

CHAPTER 14

The nature of reality

*The way that can be spoken is not the constant way.
[Lao Tzu 451-479 BC, Tao Te Ching]*

Introduction.

The motivating theme of this book has been the hypothesis that:

- The laws of the universe are such that, wherever there is mass and energy available, there will be a tendency for self-replicating information processing systems (organisms) to emerge.

Once this has happened there will inevitably be competition and evolution of information processing systems. First, we seek to describe the basic mechanisms of evolution. Second, we try to understand neural information processing and how such systems can be genetically encoded. Third, we can put the two together and construct models of evolving information processing systems. Finally, we can use these models to understand the world around us. This seems an ambitious but not unreasonable aspiration. If it implicitly involves the assumption that there is nothing unique to human beings in this respect, then so be it. A book like this inevitably raises many questions outside the merely academic study of the models and this chapter reflects my personal meditations on such issues.

It has been forcefully argued by many writers (see for example [Penrose 1989] and also the whole Searle debate about the Chinese Room) that the essence of consciousness can never be captured by a mere machine, by which is meant a finite state machine. The proponents of this view may possibly be right in the practical sense, that we shall never be able to build such a machine. On the other hand, my feeling is that this is a very unscientific line of argument, by which I mean that if we accept it, and consequently put aside the quest to understand the basis of intelligence and consciousness, then we shall never progress. The idea that it is necessary to appeal to quantum theory and the uncertainty principle to explain biological information processing seems to me rather bizarre - it could be true, but why not explore simpler alternatives first?

Most readers will accept that the world view (perception of 'reality') of an ant¹ is more limited than our own. Why? Surely because the ant has rather less equipment with which to perceive and interpret the world. According to this view an organism's consciousness and intelligence is a function of its computational ability. If this is true then there is no magic threshold between not-conscious and conscious, rather a continuous graduation between a limited world perception to a less limited one. If what we perceive is limited by our computational capability then, since these resources are finite, any certain knowledge of the external world becomes suspect and tentative. All living things would then suffer this limitation to one degree or another.

Philosophy has had no difficulty in recognising these limitations. In Plato's *Dialogues* [Plato 1987, page 747: Republic VII. Book VII] we are asked to

Picture men dwelling in a sort of subterranean cavern with a long entrance open to the light on its entire width...

¹ We leave aside the argument that the relevant entity here might arguably be the whole ant-nest!

Plato goes on to address the basic epistemological issue

For, to begin with, tell me do you think that these men would have seen anything of themselves or of one another except the shadows cast from the fire on the wall of the cave that fronted them?

He says

Then in every way such prisoners would deem reality to be nothing else than the shadows of the artificial objects.

explicitly asking us to draw an analogy between ourselves and the prisoners in the cave. More recently in *Tractatus* [Wittgenstein 1921] investigates the properties of a perfect language (in 1-1 correspondence with the world of facts and their implications) and comes to the Godelesque conclusion that since a perfect language should be able to describe its own limitations it cannot exist.

The simplest alternative to mysticism in discussing consciousness, is that the essence of consciousness is computation. If this is the case then surely the hardware which performs the computation is largely irrelevant to the principles of the process itself. This does not mean that an artificial consciousness would necessarily see the world as we do. Indeed this would seem quite unlikely. Humans are mammals and mature through a process of socialisation. The child is taken by the hand and experiences the world described, in a moderately consistent fashion, by adults. Eventually the child acquires a similar model of reality and thus gains membership of a cultural linguistic group, see for example [Berger 1967]. Thus for a particular organism the nature of consciousness and intelligence are doubtless a function of genetically gifted computational capability and experience. Although machines constructed along such lines will perhaps eventually exhibit intelligence they will be *truly alien*, but that does not necessarily mean that they will not be conscious.²

The study of how we come to interpret our sense data, the perception of reality, has been the central intellectual pursuit of my life and one of endless fascination. How do we know anything? In the final analysis there is only the phenomenology of our sense data.³ Following Descartes and Bomb #20 we assert our existence on the basis that we think, but how do we know anything else exists? Prompted by the necessities of survival we seek to build consistently useful predictive models based on sensory input. Failure for any individual means relegation from the game of life. Godel's theorem, the computational limitations of Turing machines, and NP hardness mean, on the one hand that logical competeness and decidability are out of our grasp *in principle*, and on the other that even what we can in principle be certain about we often can't in practice decide, because we can't complete the necessary computations within a time scale that will be useful.

