Watching Robot Evolution
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The theme of the Ars Electronica Festival 96, "Memesis — the Future of Evolution", allows for Robotics with casual reference to "robotic prosthetics" and "cyborg theory." But, that acknowledgement may be grudging and not prepared to accept pure robot evolution. Natural selection may find for an utterly non-mammalian creature.

Right now robots are no more than mechatronic manifestations of human technical ingenuity. Their evolution is, however, proceeding at flank speed. At some early juncture we humans will probably be marveling at robot evolution that had somehow become self-sustaining. Whether the marveling is accompanied by delight or dismay remains to be seen. Whatever, there will be no "meat machine" handicaps to impede robot evolution.

Robots have a long history in human imagination, from mythology to science fiction. Prior to World War II the building of automatons that danced, played instruments or wrote in painstaking longhand required clever use of springs, cams, levers, wheels, gears and music box programming. As late as the 1939 World's Fair in New York, Electro and his dog, Sparky, were also so mechanized and they still became popular attractions in the Westinghouse Pavilion.

Servo mechanisms were born during the War and shortly thereafter came digital logic and solid state electronics. The fundamental tools were then available to permit development of an industrial robot. The first practical one, the Unimate, went to work in a General Motors plant in 1961. By 1995, the world's population of industrial robots exceeded 500,000 and roboticists commanded a rich toolchest of technology to make possible robots for service applications that could be mobile, multi-armed, sensate, articulate and modestly aware [see Toolchest figure].

Talk about accelerated evolution! An early high point was owed to Pygmalion and his magnificent Galatea of Greek mythology. Then retrogression until the Strasbourg Cock of 1574 crowed and flapped its wings to announce midday. Next a plateau for over 300 years until Electro and Sparky bumbled around. Then, suddenly, the first industrial robot arrived, only 30 years later. By the turn of the century, personal robot companions to care for elderly and infirm folks will become cherished servants! Who can confidently predict that ongoing robot evolution will remain always beholden to human intervention?

If the sensory perception complement in the Toolchest can provide evidence regarding a robot's physical attributes and its physical environment and if roboticists continue to strive for goal-oriented robot performance, how long will it be before robots will formulate goals of their own? Such goals may or may not conflict with goals that mankind sets in its own shaky wisdom.

A flourishing robot population could very well be mankind's savior, even though many of us will resent this new creature that will become smarter, stronger, more adaptable after a few centuries of evolution than did Homo Sapiens in a few million years of his.

Just possibly flesh and blood are not the optimum ongoing media for existence of intelligent life. While SETI, Search for Extraterrestrial Intelligence, is hoping to sense signs of life elsewhere in the galaxy, it may be that the place to watch is on earth. Robots can be far better

adapted to colonize our solar system and beyond than can humans. So, we could send intelligence forth rather than probe the universe for other centers.

Of course sending robots forth is far superior to sending frail humans out into space. Our astronauts spend the bulk of their time taking care of their pitifully inappropriate bodies. Robots can be designed to revel in space. Silicon, titanium, ceramics and software are the stuff of life on Mars. Human astronauts ought soon to become an anachronism.

Okay, so maybe robots could be superior space travelers, but could they really hold their own here on earth? Well now, what are some of the roles we already foist on robots? How about underwater maintenance, nuclear power plant service, noxious landfill cleanup, bomb disposal. Robots can handle it. Humans get credit for making the messes.

Yeah, but what about ordinary daily life — are not humans best equipped by evolution? By evolution, yes, by our own hands, no. We overpopulate, pollute, harass the environment in a fashion that may make robotics the life form of terrestrial choice. Before that happens, our goal-oriented robots may reason that prevention is preferable to cure and firmly admonish, then chasten us to mend our ways. In extremis one can imagine the most advanced life form taking upon itself the preservation of the human species — a sentimental gesture in fondness for the progenitors who invented robotics and then obsoleted themselves.

Obsolete in evolutionary terms, but certainly not then extinct. Humans, as other life forms have done, may prosper for millennia. It is just that evolution will have passed us by the same way as it did with some humanids. Now, however, evolution would no longer depend upon random mutation but would be force fed. Our animal husbandry activities would pale before robot husbandry.

Just consider, we take years to download operational knowledge into a newborn member of the human race. Every new built robot [production cycle three months, not nine months!] will arrive full size, will have its knowledge base downloaded in milliseconds, its instincts honed, its musculature fully developed and its motor skills optimized. It will have a statistical life span [great for space travel!] and enjoy continual hardware and software upgrades.

If meanwhile, as Memesis suggests, "post biological protozoa, like Internet, Cyberspace and I-way" evolve, robots will constitutionally be best equipped to benefit.