

**AI NN**  
**ASSIGNMENT – 3**

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The paradox by Moravec is that artificial intelligence and robotics researchers observe that thinking and computing takes relatively little calculation, yet the sensorimotor talents require huge computer resources. Hans Moravec, Rodney Brooks, Marvin Minsky and others stated the idea in the 1980s. Moravec noted in 1988 that "It is comparatively easy to make computers exhibit adult level performance on intelligence tests or playing checkers, and difficult or impossible to give them the skills of a one-year-old when it comes to perception and mobility." Minsky also stressed that the abilities that humans perform subconsciously are the hardest to reverse engineer. "In general, we're least aware of what our minds do best", he wrote, and added "we're more aware of simple processes that don't work well than of complex ones that work flawlessly".

Moravec proposes evolution as one possible solution for the paradox. All human abilities are executed organically, with natural selection-designed equipment. Natural selection has tended to maintain design enhancements and optimizations over the course of their evolution. Natural selection has had more time to enhance the design of an older talent. Because abstract cognition is a relatively new concept, we should not expect it to be very efficient in its implementation. Moravec also argues that:

- The complexity of reverse-engineering any human talent should be approximately proportionate to the length of time the skill has evolved in animals.
- Because the oldest human talents are mostly unconscious, they appear to be simple.
- As a result, we should expect abilities that appear to be simple to reverse-engineer to be difficult to reverse-engineer, whereas skills that take effort may not be difficult to reverse-engineer at all.

Many famous academics in the early days of artificial intelligence research thought that once they had (nearly) solved the "hard" issues, the "simple" problems of vision and common-sense reasoning would fall into place. They were mistaken for a variety of reasons, one of which is that they are not easy issues at all, but rather extremely tough ones. It didn't matter that they had solved issues like logic and mathematics because they are relatively simple for machines to tackle. Earlier AI research, according to Rodney Brooks characterized intelligence as things that highly educated scientists found challenging. "The things that children of four or five years could do effortlessly, such as visually distinguishing between a coffee cup and a chair, or walking around on two legs, or finding their way from their bedroom to the living room were not thought of as activities requiring intelligence." This led to Brooks making a new direction for intelligent machines that had no cognition, just sensing and action, leaving out the traditionally acclaimed "intelligence" in artificial intelligence. This he called "Nouvelle AI".