

HUMANS VS CHIMPS: SMALL STEPS FOR DNA, GIANT LEAPS FOR US

By David Elder

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It is a provocative observation that the DNA of a chimpanzee is some 98-99% the same as that of a human being. This is the degree of similarity in the sequences written out in the code of the four nucleotide bases A, G, C and T, the level of 'homology' in the strings of billions of these bases forming the hereditary instructions to make an ape or ourselves. But this poses a puzzle. If chimp DNA is so similar to ours, why don't chimps almost totally resemble us? Some like Peter Singer of animal liberation fame would have us believe that chimps are, in fact, closer to us than we thought, since chimps can supposedly learn to use sign language as we do. But primatologists and linguists don't take this seriously; chimp sign language lacks the complex grammar of human communication. Likewise, chimps can use primitive tools, like stones for splitting nuts; but their capacity to do so is much less than ours. Chimps are marvellous animals, but they are nowhere near as clever as humans. Chimps don't even worry about these questions, or debate whether they should or should not be going to church on Sunday. So, how can the two DNAs be so similar, yet the two creatures be so different in such important ways?

One can look at this from two angles. Firstly, the theologian could argue that there is a spiritual aspect to humanity, which is unique to us, or uniquely developed in us. Certainly if our minds are only bigger and better monkey brains - and nothing more - how can we really trust those minds? And what becomes of ethics, free will and moral responsibility, if our minds are really only complicated chemical machinery, and nothing more? Whatever we think or do, our molecules make us do it, and that is that; ethical judgements are ultimately no more possible than for an animal or even a computer. Even though most people acknowledge some sort of divine spark in us, we cannot really say exactly how it relates to our biology, and even less so in animals. We acknowledge that spark in us somehow, otherwise our ethical judgements make little sense in anybody's language.

It is not only the theologian who has something to say about this matter - the biologist also has something to contribute. For although our DNA may be only a little different to a chimp's, this can be seriously misleading. In a complex system like a living creature, *small changes can have large effects*. Consider your desktop computer and word-processor. Suppose you hit a wrong key. The results may merely be a small misspelling

of a single word, and the piece you are writing will not be seriously affected overall. But if you accidentally hit higher command keys, like "Select All", one or a few changes can alter, scramble or even wipe out your whole piece. Or think of the generals of an army, or the politicians of our society, or the higher clergy of the churches. Change the mind of only one or a few of them, and big changes can follow, for these key figures can then drive changes in many things and people under them.

Living creatures are also like this. Not all genes are equal. Some master genes, 'regulator genes', control the activities of many other genes under them. For example, they can do so by coding for proteins which bind to specific sequences in the DNA of many target genes, and thereby switch on the expression of those target genes. We have long known about such master regulator genes. Consider that fast-breeding favourite of geneticists, *Drosophila* the 'fruit fly' (not the harmful sort). Mutations in only one or a few regulator genes can produce a fly with startling changes to the body plan. For example, these control-gene mutations can lead to extra wings on body segments which usually lack them - even wings on the fly's head. Hundreds or thousands of genes are needed to make a wing; but the control gene can turn them all on, and a mutation altering the action of the control gene can thus produce these spectacular transformations. Such creatures may sound like mere laboratory freaks, of no relevance to life out in nature. But some insect species do have wing like structures on the heads of the males, which are used to signal to females in courtship. So changes restricted to a small number of master control genes can produce big differences in an organism, and sometimes these differences can be useful.

One may strongly suspect that this is important for our chimp/human DNA story. When humans appeared, a few master genes probably changed, and big differences resulted, such as new or much-improved brain areas for specifically human traits. For example, humans alone have that part of the brain, Broca's area, usually located in the left frontal lobe which is needed for complex grammar in communication. Damage to this area severely affects this ability in a quite specific way even though the patient is otherwise normal (even singing is intact). There are other such specialised higher brain areas in humans which are especially represented in our highly developed frontal lobes. Their roles include specifically human traits like long term goal setting and emotional self-control, which can be profoundly affected by injury to these frontal regions. In apes such areas are either absent or rudimentary. And in all likelihood, relatively few changes to our DNA, in a handful of high-level control genes, would be needed to produce such new brain areas. Small steps for our DNA, giant leaps for our brains.

The same is most likely true for many other human-chimp differences, like our upright gait, hairlessness, and human skull shape with more space for a big brain, especially those frontal lobes. These differences largely reflect the retention throughout human development of the characteristics and proportions of the young chimp. Whereas the chimp matures and loses these more human-like characteristics and proportions, becoming more typically chimp-like, humans do not. This is called 'neoteny'. So again, probably only a few mutations, altering the expression of some regulator genes, are needed to bring about such changes.

What would all this mean for bioethics? Firstly, we should be particularly strong about rejecting any experiments which could place such human master control genes into animals like chimps, either by accident or design. The results could be major, unpredictable and unpleasant. For example, one could end up with a creature that had capacities comparable to those of a retarded human child. What would 'its' rights be? One would wish and hope that such questions would never need to be answered. But in view of the antics of cloners like Antinori - who is not only shocking the scientific community by proposing to use in humans a cloning technique known to produce errors galore in animals, but also seems to view himself as another Galileo for doing so – one must not underestimate the capacity of humanity's lunatic fringe for monkey business.

Secondly, the close human-chimp DNA homology can be invoked by radical bioethicists like Peter Singer. In his view, humans are only the latest thing in apes, and nothing more. We have seen that this is biologically simplistic, and also that it is philosophically disastrous. A humanity which is only a molecular machine would have no real basis for ethics or reason. This sort of reading of evolution is reductionist and limited, but need not be. I do not mind evolution, so long as people don't go 'bananas' over it. The havoc wrought by Social Darwinism warns us of the dangers of applying evolution in the broadest possible way.

Peter Singer is happy to credit the chimps (bless them) with a human-like level of communication skill, which they simply do not possess, and yet at the same time defends infanticide in his own human species. In this case, by collapsing the distinctions between chimps and humans, chimps acquire higher moral status and therefore greater protection at the same time as humans lose their moral status and protection, thereby entirely changing the moral landscape.