Vrecko (2010) produces an alphabetical list of topics for which neurobiological explanations exist that runs from altruism to zeal. This is fostered by a mass media which seems to have an insatiable appetite for the latest 'discoveries' in this mode of research. But Chomsky is only one of a growing number of scholars who are questioning the biologising of so much that is human. A review of these challenges shows that they have considerable merit and are contributing to pushing the pendulum back that has swung so far to the nature side of the equation.

**What is not challenged?**

Before reviewing the mounting chorus that is questioning the biologising orthodoxy it is important to be clear that these voices are not being raised in order to replace it with some other sort of faith. The attack on biological reductionism by social and biological scientists is not done in the name of some spiritual essence. These are not creationists, or those committed to 'intelligent design'. Indeed the systematic study of human beings and their place within nature could readily lead to the view that the 'design' this illustrates is anything but intelligent! Dysfunctional stereotypes and cognitive distortions of reality, as well as pathological social processes, which make human beings so often their own worst enemy, all imply that if there is any spiritual influence on how we come to be it is less than intelligent.

Nor do those trying to chase the biological sacred cows away typically hide behind an essentially post-modernist or constructionist view. They do not claim that the whole biological argument is some sort of category error or a problem of how we create our understanding of the world. Although elements of this do support some of the arguments against biologising the view that there are real social processes that interact with a recognisable reality are much more dominant.

Most crucially the challengers of biologising are not evolution deniers. They recognise the power of the Darwin/ Wallace theory and the huge significance of the understanding of DNA and its mechanisms for many medical conditions. They also accept that we are all limited by what are bodies do and can do. That breakdowns in our body, whether it is the loss of a leg or a part of the cerebral cortex, or influences of drugs or poisons are likely to have direct influence on a person and what they do and consequently can impact of society in general. There is no doubt that malnutrition or HIV/AIDS or the life style improvements in health that are changing the world's age distribution, to take three obvious examples, are all profound influences of changes in human biology that have far reaching social consequences.

Furthermore, there can be little doubt that there are important genetic differences between individuals. It does not require sophisticated studies of twins or genetic markers to point out that the most obvious support for this are those people who reveal their talents and capabilities despite being brought up in a deprived, unsupportive environment. Many would accept that, for instance, that rags to riches narratives imply something inherent in those individuals that overcome their circumstances.

The central stance of those who challenge biological explanations is that human biology is not the whole story. To put it in terms of scientific territory, the men and women in white coats in heavily equipped laboratories and those who follow on their coattails with evolutionary explanations do not hold the secret to all aspects of human actions and experiences. Furthermore, it is important to evaluate biological explanations for many aspects of modern civilisation because such explanations can be potentially dangerous.

**Challenges to Neuro-Biological Explanations**

The most fundamental challenge to reductionist explanations of humanity is the argument that not all complex systems can be reduced to simpler ones. Or as Goodwin (1997) put it "Inheritance and natural selection..play significant roles …, but they become part of a more comprehensive dynamical theory of life which is focused on the dynamics of emergent processes" (page xiii). He summarises this slightly differently when he points out that the mathematics of organism development and change makes it clear that they have a "reality

that is not reducible to their parts "and also "creates a space for subjective experience" (page 220). It is this potential for the emergence of entities and processes, that mathematical logic shows have complex qualities which do not allow simplification to some 'lower' level of components which is the fundamental challenge to biological reductionism. This opens the way for social and psychological sciences that have a logical and legitimate existence that is independent of, although constrained by, biological underpinnings.

*Challenges to Neuropsycholology*

Goodwin's (1994) argument that the reduction of all high-level, complex aspects of life cannot logically be reduced to some simpler form of existence is at the heart of the challenge Tallis (2011) makes to neuroscience explanations of many aspects of personal experience. He explores such central aspects of experience as the self, consciousness and self-awareness and the sense we have of making decisions and having responsibility for them. He draws on his extensive knowledge of neuroscience to demonstrate that it is just not possible for nerve synapses, or brain structures to be self-aware and experience guilt for the actions they facilitate. He explains, what seems obvious once it is expressed with such clarity and confidence, that electronic sensors and brain scans cannot be expected to measure such aspects of human experience as hope or the continuity of the self.

