results into their structure. Artilects have no obvious limit as to the number of components they may choose to integrate into themselves. To them, our trillion neurons may seem puny.

Not only may artilects be superior to humans in quantitative terms, they may be greatly our superiors in qualitative terms as well. They may discover whole new principles of "intelligence theory" which they may use in restructuring themselves. This continuous updating may grow exponentially — the smarter the machine, the better and faster the redesigning phase, so that a take-off point may be reached, beyond which, we human beings will appear to artilects as mice do to us.

This notion of Darwinian experimentation is important in this discussion, because it runs counter to the opinions of many people who believe (rather naively, in my view) that it will be possible to construct artilects which will obey human commands with docility. Such machines are not artilects according to my conception of the word.

I accept that machines will be built which will show some obvious signs of real intelligence and yet remain totally obedient. However, this is not the issue being discussed in this paper. What worries me is the type of machine which is so smart that it is capable of modifying itself, of searching out new structures and behaviours, that is, the "Darwinian Artilect".

Since any machine, no matter how intelligent, is subject to the same physical laws as is any other material object in the universe, there will be upper limits to the level of self-control of its intellectual functions. At some level in its architectural design, there will be "givens", that is, top level structures determining the artilect's functioning, which are not "judged" by any higher level structures. If the artilect is to modify these top level structures, how can it judge the quality of the change? What is meant by quality in such a context?

This problem is universal for biological systems. Quality, in a biological context, is defined as increased survivability. Structural innovations such as reproduction, mutation, sex, death, etc., are all "measured" according to the survivability criterion. It is just possible that there may be no other alternative for the artilect, than taking the same route. Survivability however, only has meaning in a context in which the concept of death has meaning. But would not an artilect be essentially immortal, as are cancer cells, and would a fully autonomous artilect, resulting from an artilectual reproductive process, but with modified structures, accept being "termina-