Towards a truly clever Artificial Intelligence

February 4 2005

A pioneering new way of creating computer programs could be used in the future to design and build robots with minds that function like that of a human being, according to a leading researcher at The University of Reading. Dr James Anderson, of the University's Department of Computer Science, has developed for the first time the 'perspective simplex', or Perspex, which is a way of writing a computer program as a geometrical structure, rather than as a series of instructions.

Not only does the invention of the Perspex make it theoretically possible for us to develop robots with minds that learn and develop, it also provides us with clues to answer the philosophical conundrum of how minds relate to bodies in living beings.

A conventional computer program comprises of a list of instructions, and if one of those instructions goes missing or is damaged then the whole program crashes. However, with the Perspex, the program works rather like a neural network and is able to bridge gaps and continue running and developing even when it sustains considerable damage.

"All computer programs can be written in terms of the Perspex. Essentially, it is a new, geometrical computer instruction that looks like an artificial neuron. Any existing computer program can be compiled into a network of these neurons".

The Perspex links the geometry of the physical world with the structure of computations so, to the extent that mind is computable, the Perspex provides one solution to the centuries-old problem of how mind arises in

physical bodies.

"Perspexes exist in a mathematical space called 'perspex space'. Perspex space can describe the ordinary space we live in, along with all of the physical bodies that make up our space, and all of the minds that arise from physical bodies. It provides a model that is accurate enough for a robot to use to describe its own mind and body".

Perspex programs show the very human trait of periodic recovery and relapse when they are damaged; perhaps for the same reason. The Perspex tells us how mind can relate to body so the geometrical properties that govern a Perspex program's injury and recovery also apply to us because our bodies exist in space. We share a common geometry, and this has implications for our minds and bodies. For the first time, the Perspex makes computer programs prone to injury, illness, and recovery like a human being. And a computer program that continues developing despite damaged, erroneous, and lost data means that, in the future, we could have computers that are able to develop their own minds despite, or because of, the rigours of living in the world.

"The Perspex allows global reasoning to be attained with just one initial instruction. So a Perspex program can operate on the whole of a problem before it attends to the myriad of detail. This is very much like human strategic thinking. It arises from the geometry of the Perspex, not from the specific detail of the program that is being run. This tells us that strategic thinking can be a property of the way our brains are constructed and is not necessarily to do with the substance of what we happen to be thinking about. It might be that some people are better at strategic thinking than others because of the geometry of their brains."