In many different illustrations Tallis (2011) shows that the studies on which such claims are made invariably greatly oversimplify the human phenomena they are studying. He reviews as illustrations the explorations of the neurological basis of:

- love (by scanning care assistants as they looked at photographs of people with intellectual difficulties first neutrally then with unconditional love – Beauregard et al, 2009)
- beauty (people were scanned when contemplating pictures they had previously classified as beautiful, neutral or ugly – Zeki & Kawabata, 2003), or
- wisdom, by identifying and connecting the areas of the brain associated with what the researchers (Jeste & Meeks, 2009) regarded as the components of wisdom, such as emotional regulation, decision making and valuation.

Equating complex emotions and thought processes, with what happens in the brain when a person looks at a photograph, or thinks about a particular topic, whilst in the curious environment of an fMRI scanner, is a huge oversimplification. The claims that what happens in the brain in these conditions has any relationship to the intricate phenomena that are an integral part of human interactions is to ignore everything that psychology and the other social sciences has revealed about the culturally and personally dependent nature of human activity and experience. If Beauregard and his colleagues (2009) had only read Othello they would have understood that love, even the unconditional love they posit, is far more complex and changes over time in such a way that it cannot be reduced to looking at pictures with a particular caste of mind.

Even if such oversimplifications were accepted as the first step towards understanding a complex process there are still grave doubts about what brain scans are recording beyond crude anatomical correlations. Tallis (2011) points to the examination that Vul et al (2009) carried out of many studies that claims to have linked activity in brain regions to psychological phenomena such as social rejection, neuroticism and jealousy, arguing that the method "inflates the strength of the link between a brain region and the emotion or behaviour".

In detailed consideration of brain localisation research Tallis (2011), quoting Crawford (2008), argues that a brain scan is "a fast-acting solvent of the critical sense". Not only do these studies suffer from the problem analogous to trying to reconstruct the workings of a car from information about which parts heat up, in that brain scans are indirect measures of very limited aspects of brain activity, but they also suffer from the way the aggregate results from repeated studies of groups of subjects are summarised. The utility of this summary is often further undermined because once a set of results is amalgamated another set of summary results is subtracted from these. What is left in the visual image of the brain scan, when one aggregate set of results is subtracted from another, is regarded as an indication of the localisation of the function being focused on.

*Consciousness*

Perhaps the most crucial challenges to neurological interpretations are those that search for the biological substrates to consciousness. Velmans (2012) contributes to this debate by arguing that there is no reason to believe that human neurological mechanisms should generate consciousness when other complex biological systems do not. This reflects Tallis' (2011) position that it makes no sense to think of cells becoming aware of themselves. In addition he shows that what we know of the distinction between sensation and perception raises fundamental questions of how a brain can become aware of its surroundings and of itself without some embedding within a person and his/her experiences of the world.

It has been established for centuries that what the brain receives by way of sensations through the sense organs does not have the focus and structure that our experience has. Tallis (2011) shows in some detail that the creation of experience from sensations cannot be a simple product of the action of unthinking chemicals and electrical charges passing between cells. In other words, consciousness is part of self-awareness, which in its turn is an aspect of being a person. These components of being human cannot be isolated in the way that is required for brain localisation and the assumption that they are merely generated through nerve synapses and associated biochemical changes. Conscious persons are not stand-alone brains, as science fiction would have us believe.

The idea that consciousness evolved as a biological necessity for survival is also strongly challenged by Tallis (2011) and Velmans (2012). Although Velmans accepts that there are close associates of "given conscious experiences with given brain states and functions, it does not require conscious experiences to be *reduced* to their correlated brain states or functions". Both Tallis (2011) and Velmans (2012) emphasise that brain states do not have to be the sole explanations of consciousness just because they are associated with them. Velmans (2012) also adds that the existence of these neurological correlates "does[not] require experiences to be illusions or tricks of the brain whose only purpose is the enhanced propagation of genes".

