

**From "Brother Machinemen", Der Spiegel, 38/2001
(translated from the original German):**

"Intelligent behavior does not have anything to do with pure symbol processing", says Rolf Pfeifer, director of the Artificial Intelligence Laboratory at the University of Zurich. Intelligence developed in nature because organisms, over the course of evolution, had to develop behaviours with which to protect themselves, and thus to survive. The bodies and brains of organisms developed together. Therefore Pfeifer doubts, along with many of his colleagues, whether it makes sense to build robots based on humans. Nobody knows which type of body a machine needs to act intelligently. There is only one way to find out: machines must pass through their own evolution. Such a process shows what kind of body is needed. Pfeifer's researchers therefore develop artificial worlds within which to test out such ideas. For example, two of them have built a simple, artificial world in the computer, in which the laws of physics from the real world prevail. As an example, they then built a model of a two-legged runner in the world, and submitted it to simulated evolution: after many races a new generation of runners appear, and the best of these runners survive to the next generation. Researchers can then watch, for example, how new weight distributions appear in the faster runners. Or they let simulated insect eyes grow and observe how the facets arrange themselves. Or they breed bull-like creatures that can move heavy blocks.