Cybernetic Organism

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A robot is a robot and an organism is an organism.

An organism, as we all know, is built up of cells. From the molecular standpoint, its key molecules are nucleic acids and proteins. These float in a watery medium, and the whole has a bony support system. If is useless to go on with the description, since we are all familiar with organisms and since we are examples of them ourselves.

A robot, on the other hand, is (as usually pictured in science fiction) an object, more or less resembling a human being, constructed out of strong, rust-resistant metal. Science fiction writers are generally chary of describing the robotic details too closely since they are not usually essential to the story and the writers are generally at a loss how to do so.

The impression one gets from the stories, however, is that a robot is wired, so that it has wires through which electricity flows rather than tubes through which blood flows. The ultimate source of power is either unnamed, or is assumed to partake of the nature of nuclear power.

What of the robotic brain?

When I wrote my first few robot stories in 1939 and 1940, I imagined a “positronic brain” of a spongy type of platinum-iridium alloy. It was platinum-iridium because that is a particularly inert metal and is least likely to undergo chemical changes. It was spongy so that it would offer an enormous surface on which electrical patterns could be formed and un-formed. It was “positronic” because four years before my first robot story, the positron had been discovered as a reverse kind of electron, so that “positronic” in place of “electronic” had a delightful science-fiction sound.

Nowadays, of course, my positronic platinum-iridium brain is hopelessly archaic. Even ten years after its invention it became outmoded. By the end of the 1940s, we came to realize that a robot’s brain must be a kind of computer. Indeed, if a robot were to be as complex as the robots in my most recent novels, the robot brain-computer must be every bit as complex as the human brain. It must be made of tiny microchips no larger than, and as complex as, brain cells.

But now let us try to imagine something that is neither organism nor robot, but a combination of the two. Perhaps we can think of it as an organism-robot or “orbot.” That would clearly be a poor name, for it is only “robot” with the first two letters transposed. To say “orgabot,” instead, is to be stuck with a rather ugly word.

We might call it a robot-organism, or a “robotanism,” which, again, is ugly or “roborg.” To my ears, “roborg” doesn’t sound bad, but we can’t have that. Something else has arisen.

The science of computers was given the name “cybernetics” by Norbert Weiner a generation ago, so that if we consider something that is part robot and part organism and remember that a robot is cybernetic in nature, we might think of the mixture as a “cybernetic organism,” or a “cyborg.” In fact, that is the name that has stuck and is used.

To see what a cyborg might be, let’s try starting with a human organism and moving toward a robot; and when we are quite done with that, let’s start with a robot and move toward a human being.

To move from a human organism toward a robot, we must begin replacing portions of the human organism with robotic parts. We already do that in some ways. For instance, a good percentage of the original material of my teeth is now metallic, and metal is, of course, the robotic substance par excellence.

The replacements don’t have to be metallic, of course. Some parts of my teeth are now ceramic in nature, and can’t be told at a glance from the natural dentine. Still, even though dentine is ceramic in appearance and even, to an extent, in chemical structure, it was originally laid down by living material and bears the marks of its origin. The ceramic that has replaced the dentine shows no trace of life, now or ever.

We can go further. My breastbone, which had to be split longitudinally in an operation a few years back is now held together by metallic staples, which have remained in place ever since. My sister-in-law has an artificial hip-joint replacement. There are people who have artificial arms or legs and such non-living limbs are being designed, as time passes on, to be ever more complex and useful. There are people who have lived for days and even months with artificial hearts, and many more people who live for years with pacemakers.

We can imagine, little by little, this part and that part of the human being replaced by inorganic materials and engineering devices. Is there any part which we would find difficult to replace, even in imagination?

I don’t think anyone would hesitate there. Replace every part of the human being but one—the limbs, the heart, the liver, the skeleton, and so on—and the product would remain human. It would be a human being with artificial parts, but it would be a human being.

But what about the brain?

Surely, if there is one thing that makes us human it is the brain. If there is one thing that makes us a human individual, it is the intensely complex makeup, the emotions, the learning, the memory content of our particular brain. You can’t simply replace a brain with a thinking device off some factory shelf. You have to put in something that incorporates all that a natural brain has learned, that possesses all its memory, and that mimics its exact pattern of working.

An artificial limb might not work exactly like a natural one, but might still serve the purpose. The same might be true of an artificial lung, kidney, or liver. An artificial brain, however, must be the precise replica of the brain it replaces, or the human being in question is no longer the same human being.

It is the brain, then, that is the sticking point in going from human organism to robot.

And the reverse?

In “The Bicentennial Man,” I described the passage of my robot-hero, Andrew Martin, from robot to man. Little by little, he had himself changed, till his every visible part was human in appearance. He displayed an intelligence that was increasingly equivalent (or even superior) to that of a man. He was an artist, a historian, a scientist, an administrator. He forced the passage of laws guaranteeing robotic rights, and achieved respect and admiration in the fullest degree.