In the normal course of events sense data (interpreted 'correctly') tends to paint a remarkably consistent picture of 'objective reality' at the physical level. But how we *interpret* the sense data - that's another question, because what we directly experience is mediated through our belief system, see for example [Whorf 1956].

Our belief systems tend to assert the reality of immaterial qualities outside the realm of mere physics. For example, qualities such as 'good' and 'evil'. Even if our judgements of such qualities derive from acculturation nevertheless it would be rash to act as if such things did not exist. This is a reality played out beyond physics, in the realm of abstractions.

We can give an illuminating example from Kracauer's work on the theory of film [Kracauer 1947], [Kracauer 1960]. In the classic story of the *Cabinet of Dr. Caligari* we start off by assuming (quite naturally) that the patient is insane and the psychiatrist is sane. By the end of the film we realise that it is the other way around. Kracauer asserts that one can learn a great deal about a society by studying the films it makes, just as for earlier periods we study the literature a society generates. In the Germany of the 1930's it was unacceptable to have an authority figure who

² History is littered with examples of ethnocentrism in science. In this context I cannot resist quoting the fictional drone Skaffen-Amtiskaw: "They also refuse to acknowledge machine sentience fully; they exploit proto-conscious computers and claim only human subjective experience has any intrinsic value; carbon fascists." [Banks 1992] p 101.

³ I am reminded of the discourse between Doolittle and the intelligent planet buster Bomb #20, in which Doolittle tries to explain to the bomb why it is a bad idea to explode. The bomb has by this time twice received the order to explode and twice had it cancelled. It is getting rather irritated! [Carpenter 1974].

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turns out in the end to be insane. The story was adjusted by the addition of a scene at the beginning and another at the end, the effect of which was to invert the meaning of the story - the scenes made it clear that the patient really was insane and the doctor a benevolent figure who had the patient's best interests at heart! We can think of these extra scenes as a *reality frame*: inserting the story in such a frame inverts the meaning, or alters it in some significant way. A technique found often in literature and humour.

If our interpretation of any sequence of events can be modified in this way, by the addition of further information, then how are we to know that any interpretation is correct? We live in a world of uncertainty, despite the apparent certainties of physics at the macrolevel. The models that we build of 'what is going on out there' are, of necessity, only valuable in a predictive sense as long as they work. We build meta-rules, rules about classes of models, of behaviour on the basis of abstractions. These rules are derived to a large extent from a socially accepted consensus regarding the nature of, for example, good and evil. But these ethical concepts are also, at the social level, governed by their own laws of survival of the fittest. Thus there are stages upon which ideas themselves form an evolving and competing population.

The first line of the Tao finds finds echos in the final words of Wittgenstein's Tractatus

Wovon man nicht sprechen kann, darüber muß man schweigen. (Whereof we cannot speak we must remain silent.) [Wittgenstein 1921]

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有名萬物之母故常無欲以觀其妙

常有欲以觀其徼此兩者同出而異名

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*The Way that can be spoken
Is not the constant Way...
The name that can be named
Is not the constant name
The nameless is the beginning of heaven and earth
The named is the mother of the myriad creatures
Ever desireless, one can see the mystery
Ever desiring, one can see the manifestations
These two flow from the same well
But differ in name as they spring forth
Being the same they are called mysteries
Mysteries upon mysteries
The gateway of the manifold secrets*