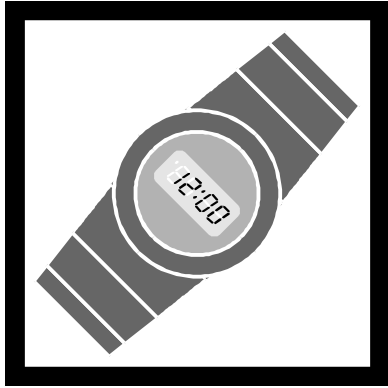


The Watchmaker



While walking through the park, I found a watch. Watches (in my experience) do not simply spring into existence alongside the path. Someone of fairly high intelligence must have made the watch, then left it there. Wondering why someone might do such a thing, I decided to find the Watchmaker.

Luck was with me. On the way home I saw an advertisement for similar watches available free (with the purchase of a meal) at a popular fast-food chain. I went to the nearest franchise and asked to see the Watchmaker. The counter-person was not helpful. "Dude, there's no Watchmaker here, we just pull 'em out of a box."

I expressed my conviction that the watch could not simply happen. There must be a Watchmaker. The manager (who took an interest when I began to raise my voice) was able to shed some light on the matter. "Sir, we receive these watches from corporate headquarters in Vermont. If you want to find the Watchmaker, you will have to contact them."

A very nice person at corporate headquarters was able to refer me to her contact at an import company, who referred me to his contact at a Far-Eastern manufacturing firm. Once I convinced him that I was not investigating his company's employment practices, he was kind enough to provide me with a description of their manufacturing process.

The watches were assembled by unskilled workers paid the equivalent of about two dollars a day. (For some reason my contact thought it was important to point out that this is nearly one-and-a-half times the local minimum wage.) The watch band, case, and face were injection molded in an automated process. The electronic portion of the watch was purchased in bulk from another company.

Contacting that company, I found that the electronic portions were produced on an assembly line using a combination of industrial robots and semi-skilled labor.

The microchips were cut from blanks grown from vats of molten silicon and traces of other elements. The machinery that did this is impressive, but it did not build the blanks so much as control the environment so that the silicon could assemble itself.

The control circuitry is photo etched on to the silicon chips. The photo etchers are fairly complex, as machines go, but hardly intelligent. The operators of these machines are better trained than the laborers who assemble the finished product. However, their knowledge is limited to running the machines. They had nothing to do with the design of the watch.

The doohickey that counts off the seconds is a small bit of quartz. Quartz is a naturally occurring crystal that vibrates at a constant rate when an electric current passes through it.

I'm sure all the folks involved in the manufacture of the watch were quite competent. Many of the folks I talked to seemed quite intelligent; but none of the people directly involved in the watch's manufacture would have been able to make a watch themselves from scratch. No one I had talked to so far was truly the Watchmaker.

The engineer who actually produced the design was knowledgeable and helpful. Unfortunately, his enthusiastic description of the process of circuit design was largely beyond me. I was able to glean two important facts: First, he used a computer aided design system. Second, his design was an enhancement of a previous design by another engineer, who based her design on an even earlier design, and so on; back through several decades.

The engineer was also able to provide me with a very interesting pamphlet entitled A brief history of time-keeping. This pamphlet traced the development of quartz clocks and watches back to a team of designers in the sixties. It went on to trace time-pieces in general back to the water-clocks of the ancient Greeks. It even contained a little speculation about the prehistoric peoples who built Stonehenge.

The watch was the product of intelligent design and construction, but there was no single Watchmaker. The watch embodies the combined intelligence of countless entities over the course of millennia, from the geniuses who invented the semi-conductor, to the minuscule "intellect" of the silicon and quartz crystals, back to the Babylonian scribe who invented astronomy, and even the purely mechanical motions of the heavenly bodies that inspired him.



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Seeking respite from thoughts of watches and Watchmakers, I returned to the park. As I walked along, I found a flower. Flowers (in my experience) do simply spring into existence. The flower grew from a seed, which grew on a flower, which grew from a seed, and so on. The flower is its own manufacturer. This makes the initial design of the flower all the more impressive.

