

# The butterfly challenge

Will computers outstrip human intelligence any time soon? Not a chance, I'd venture to say, because you just can't reduce everything to numbers.

If my view seems naïve and sentimental, I invite you to take a cold hard look at the butterflies that are making their way towards Presqu'île.

Right now hundreds of thousands of monarchs are migrating from their wintering site in northern Mexico, spreading out across the continent. Meanwhile, a few hundred computer scientists are going back to the drawing boards, after their dismal failure in the recent "Grand Challenge" of robotics in the California desert.

The Grand Challenge was sponsored by a research branch of the US military. Hoping to spur a great leap forward in robotics, the agency set up a \$1 million prize, to be awarded to the team whose robotic vehicle could most quickly traverse a course of up to 400 kilometres.

The Red Team from Carnegie Mellon University was heavily favoured. Their craft was a custom Hummer, outfitted with \$3 million worth of optics, radar, Global Positioning System receivers, and state of the art computer processors.

On race day, the exact course was announced. The teams had two hours to feed race co-ordinates into their robots' computers and make final checks, before starting the engines. The robots were then supposed to find their own way, around or over obstacles, without any further guidance from their makers.

Sensing, perhaps, that the original goal had been a bit grandiose, the organizers had reduced the course to just over 200 km. Their misgivings proved prescient, as all the teams came up a little bit short.

How short? Well, the famed Red Team tied with one other for the most distance: they managed all of 11 kilometres.

Within a couple of years, the Grand Challenge will be repeated. I don't doubt that

someday, perhaps soon, a team of engineering wizards will succeed, and their robot will manage a self-guided trip of a couple of hundred kilometres. In the process, they'll advance the science of robotics by leaps and bounds. (They'll also show that if you throw enough money and computing power at the problem, you can actually put some kind of a brain behind the wheel of a Hummer – but I digress.)

But whether success in the Grand Challenge comes in two years or twenty, the feats of the boys and their toys will be as child's play, compared to the journey of the monarch butterfly.

Right now, monarchs are winging their way northward. They travel a while, lay eggs, the eggs hatch, and after a metamorphosis another generation of butterflies fly north some more. When they reach Presqu'île, the monarchs continue to breed and live out their brief life cycles.

But in August, the cycle changes. The final generation of the season is born, and their reproductive maturity is mysteriously delayed. Before reproducing again, each member of this generation sets out to complete the entire 3400 kilometre trip back to Mexico – a trip last made, roughly speaking, by their great-grandparents.

If we try to think of this navigational feat in computing terms, then the monarch's tiny brain, which develops entirely unaided from an embryo, must contain a highly sophisticated program. This program must be able to guide a fragile flying machine of a gram or two, over a completely unknown course of 3400 kilometres, coping with unpredictable changes of weather, temperature and precipitation.

The embryo of a butterfly, therefore, contains seeds of intelligence vastly more sophisticated than anything the brightest computer scientists have concocted.

To me, that's pretty good evidence that the brilliance of a living creature is more than a clever sequence of ones and zeros.

