Christians in Science Lecture 14 at St Peter's Church Frimley 9th July 2019

Dr Stuart Judge - 'Just a Pack of Neurons?' - A Christian View of Human Nature'

Dr Judge is an emeritus reader in physiology at the University of Oxford, specialising in the neuroscience of vision (myopia and the causes of presbyopia). He is an active and committed Christian and a member of Christians in Science. Stuart gives lectures on bioethics and the Christian view of Nature and publicly argues for the continued relevance of a Judaeo-Christian view of the world.

Whilst introducing Dr Judge, John Russell alluded to statements made by Francis Crick (alongwith James Watson and others of DNA fame) that 'even our loftiest thoughts and aspirations are mere byproducts of neural activity' and that 'our consciousness and sense of self are based entirely on the activities of the billions of bits of jelly that constitutes the brain – in short, 'we are nothing but a pack of neurons', adding that this was 'a dangerous idea if true'!.

Before beginning his address Dr Judge (SJ) apologised profusely that as he was unable to locate the slides relating to his intended lecture on his laptop, he would be illustrating what he had to say, as best he could, by using the slides of an older but related talk.

SJ commenced his talk with what he referred to as some Biblical anthropology – what is the essence of a human being. The ancient Hebrews of the Old Testament were essentially 'monists' believing in a **single** entity, consisting of body, mind and soul (*nephesh*) which were not seen as being separate. The 'soul', the concrete life of the body, was not seen as unique to humans. The New Testament view is perhaps less clear – Jesus exhorted his followers to 'love the Lord your God with all your heart (*lev*), and with all your soul, and with all your mind (*psyche*), and with all your strength . . .' The classical position could be said to be that humans have three parts – a material body and 'immaterial' soul and spirit (*ruach* or inspired life). However, this view was condemned as a heresy at the 4th Council of Constantinople in the 9th century. It is perhaps more plausible to say that all these terms apply to a human being in his or her entirety.

In the following part of his talk SJ gave some examples of a statistical relationship or correlation between what is going on at the level of the whole human person and what is going on in one or more parts of the brain. He showed a slide of a horizontal (MRI scan) slice of the brain with the front at the top. This part of the motor system is affected in patients with Parkinson's disease and within it the anteromedial caudate body correlates closely ('lights up') with feelings of passionate love in young people. Considerable research has been carried out on New World marmosets – very intelligent creatures with quite advanced social characteristics such as a highly integrated family life with fathers and 'teenage children' taking a very active part. Here it was found that the structure of the dendritic spines (which convey input to the neurons) of the nerve cells in the prefrontal cortex changed significantly as the male marmosets matured into fatherhood. It has also been found that people with damage to the prefrontal cortex tend to make more biased (utilitarian) moral judgments compared to a control group and he cited the scenario of a disaster at sea where the lifeboats are overloaded with survivors, including some injured people who are not actually going to survive. Would you 'jettison' the latter in the interests of the majority? The control group would tend to make the 'compassionate' decision (to retain the injured) but not those with damaged brains. Examples such as these have been used by neuroscientists and others to support the 'Crick' argument that the (material) brain per se is in control of behaviour. That is, if you define an activity of any sort you can generally find a bit of the brain that 'correlates' with that activity. So, nerve cells have been found associated with risk/reward and likewise areas of the brain characteristically affected by drugs such as cocaine. There is, therefore, reasonably good evidence at the level of nerve cells and their connections to account for, or correlate with, those aspects of behaviour that have been systematically investigated (but not presumably **how** the neurons actually give rise to those traits). SJ pointed out, however, that neuroscientists are **very** prone to 'over-claiming' results ie overstating the conclusions to their research work. No-one has any idea how numbers are represented in the brain, nor, for example, how the brain handles the idea that there can be no limit to the size of prime numbers. An example of 'over-claiming' results is the way experiments carried out on 'religious' and 'non-religious' subjects have been

interpreted. A relatively recent study using brain imaging (PET scans) showed that particular areas of the cortex were activated when religious people read Psalm 23 but not when non-religious people read it. These results created huge interest but SJ suggested they could easily be reproduced by **any** enthusiast for a particular cause or religion, perhaps by a Communist reading from a Marxist document, and hence these areas of the brain almost certainly do not have any uniquely Christian correlation. Many such neuroscience studies are similarly poorly controlled. In similar vein, SJ referred to the Dostoevsky (autobiographical) novel 'The Idiot' where the saint-like central character, Prince Myshkin, is an epileptic and experiences the most incredible sensations as part of the 'aura' preceding his epileptic fits. Such experiences are very rare, but well documented, and sufferers like Dostoevsky can feel, in their ecstatic mood, that they understand everything and that they are in communication with God! These experiences have been compared to the feelings of the great mystics and certainly, the brain 'doing funny things' (SJ) can give rise to feelings rather like religious ecstasy which, however, remain to be explained.

