In one of the most fascinating papers in the proceedings Linden and Altschuler described their work on the use of genetic algorithms in designing wire antennas. They pointed out that current methods of designing was a very laborious process that required engineers to have a very good knowledge of the universe of conventional antenna designs. Instead GAs did not require an initial reasonable design and the engineer was required to supply only a small amount of information. The designs produced by their GA had excellent gain characteristics with bizzare shapes that would not have looked out of place in a gallery of modern art. Interestingly in different runs the GA would produce designs with similarly good characteristics but very different shapes.

I was also impressed by the paper of Nicholas Macias on the design of a massively parallel fine grained self-reconfigurable infinitely scalable architecture (PIG). The PIG is a non von Neumann computing machine with no designed memory, no instructions and registers. It is a pure dataflow machine. Every evolvable hardware research group should have one (they are very affectionate!).

I welcomed the friendly argument of Marek Perkowski et al. who thought that "black box evolution" was not going to be as effective as symbolic learning. They claimed not to be able to find a single example where a GA based algorithm was superior to a hand-crafted algorithm for the design of a binary logic network. Although I personally dispute this it is important that evolutioneers engage in debate with those from the more established design and artificial intelligence communities.

I found George Milne's paper on his attempts to develop a formal language for modeling the concurrent and self-reconfigurable systems thought provoking. I was also intrigued by the paper by Mjolsness et al. who described a computational model of a key aspect of morphogenesis in plants, the shoot apical meristem. The essential aim was to learn from and reproduce (robotically) methods of engineering in biological systems.

Klimek et al. described some very interesting work on using a genetic algorithm in association with quantum device design and analysis tool (called NEMO) to design quantum resonant tunneling devices. Simulation is the only way a large number of different designs can be evaluated. There is probably a lot of scope for interesting research by using GAs together with sophisticated simulators in many fields of study (engineering, chemistry, physics, etc.).

Masner et al. presented some work on evolving sorting networks both in simulation and using reconfigurable hardware. They examined three different chromosome representations. They defined an interesting metric for gate-level resilience to faults: bitwise stability. It appeared that evolution inherently improves this and that tree structured chromosomes had more bitwise stability than linear chromosomes.

The workshop closed with a lively panel session panel session. Adrian Thompson stressed the need for fully open architecture reconfigurable chips with fast and partial reconfiguration. Steve Trimburger of Xilinx suggested that researchers would be very happy with the new Virtex chip. Leo Alkali urged people not to be too obsessed with current technologies and instead to look at bio-inspired devices