Interestingly Velmans (2012) commits himself to what he calls the continuity theory of consciousness whereby consciousness co-evolved with organic evolution: "as the material forms evolve, for example in the way that species evolve, their associated experiences *co-evolve"*. From this challenging perspective some form of consciousness has always been present in animals, but it has reached unique levels in modern humans.

Velman's (2012) continuity perspective has a different emphasis from the explanation Tallis (2003) develops in great detail. Tallis sees a form of discontinuity in the emergence of

human self-awareness and with it consciousness. He cogently argues that consciousness is a product of biological differences between humans and other primates. These include the evolution of the human hand. The opposable thumb, and all the associated sophistication in manipulation that the upright posture allowed, gave rise to a distinction between the self and the world out of which tool making and the allied culture emerged. The hand, a proto-tool, is the basis for humans as the tool-making animal and the transformation of the primate organism into a conscious agent, According to Tallis (2003, 2011) this opened up a gradually widening space between *Homo sapiens,* in which social processes are powerful, and the natural world, in which mindless Darwinian evolution operates.

*Pharmacology*

Much as brain imaging studies greatly oversimplify human experience in order to be able to study it, so pharmacological explanations reduce complex social processes to some limited aspect in order to claim biochemical influences. One particularly important example of this is the medicalisation of addiction. Caan (2012) challenges the reduction of this multi-faceted phenomenon to some microscopic pathology in individual addicts. He reviews the evidence that makes clear that a dependence syndrome combines biological, inter-personal and societal dimensions.

The consequence of treating addiction as a solely medical problem are that one addiction, such as that for heroin, may be substituted with another, methadone. The complex milieu that links individuals and their social context out of which addiction emerges may be ignored because that is much more difficult to manage than prescribing a drug. There may be psychological benefits to addicts in considering their problem to be a medical one, giving them a rationalisation that allows them to seek help, but the evidence Caan (2012) offers points to the power of social interventions that take account of the cultural nexus which the addict is within. If addiction were a brain disease analogous to Parkinsonism or Alzheimer's disease, it is difficult to understand how it could be successfully managed by rewarding people who shake off their addiction, as Satel (2010) points out.

*Geneticism*

The belief in the dominant influence of biological evolution on all aspects of human beings is consistent with the belief that there is a clear genetic basis to many, possibly all, aspects of human actions and experience and related differences between people. The consideration of genetic influences may often be cautiously expressed as being modulated by environmental influences, but the message is still that the dominant insights come from genetics and their neurobiological correlates. A recent telling example of this is the review by McCrory and his colleagues (2012) of the link between child abuse and psychopathology. Although these clinicians are aware that both positive and negative environmental experiences can influence whether or not behavioural disorders develop after maltreatment, nonetheless they support the view that there is a genetic basis to how likely a person is to be vulnerable to 'reactive aggression following maltreatment'.

It is instructive to follow to its source McCrory et al's (2012) conclusions. They cite a review by Viding and Friths (2006). This draws on an fMRI study by Meyer-Lindenberg et al (2006), who compared the brain activity of people who were genetically different by getting them to look at "affectively salient social stimuli (angry and fearful faces)" (page 6270). These original authors of the actual study are very cautious in their claims, recognising that

they do not distinguish premeditated aggression and reactive aggression and that it is clear there is no simple genetic influence; that genes interact with each other and the environment in which they operate. But even this distinction is a gross oversimplification of the nature of aggression and the contexts in which it occurs. It also assumes people are either aggressive or not and confuses aggression with the more general trait of impulsivity. To unpack all of this requires a much more detailed understanding of violence than is provided by "a non-violent sample of healthy men" looking at angry and fearful faces. Nonetheless, McCrory et al (2012) already have hope for 'clinical interventions' to 'moderate environmental and genetic risk'.