SJ went on to discuss various 'button-pressing' experiments, very simple tasks designed by neuroscientists to elucidate how the brain makes decisions. In the very simplest variant a subject is invited to press a button repeatedly whenever he/she likes and this operation is monitored via conducting discs placed on top of the subject's scalp (above the supplementary motor cortex). This shows that up to about a second before one does something there is a slow build-up (over a period of about a second) in the so-called 'readiness potential' as measured on top of the head. When the study is monitored using brain-imaging techniques, the part of the brain correlated with hand movement 'lights up', as might be expected. In a more complicated variant where the subject is required to press the button with several fingers in some sort of sequence (as if 'playing a tune'), the supplementary motor cortex (SMC) is also activated – an area known to be correlated with more complex movements. When the subject was simply asked to **imagine** he was pressing the button in a similar sequence the same area of the SMC was again activated. This led the neurophysiologist Eccles – a classical 'dualist' – to believe that the SMC was where the 'mind' controls the brain. He thought that the reason we aren't able to physically observe this is something to do with 'quantum-mechanical uncertainty limitations' – SJ thought this was a 'rather extravagant view'. In Libet's variation of the same sort of experiment, the subjects have a 'clock' in front of them with a spot rotating around the 'clock' face and they are asked to report the moment when they **decide** to press the button. It turns out that this moment is quite late into the build-up of the 'readiness potential' leading some (non-dualist) neuroscientists to argue that it is the brain cells (neurons) per se that are actually making the decision **before** the subject is consciously aware of 'making' the decision (to press the button). That is to say that what we **feel** is a 'conscious decision' is just an epi-phenomenon (secondary effect) like the shaking of buildings after an earthquake. SJ felt that this was similarly a very unreliable, 'extravagant' interpretation' – do you **really** know when you make a decision?? It could, for example, mean that what the subject reports is simply the last moment at which the decision to press the button could be cancelled.

In the latter part of his talk, Dr Judge criticised the views of Professor Crick and others – which he termed 'reductive or negative materialism' – as being a philosophy to which they are committed without it being, in his view, entirely rational, and one that is ultimately self-defeating. One of his reasons for saying that was that it tends to fly in the face of, or negate, what SJ called 'first person experience', ie what we are **actually** thinking/feeling at the time we are engaged in some activity or other. If everything we do or think or feel is more or less just the (random?) machinations of the neural networks in our material brain, might that not mean, for example, that the whole scientific 'edifice', based on a great array of personal observations by individual scientists, is somehow unreliable. Machines do not make observations per se and one cannot create the intellectual structure of science without assuming that the human observers (scientists) are broadly-speaking reliable, that is that their experience as conscious agents is valid. One of SJ's neuroscience colleagues (a non-Christian) has written – 'Suppose we really could succeed in 'reducing' rational behaviour to molecular or cellular causation. In that case, we would no longer be able meaningfully to express the truth of what we had succeeded in doing. No such reduction is conceivable. We know what it is to be rational and what it is to lose that capacity. That knowledge has nothing to do with the question of whether there exist specific and causally sufficient neural states and interactions while I am writing this book, for example. Of course there are, but so what? If we could discover them (the neural interactions), they may well provide a complete mechanistic explanation for how my brain

operates while 'I' am thinking and writing. But they would not lead to the discovery of where 'I' am to be found. Nor do 'I' need to consult my brain states to know what I am doing and intend to do'. That does not mean, of course, that our perception is never mistaken, we can all make mistakes. We might, for example, see something 'out of the corner of our eye' that is red and mentally assume it to be a bus while in reality it is a balloon(!); but to argue that our whole 'first person experience' is invalid, or nothing but 'the chattering of neurons', would in SJ's view negate the basis of science. 'Science' is a 'story' told in terms of what human beings can understand, not in terms of what neurons can do anything with. As an analogy between the conflicting theories of dualism (separate, independent mind and body (including the brain)) and reductive materialism (just a physical, material brain) SJ showed a slide including a picture of a dog. A 'hard-nosed' reductionist might see the latter simply as a series of lines and curves and at one level it is nothing but that ('Nothing-buttery' as coined by MacKay), but a dualist might see it both as a dog **and** spots of colour in some sort of pattern. To say that a human being is nothing but the machinery in his/her brain misses the significance of all the activity of the neurons and what it accomplishes, **IF** we make the assumption that there is no other separate 'substance' such as the mind. Even if one thinks there isn't good evidence for '**substance'** dualism (two separate entities – mind and body) it is still quite coherent to deny the reductive materialism concept.