Before researching the Watchmaker, I might have supposed the flower had a single, super-human designer. With the Watchmakers firmly in mind, I contacted the nursery that produced the flower.

A staff member described the process. The flowers indeed grew from seeds. When I asked about the design of the flower, I was surprised to hear that they were a patented variety developed by a midwestern firm specializing in such things.

A botanist developed this variety from existing varieties by selective breeding. The botanist knew what he wanted, but had no way of making the design changes directly. There was also no way to communicate his desires directly to the plant. For that matter, there was no way for the plant to make the changes had there been a method of communication. There were small changes in each generation of plant, but these mutations were random.

Together the botanist and the plants were able to make deliberate, intelligent changes through a process similar to a game of twenty questions. The variations in each new generation were the previous generation's way of asking "How should I change." The botanist supplied the answer by growing the next generation using seeds from the plants representing the closest guess.

In times past, gardeners made it a practice to save seeds from the best flowers to use in planting next year's garden. In hindsight, I saw that this was a kind of selective breeding.

Again the development was a cooperative effort between humans, and the existing varieties of flower. The gardeners had only a general idea of what they wanted, namely better flowers. The variety still asked the question "How should I change?" Humans still supplied the answer by growing the next generation using seeds from the plants representing the best guess.

There was a blight at the turn of the century that nearly caused this species of flower to become extinct in North America. For several years the American population of this flower declined, then it leveled out, then it started a slow climb. Eventually the flower returned to its previous numbers. Seeds imported from Europe continued to do poorly against the blight. Americans had to rely on their new, blight-resistant varieties.

There was no intelligent botanist or gardener, but the development of blight resistance was, in a sense, still an intelligent design choice. The variety still asked the question "How should I change?" The blight supplied the answer by destroying a greater proportion of the plants representing the wrong answer, leaving a greater proportion of plants representing the correct answer to provide the seeds that would grow into the next generation.

Blight was not the only non-human quiz master. Insects, other plants, higher animals, cooperative microbes, and many, many others all contributed their limited intelligence to the plants' design. Even the Sun, rain, and soil (literally dirt-dumb) made a contribution.

Even discounting the human intellect of the botanists and gardeners, the flower is the product of intelligent design and construction of a sort. There was no single Designer. The flower embodies the combined intelligence of countless entities, over the course of billions of years; from the tiny intelligence of the bee, to the minuscule "intellect" of various microbes; and even the mechanical actions of wind and rain.

Returning to the park I contemplated this process of evolution. I marveled at the diversity and complexity of the life it creates. I considered the process of evolution itself. I meditated on its elegant simplicity, and sublime design.

Old habits die hard. Soon I found myself wondering if there wasn't some subtle intelligence behind the design of evolution. Suspecting the answer almost at once, I was able complete my research quickly.

Sexual reproduction, one of the key elements in the whole process, was itself a mechanism that evolved from a simpler process of asexual reproduction. If the process of evolution itself can evolve, it requires no great leap of imagination to trace the process back through the ages to processes so basic that they are none other than the laws of physics.

The process goes the other way, too. The learning ability of higher animals is essentially an improved form of evolution; able to make improvements in less than a single generation. Our own natural intellects are yet a further enhancement. Beyond even that, we develop better ways of learning, and of sharing our knowledge, nearly every day.

I am able to make it back to the park before nightfall. I watch the Sun set, then I watch the stars come out. I am a direct descendant of the laws of physics, the product of intelligent design and construction, but with no single Creator. I embody the combined intelligence of countless entities since the beginning of time, from the first primates who used stone tools, back to the first creatures to experiment with sex, forward to my college instructors, and back again to the laws of physics themselves.

The stars are out in all their glory. As I stargaze, I think how lucky I am that the universe is a place where the laws of physics allow life and intelligence to evolve. I wonder, for just a moment, if those laws just happened, or if they were the product of intelligent design. I laugh, and go back to stargazing. I do catch-on eventually; given enough time.