Differences in genetic makeup are being studied more extensively now that the human genome is available for cross-reference, but it is still the case that many claims of genetic influence are based on twin studies. The comparisons of monozygotic (MZ) (identical) with dizygotic (DZ)(non-identical) twins, as well as twins reared together with those reared apart, are accepted as a definitive paradigm for demonstrating the influence of genetics. Yet there are many challenges to the assumption that this really does reveal genetic variation.

Joseph (2002) articulates these challenges, pointing out in an extensive review that there are three major assumptions underlying the study of twins to determine genetic influences: "1) that there are two types of twins, and researchers can reliably distinguish between them, 2) the results from twin studies are generalizable to the single-born population; and 3) the environments of MZ and DZ twins are roughly equal" (page 73).

He reviews detailed consideration of all three of these assumptions to show that none of them stands up to scrutiny. The experience of being a twin is typically different from any other sibling relationship and there are important variations in how twins who look alike experience the world compared with those who do not. Crucially, also, the MZ/DZ distinction is not a simple dichotomy. There are many subtle gradations between. Joseph (2002) concludes that "There is little reason to accept that studies of twins, whether reared together or reared-apart, measure anything more than environmental influences, error, and bias" (page 80).

*Challenges to Evolutionary Explanations of Social Processes*

Velmans (2012) also argues that far from being of value in the survival of the individual there are many aspects of consciousness which could be regarded as counter-productive. This reflects Tallis' (2011) detailed consideration that higher levels of consciousness, such as planning, deliberation, remembering and rehearsing put an organism at a biological disadvantage when compared with those that act, well, instinctively. As Tallis (2011) puts it "he who deliberates is lost" (page 178). The argument is not whether once an organism has consciousness it can then harness this for survival, but how could the mechanical processes of material survival have generated such a biologically inefficient system.

One challenge to this may be that there are two different sets of cognitive processes (recently popularised by Kahneman, 2012); one that is more primitive, unthinking and impulsive, the other contemplative and self-aware, the implication being that the more primitive system has emerged from our evolutionary past. However, it is also clear that these two systems are not independent. For example expressions of prejudice can be revealed from impulsive reactions that a person is unaware of, but the prejudice itself is a product of that individual's social context and self-awareness.

Marks (2012) develops the challenge to a purely biological explanation of human evolution. He claims that anthropologists have generally dismissed such Darwinian claims because they ignore the power of socio-cultural developments in human societies over millennia. In a lively review of the historical turf battles between biology and anthropology he points out that not even the much vaunted bipedality of human beings is an inevitable consequence of our genes, but has to be learned and encouraged within a family setting. As he points out "innate and learned are not antonyms". He puts it thus, " history of human adaptation is technological, not cranial. Our foreheads and chins, the marks of modern humanity, first appeared in Africa between 150,000 and 200,000 years ago; but many tens of thousands of years elapsed before representational art appears, much less metallurgy or the wheel or sliced bread."

It is important to emphasise that it is not just anthropologists who are challenging Darwinian explanations of every aspect of human being. Tallis, a well-respected physician and neuroscientist is in a tradition given impetus some time ago by the distinguished evolutionary biologists Gould and Lewontin (1979). They mirror the argument made by Goodwin (1994), discussed earlier, that all aspects of complexity cannot be reduced to simpler processes. Gould and Lewontin (1979) point out that biological explanations of evolutionary processes gave "an evolutionary biology of parts and genes, but not of organisms. It assumed that all transitions could occur step by step and underrated the importance of integrated developmental blocks and pervasive constraints of history and architecture" (page 17). Social scientists would add that language, society and culture are also fundamental to these 'developmental blocks'.

*Challenges to Selectionism*

The criticisms of what Gould and Lewontin (1979) call the 'adaptionist program' are also relevant to what may be regarded as the less fundamentally reductionist application of evolutionary models to social processes that do not imply any biological substrates. As mentioned earlier, Campbell (1960), and more recently Runciman (1989), have argued that changes in society over time can be conceptualised as similar to biological evolution. What Tsuda (2011) calls 'selectionism'. This stance is often not clearly distinguished from directly biological explanations, giving rise to what Derry (2008) calls 'Darwin in Disguise'. Yet even stripped of any claim to neurobiological substrates it can be seen that it suffers from many of the weaknesses of full-blown biologising.