Summarisng, Dr Judge said that there is both Biblical and neuroscientific evidence which is consistent with humans being fully embodied in a physical body – he made no assertions as to what happens after death – and that it is quite possible to have a coherent and valid view that is neither reductively materialistic nor rigidly dualistic. This is often referred to **as Dual-aspect Monism,** that is two different views of the same entity (the brain) - a term he disliked, but relevant to his own personal beliefs. Some neuroscientists subscribe to 'interactive' dualism ie that there are gaps in the causal chain in the brain where mental processes influence brain activity, but most believe that it is likely that we will be able - at some point – to give accounts of neural processes that are sufficient to account for moderately complex human behaviour. Having said that, SJ did not think we needed to be 'distraught' that discoveries in neuroscience would undermine our Christian faith. He didn't think they would but they might teach us to be more cautious about the stated authenticity of some (religious?) experiences. He felt that the materialistic 'dogma' that people like Crick came up with was only loosely related to science and really pretty self-contradictory. Some philosophers adhere to it but not many and he recommended a very recent book 'Am I just my brain?' by a former neuroscientist colleague Sharon Dirckx who is now a Christian evangelist.

There were a number of very interesting questions and comments from members of the audience to which Dr Judge responded:

- why don't philosophers and neuroscientists talk to each other (more)? SJ said some do, but there was a curious tendency amongst some Christian American philosophers to insist on 'substance dualism' (discrete mind and body), to be anti-evolution and sceptical re modern scientific discoveries.

- as part of neuroscience research are there attempts being made to help those people whose mental processes are not operating as they should? Yes, some work is being done on people with, for example, damage caused by spinal injuries but rather more on nervous system diseases such as MS, Parkinson's and schizophrenia - with some progress on the first two.

- has any research been done on 'Locked-in Syndrome' (LiS)? The case of an elderly lady with this condition (as a result of a stroke) was cited. Her behaviour was unpredictable, generally uncommunicative but on occasion extraordinarily lucid. SJ said he was not an expert in this area but agreed that people with apparently very little brain activity could nevertheless be 'there'. There was a lot of interest in 'LiS' but it was tricky area of research and clinical care.

- would SJ like to comment on the recent discussions of near-death experiences (NDES)? Dr Judge said in no way did he wish to discount the experiences people describe when they are somehow revived, for example, following a severe heart attack. Patients as they recover often recall very vivid and striking experiences which are very real to them and sometimes with a spiritual dimension. He was, however,

doubtful about the **interpretations** that have been made regarding these experiences, for example, that patients feel that they are floating 'out of their bodies' and in some cases that they are entering heaven. There is good evidence that these NDES are more likely a physiological effect due to lack of blood flow (oxygen) to the brain, particularly to the parts known to be associated with movement of the body. Experimental stimulation of these areas can produce a similar sensation of 'floating'. SJ was also concerned that the accounts of NDES were often very similar, often rather banal and very little like the Biblical stories of encounters with the Almighty such as experienced by Isaiah in the temple and by Moses near the 'burning' bush or, indeed, the experience of the disciples at the Transfiguration. In these instances there was always a strong element of 'awe'. He would not, however, dismiss the reported interpretations of NDES out of hand.

- could SJ say more re the relationship between the 'mind' and the brain? Could we hypothesise that the mind (residing in the supplementary motor cortex?) selects from the brain modules, reads and integrates them, and then modifies the brain circuits – rather like the conductor of an orchestra? SJ respected people who take this view but he didn't believe there were compelling reasons to believe it. What he felt was true were our 'first person experiences' of thinking, talking and listening. There is at least a duality of evidence about 'who we are'. SJ added that although we may think our personal experiences/sensations (eg of pain) are private, this cannot be the case.

- in comparing religious ecstasy to the 'aura' that precedes some epileptic fits are you saying that religious ecstasy can be a self-induced experience? SJ replied he was not making any definitive argument on the subject simply to say that Dostoevsky's description was the best known example.

Richard Heddle gave an excellent vote of thanks in which he referred to the extraordinary complexity of the human brain and hence how profound the personality changes can be where there is accidental damage or incomplete development. He thanked Dr Judge for bringing his Christian faith to bear in the field of neuroscience and for expressing his view that we are **not** 'just a pack of neurons' - firing like transistors. The next meeting of the Surrey Heath CIS Group will be at St Paul's Church, Camberley either on the 29th October or the 5th November, 2019. The speaker's subject will be '**Climate Change'** – perhaps the greatest science issue the world is facing. The date will be confirmed on the website, through the email mailing list and elsewhere.

John Wood