



Exploring psychology

Creative thinking

Narrator

There's a traditional view that science might involve what we might call convergent thinking, thinking which proceeds logically step by step while artistic creativity involved divergent thinking, thinking which proceeds by leaps and bounds and intuition, but actually there are common elements to both these types of activity.

Woman

Both science and more artistic forms of creativity involve conjuring with the hypothetical, with things which might be the case and they both phases of intuitive thinking, leaps in the dark.

Narrator

Just such a mix of hypothesising and intuition helped to elucidate the double helix structure of DNA. Two spirals, each carrying it's sequence of chemical components called A, T, G and C, intricately interwoven to develop the building bricks of life. The shape is quite famous now but it eluded scientists for ages until in the nineteen fifties research by Jim Watson, Francis Crick and the late Rosalind Franklin finally led to the revolutionary discovery of the structure. Crick and Watson looked back some time later on the leap of imagination involved.

Jim Watson

And suddenly I could put together A and T and G and C. I could hardly believe it and Francis came in almost immediately and saw this and he, you remember...

Francis Crick

Something came out of the model building that Jim had done which he hadn't put in and that's always the sign that you feel you're on the right lines. When something begins to click which you hadn't actually put in in your thinking of this, I mean, but you knew was there.

Narrator

If imagination helps to conjure exciting new insights from the processes of scientific investigation and enquiry, can scientific methods in turn help to elucidate the origins and psychological basis of human imagination?

Narrator

To consider how and why imagination might have come about it's useful to start with the ancestors of present day humans. Archaeologists and paleo-anthropologists derive theories about early cognitive capacities by linking biological remains, particularly skulls and skeletons with other evidence of life style and habits. Simple stone artefacts probably emerged some two and half million years ago. The hominid beings of this era lived in social groups and shared food. They made tools by roughly chipping one stone with another and then used them to cut off flesh from animals. Whether they scavenged these animals or actually hunted for them is not really known. By half a million years ago tools had become somewhat more sophisticated. They were designed to a consistent model, symmetrical and shaped to facilitate cutting and chopping. Now what sort of mind was required to make a tool of this kind? Was anything resembling imagination involved? Archaeologist Chris Chippindale.

Chris Chippindale

This is a lower Palaeolithic artefact and it shows the habit, the attitudes of mind of human beings making these things really for the best part of a million years. It has a distinct shape that the person making it was aiming for, but the important point is that when you make a flint like this you do it just one step at a time. What you do is you knock off one piece, knock off

another piece, and then each time you knock off a piece you can kind of look and see where you are and think the next step.

Narrator

The toolmaker must have had some concept of the end product in his mind's eye and in this sense demonstrated a basic pre-requisite for imaginative thought, but the process only reflected limited capacity to plan actions towards a goal. From a quarter of a million years ago there was a further striking development in tool technology suggesting greater cognitive capacity for abstraction and planning. Significantly this coincided with the emergence of species closer to modern Homo sapiens who had markedly bigger brains than their predecessors.

Chris Chippindale

This is a middle Palaeolithic flint tool and what it shows is the care that was taken to plan. Somebody had in mind what they were making and then they made it systematically. And what they did was to do a whole series of blows all the way round and then a final big blow at the end and off comes this flake which is what they're making. In other words you have to imagine in your mind before you start what the end result is in order that the last mechanical action of the twenty or thirty or forty blows you make gives exactly what you intended to make from the beginning.

Narrator

The ability to envisage a future outcome and the steps necessary to reach it suggest further evolution of the basic prerequisites for human imagination. In its fullest sense imagination involves fluidity, an inventiveness of mind, the capacity to see one thing as something else and to symbolise things in this way. Evolution anthropologist Rob Foley.

Rob Foley

And of course the glory of it are things like this which is one of these so-called Venus figurines, where you have a female form, presumably very symbolically expressed. The face is missing. The hair is very elaborated, the shape, the body proportions are indications of high fertility perhaps and so what's interesting is we've got on the one hand an anatomical change some hundred and fifty thousand years ago, people spread out over the world. They must have had the same biological characteristics as ourselves, but it's only rather later in particular places you get the expression of that.

Narrator

So it seems that the basic cognitive capacities necessary for imagination evolved well before the period starting perhaps fifty thousand years ago when they were channelled into creative outputs. Creative artefacts may well have been produced earlier but from materials such as wood which have perished. What's clear is that fifty thousand years ago key elements of modern imagination were being extensively deployed and not least the crowning glory of this mental apparatus, the capacity to conjure with the hypothetical; to imagine things which might happen or might never happen; to enter the world of fantasy or myth.

Rob Foley

Of course from the point of view of the biological evolution it's not that our brains evolved for us to be able to invent a Venus figurine, but that our brains having evolved could be turned through imagination to say if I make objects which mark out my group, my status, then I can turn it to some sort of ecological advantage or to some sort of social advantage or to some reproductive advantage.