Tsuda (2011) provides a masterly deconstruction of this much heralded new model of social theory. He articulates a growing chorus that points out that even if the concepts and arguments were less ambiguous than they are, they are just not open to the sort of empirical tests that their proponents claim is their major strength. The central problem lies in the need to identify distinct entities in society, analogous to 'parts and genes'. Some have tried to claim that there is a unit of meaning, given the label a 'meme' (e.g. Blackmore, 1999) which is the component that suffers from the process of regeneration and survival. But as Derry (2008) has shown the study of memes, even if given the neologism *memetics ,* fails as a science because there has been no unambiguous definition of a meme or any demonstration that memes have "a replicated code script that can be acted on in the same way by our minds as natural selection acts on DNA"( page 75). Derry (2008) comments that "memes can be anything from paperclips to proverbs, marketing ads to Mozart arias". To treat such a huge variety of entities as all illustrations of one phenomena seems a remarkably simplistic notion

of what the ideologies, systems of thought and cultural artefacts are that make up any society.

A further problem with selectionism is that it requires the individual entities to transmute in transmission, so that more environmentally effective versions emerge for further distribution through minds. Yet the history of psychology shows how conservative are human thought processes. This was perhaps given its first clear illustration in the seminal work of Bartlett (1932) in which he showed in studies based on a form of visual or verbal 'Chinese whispers' that far from messages, in any mode, becoming more diverse over time as they pass from person to person, generating variations that would succeed or fail to be passed on, the opposite is the case. There is a tendency for a reduction to the mean, determined by the norms and expectations of any cultural context. If it is claimed somehow, that the drawings or stories Bartlett used were examples of 'memes' then his findings show that there is not much scope for them to evolve. As many commentators have pointed out (e.g. Derry, 2008; Tallis, 2011; Tsuda, 2011) the impetus for these selectionist theoreticians is more readily found in the faith they have that Darwinism can be applied to all explanations of humanity than to any clear, factual evidence in support of their arguments.

The distinction between a fundamentalist biological Darwinism and the more liberal, selectionist, neo-Darwinism is often difficult to discern in many writers. The power of evolution as an analogy or metaphor is so strong that the use frequently ignores the very clear components that exist within its biological origins. This may be illustrated and expressed by pointing out that concept of evolution itself has evolved to survive in many different environments from those in which it had its origins. Whether the new variants of evolution really are a different species from their biological forebears, and should not be confused with them, is important to determine. It seems likely that using evolution as a metaphor adds implicit power to an argument by its connotations with the careful science from which it is drawn. Using the language of evolutionary biology can lay a patina of respectability on arid speculation.

**Some Consequences of Biologising**

The importance of challenging the biologising of the social sciences becomes clearer when specific applications are considered. As indicated above, the range of inappropriate biologising is legion, so for illustration I will focus mainly on those examples dealt with in this current issue of *Contemporary Social Science.*

*Education*

In reviewing the impact of biologising on educational theory, Turner (2012) emphasises the fundamental distinction between the time frame of educational processes that have developed over the last few centuries and the many thousands of millennia that are necessary when considering hominid emergence from the other primates. In contrast neuroscientific explanations are drawn from studies of processes that last a few seconds or minutes at the most, whereas teaching and learning happens over weeks, months and years. As a consequence the comments from neuroscientists on student thought, often now called neurocognition, are typically trivial or misleading.

Often the misleading influences that are presented as based in neuroscience, such as the view that each student will have a dominant thinking style that is directly related to the power of a particular hemisphere of their brain, or even that children will improve their cognitive

abilities by drinking lots of water, are just bad science by any standard. Turner (2012) argues that these ideas gain power from the confidence with which biologising is presented and the lack of interaction between neuroscientists and educators. This in turn is rooted in an arrogance that comes more from the expensive equipment and status of neuroscience than from any lack of willingness on the part of educators to engage with them. An arrogance that Turner (2012) points out is supported by the added acceptability of a proposal if it is given a neurobiological label.

*Violence*

Lloyd (2001) elegantly characterises the arrogance of many biologisers in a context different from education, but still directly relevant, when she reviews evolutionary explanations of rape. She confronts the disdain with which evolutionary psychologists treat challenges to their firmly held views as the 'Galileo Defence' : "I am telling the Truth and doing excellent science, but because of ideology and ignorance, I am being persecuted." In an insightful and very detailed critique of Thornhill and Palmers' (2000) book claiming the evolutionary origins of rape, she shows that these authors are not doing good science or taking account of the many biologically based challenges to their proposals.

Yet just as simple-minded neuroscience can mislead teachers, as Turner (2012) illustrates, biological explanations for violence provide little of practical value and are typically conservative in their implications. Many commentators have argued that by positing, as Thornhill and Palmers (2000) do, that rape is a 'natural' part of being male, this leads to suggestions with which Islamic and other religious fundamentalists would readily agree; that women are inevitably targets for sexual assaults unless they protect themselves and avoid opening themselves up to lustful desires. The treatment that is proposed for men who act on their predatory sexual instincts focus entirely on the sexual component of the act even though this has proven of little value unless the cognitive and emotional consequences are also dealt with. Indeed Lloyd (2001) has pointed out that by implying rape is 'natural' actually makes sexual aggressions more likely whilst ignoring the outstanding fact that the great majority of men in all societies do not rape

*Adolescence*

Just as evolutionary explanations of rape can, possibly inadvertently, open the way to legitimising the control of women, so also Bessant and Watts (2012) show how the biologising of adolescence can be used to support reduction in adolescents' freedom and promote views of them as childish. Yet, as they demonstrate, the claims of differences between adolescents' brains and those of older adults suffer from the same problems that have been noted above for other fMRI studies and correlations. These are compounded by the lack of any evidence of what a 'mature' brain would be or what is typical of all adolescent brains and the range of variation around this if it could be established. In addition the popular idea that all adolescents are the same, with chronic behavioural problems, risk taking and impulsive is just not borne out by even casual daily contact with teenagers, let alone the systematic studies that show the stereotype is a gross oversimplification.

*Disordered Selves*

Hallam (2012) demonstrates that biologising has its roots, perhaps paradoxically, in notions of the spirit and soul. This is especially apparent in the consideration of mental illnesses. Just as religions sought for the causes of disturbed mental states in attacks on the soul so neuroscientists look for the problems in the brain. This ignores the ways in which similar brain lesions can be manifest in very different cognitive or behaviour disturbances, and the

very wide array of experiences that are considered, or not considered, as disturbing. So although there is no doubt that there are some biological correlates of what are known as mental illnesses the emphasis on those at the expense of understanding the person and her/his disordered self is inappropriate.

Taking the example of depression Hallam (2012) draws on the work of Higgins & George (2007) to point out that the medicalisation of this experience ignores the fact that ", the most likely explanation of this activity is chronic and unremitting environmental stress rather than an intrinsic vulnerability" and that psychosocial therapy may consequently be the most appropriate form of treatment. However, as a number of authorities have pointed out there is considerable commercial advantage in regarding mental illness as a neurological based pathology which can be treated with pharmaceuticals. So although severe depression does respond to drugs the value of psychotherapeutic interventions can be masked in other cases.

*Reading*

The final example, of reading and particularly dyslexia, (Lopes , 2012) further illustrates the desire to find biological explanations for problems that are complex and not as readily open to dissections with neuroscience tools as may be anticipated. Yet as Lopes (2012) puts it: " it is perplexing that a teaching / learning issue became a biological or genetic issue, when in a real sense almost everything about it is cultural". One consequence, and perhaps part of the reason for this inappropriate biologising of reading and reading difficulties, is that it can be used to take the pressure off teachers and schools, seeing the problem as within the learner.

The reductionism of biologising , then, applies not only to the forms the explanations take but also to the simplification of the phenomena being studied, whether it is for example violence (sexual or not), adolescence, consciousness or depression, there is a requirement that it is trimmed to a size and shape that allows it to be dissected with the biological tools at hand. The consequent abuse of biology in the consideration of social and psychological phenomena starts from the assumption that human beings are nothing more than a product of their biology, whether rooted in evolutionary origins or determined by genetic and neurological constitution. Such a perspective has profound policy and related practical implications. In a political sense these assumptions are fundamentally conservative. The reduction of people to their physical components limits the possibilities for development or change. It frames a person's potential within constraints over which that individual has no control. However, these influences are not limited only to one side of the political spectrum. To use Tallis' (2011) telling term, there are neuromaniacs on both sides. Neuro-law appeals both to those who want to lock up criminals indefinitely because they are innately bad and those who argue that offenders should not be punished but have extensive treatment because their brains cause them to have diminished responsibility. This is reminiscent of belief in a righteous war in which all sides claim they have the support of their God.

The biologising of the human condition seeps further into society by its emphasis on the body independently of the person. If the body is seen as the primary and only aspect of being human, then violations of the body (Canter, 2002) are readily misunderstood. This can be the search for a perfect body through cosmetic surgery, believing this will create a perfect person, or the confusion that surrounds a serial killer dismembering his victims. Biologising processes act against other attempts to acknowledge the significance of the person.

One other important consequence of the search for biological roots in human endeavour is revealed by Syed (2010) in his popular exploration of the significance of talent against the background of opportunity and hard work. He argues that the overemphasis on innate capabilities reduces the support for effort and leads some to assume that a person is either gifted or not. If it is not in their genes there is no point in trying. However, all the evidence is that any recognised geniuses have shaped and honed any innate capabilities they have with considerable social support, developing skills over long periods of time. So although Syed (2010) does not draw directly on biologising arguments the implications of his review clearly undermines them and importantly shows the importance of help and support to enable any talent to find the light of day.

**Why is there such a faith in Biological Explanations?**

Despite the many scholars cited here who have provided profound challenges to the full range of biologising theories they are still in the ascendant. Hardly a journal can be opened without some consideration of the neurobiological and/or evolutionary basis of being human. On any day the print and broadcast media will have at least a handful of references to these forms of explanations, whether it be the reason why competitors who wear red are more likely to win than those who wear blue, the evolutionary basis for arson, or the genetic prediction of criminality in a crime fiction – to mention just that I was aware of on one day whilst writing this. The question therefore has to be asked why biological explanations survive so well.

One answer is given directly by the media interest. As O'Connor et al (2012) demonstrate neuroscience coverage in UK newspapers has been increasingly dramatically over the last decade. This has been accompanied by frequent misappropriation of neuroscience findings. They conclude that "reference to brain research is now a powerful rhetorical tool". In other words it can be manipulated to provide a basis for dramatic headlines or in support of entrenched positions and policy agendas. This gives neuroscientists a ready forum for their work even if it gets distorted when translated into the popular media. Such distortions may even facilitate their quest for further support of their work.

The glamour provided by public interest is of course partly a consequence of basking in the reflection of probably the most powerful theory ever to emerge. There can be little doubt that *On the Origin of Species* is one of the most, if not the most significant, scientific publication of all time. So any cross-reference to this provides an immediate imprimatur indicating the claims must be of scientific value. It is also a relatively straightforward narrative, with just the edge of surprise about it to be graspable by most people. It can be reduced to sound bites 'the survival of the fittest', 'nature red in tooth and claw' that also have a theatrical quality to them. It should not be forgotten either that it often gives an opportunity to talk in measured tones about sex, and 'mate selection'.

As mentioned, neuroscience explanations also have simple relationships to earlier attempts to explain humanity; the brain replacing the soul. This captures the search for 'magical' explanations that underlies superstitions, which many adults never quite lose from their childhood beliefs. It also offers the comforting possibility of simple solutions to complex problems. The sound-bite media encourage this. The idea that the brain causes behaviour is easier to get across than the subtler and more complex explanation embedded in learning, interpersonal transactions and culture. The power of biological explanations in so many areas

of science is also such that there is the assumption that the only alternative to these are supernatural explanations.

Furthermore, biological explanations provide exciting pictures. The media hunger for brain scans and animal parallels is much greater than for the more abstract formulations that come out of the social sciences. This means rather silly ideas, such as those explored by the many scholars quoted here, can get international coverage by ill-educated journalists thereby authenticating the 'science'. This is an aspect of what, in another context I've called the 'Hollywood effect' (Canter and Youngs, 2009) whereby poorly evidenced claims are given spurious support by being referred to in the mass media and fiction as if they were established facts. They consequently become fondly held beliefs within the culture.

**Conclusions**

Both Tallis (2011) and Tsuda (2011), quite independently refer to Chapter V of Gulliver's Travels in which Gulliver at the grand academy of Lagado meets a man "his beard long, ragged and singed in several places" who had "been eight years upon a project for extracting sunbeams out of cucumbers". They both recognise the mixture of confidence and bizarre improbability that many biologising ventures share with the attempt to extract sunbeams from cucumbers.

One central problem with biologising, as with trying to extract sunbeams from cucumbers, is the inherent artificiality in the way studies are conducted. It requires breaking any system into bits that can be studied in the laboratory or can be modelled as if they were distinct biochemicals. Correlations are assumed to imply causation or even identity. The challenge to this approach requires what might be thought of as essentially anthropological or ethological, field based accounts of what people do and how they live. This reveals complexity and the integration of aspects within changing systems, which are much more difficult to describe and explain.

At the most cynical it could be claimed that what is being explored here is really a turf war, with biologists and their collaborators claiming areas of human endeavour they have no other way of controlling. Of course some of these biological experts cited here, notably Tallis in a series of books (most recently 2011) and Rose and Rose (2000) have eschewed their colleagues and have chosen the dark side, despite their credentials. They are probably the most informed challengers of biologisation. They are part of a growing number of articulate, well-informed scientists who are challenging the assumptions that reduce humanity to its biology.

Interestingly Swift recognises the faith of researchers when he quote the Lagado sunbeamologist as ensuring Gulliver that "in eight years more, he should be able to supply the governor's garden with sunshine, at a reasonable rate", entreating Gulliver "to give him something as an encouragement to ingenuity". The relationship of confident belief as a basis for seeking funding was apparently the same in the 18$^{th}$ century as it is today.

As has been noted there is currently a mainstream set of explanations for human actions and characteristics that embed them deeply in some biological notion of a Darwinian evolutionary past. These spill over into a search in the genome and neurology for causes of what people do, feel and think. The idea that we are little more than our physiology and pharmacology

that are products of zoological evolution, a 'biologising' of humanity, has become such an orthodoxy that any challenge to it is usually dismissed as unscientific. Yet even when accepting the fundamentally biological nature of *Homo sapiens* trying to understand what makes us people today only through biological mechanisms is like trying to understand how a car engine works by seeing which bits heat up when you press different pedals.

As Tallis (2012) remarked "this analogy of the car engine captures two fundamental problems with neuropsychology: it ignores the unities that are necessary for any moment of a life that is led rather than merely happens; and it ignores the fact that we experience our lives and shape them – that we are active and purposive as well as (sometimes) the mere site of events. Mechanisms – and piecemeal mechanisms – could never add up to the kind of lives we lead, have biographically, and narrate to ourselves. (If the narratives are illusions, one wonders what mechanism might generate those illusions.)"

The human quest for, and delight in, narratives is perhaps the key to the hold biologising has. The attractiveness of neurobiological explanations is that they provide a gripping story; whether it be the magic of the brain, or the struggle for survival. Story telling is not in our genes or evolutionary history but is the essence of what makes us human.

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