Yet at no point could he make himself accepted as a man. The sticking point, here, too, was his robotic brain. He found that he had to deal with that before the final hurdle could be overcome.

Therefore, we come down to the dichotomy, body and brain. The ultimate cyborgs are those in which the body and brain don’t match. That means we can have two classes of complete cyborgs:

a) a robotic brain in a human body, or

b) a human brain in a robotic body.

We can take it for granted that in estimating the worth of a human being (or a robot, for that matter) we judge first by superficial appearance.

I can very easily imagine a man seeing a woman of superlative beauty and gazing in awe and wonder at the sight. “What a beautiful woman,” he will say, or think, and he could easily imagine himself in love with her on the spot. In romances, I believe that happens as a matter of routine. And, of course, a woman seeing a man of superlative beauty is surely likely to react in precisely the same way.

If you fall in love with a striking beauty, you are scarcely likely to spend much time asking if she (or he, of course) has any brains, or possesses a good character, or has good judgment or kindness or warmth. If you find out eventually that good looks are the person’s only redeeming quality, you are liable to make excuses and continue to be guided, for a time at least, by the conditioned reflex of erotic response. Eventually, of course, you will tire of good looks without content, but who knows how long that will take?

On the other hand, a person with a large number of good qualities who happened to be distinctly plain might not be likely to entangle you in the first place unless you were intelligent enough to see those good qualities so that you might settle down to a lifetime of happiness.

What I am saying, then, is that a cyborg with a robotic brain in a human body is going to be accepted by most, if not all, people as a human being; while a cyborg with a human brain in a robotic body is going to be accepted by most, if not all, people as a robot. You are, after all—at least to most people—what you seem to be.

These two diametrically opposed cyborgs will not, however, pose a problem to human beings to the same degree.

Consider the robotic brain in the human body and ask why the transfer should be made. A robotic brain is better off in a robotic body since a human body is far the more fragile of the two. You might have a young and stalwart human body in which the brain has been damaged by trauma and disease, and you might think, “Why waste that magnificent human body? Let’s put a robotic brain in it so that it can live out its life.”

If you were to do that, the human being that resulted would not be the original. It would be a different individual human being. You would not be conserving an individual but merely a specific mindless body. And a human body, however fine, is (without the brain that goes with it) a cheap thing. Every day, half a million new bodies come into being. There is no need to save anyone of them if the brain is done.

On the other hand, what about a human brain in a robotic body? A human brain doesn’t last forever, but it can last up to ninety years without falling into total uselessness. It is not at all unknown to have a ninety-year-old who is still sharp, and capable of rational and worthwhile thought. And yet we also know that many a superlative mind has vanished after twenty or thirty years because the body that housed it (and was worthless in the absence of the mind) had become uninhabitable through trauma or disease. There would be a strong impulse then to transfer a perfectly good (even superior) brain into a robotic body to give it additional decades of useful life.

Thus, when we say “cyborg” we are very likely to think, just about exclusively, of a human brain in a robotic body—and we are going to think of that as a robot.

We might argue that a human mind is a human mind, and that it is the mind that counts and not the surrounding support mechanism, and we would be right. I’m sure that any rational court would decide that a human-brain cyborg would have all the legal rights of a man. He could vote, he must not be enslaved, and so on.

And yet suppose a cyborg were challenged: “Prove that you have a human brain and not a robotic brain, before I let you have human rights.”

The easiest way for a cyborg to offer the proof is for him to demonstrate that he is not bound by the Three Laws of Robotics. Since the Three Laws enforce socially acceptable behavior, this means he must demonstrate that he is capable of human (i.e. nasty) behavior. The simplest and most unanswerable argument is simply to knock the challenger down, breaking his jaw in the process, since no robot could do that. (In fact, in my story “Evidence,” which appeared in 1947, I use this as a way of proving someone is not a robot—but in that case there was a catch.)

But if a cyborg must continually offer violence in order to prove he has a human brain, that will not necessarily win him friends.

For that matter, even if he is accepted as human and allowed to vote and to rent hotel rooms and do all the other things human beings can do, there must nevertheless be some regulations that distinguish between him and complete human beings. The cyborg would be stronger than a man, and his metallic fists could be viewed as lethal weapons. He might still be forbidden to strike a human being, even in self-defense. He couldn’t engage in various sports on an equal basis with human beings, and so on.

Ah, but need a human brain be housed in a metallic robotic body? What about housing it in a body made of ceramic and plastic and fiber so that it looks and feels like a human body—and has a human brain besides?

But you know, I suspect that the cyborg will still have his troubles. He’ll be different. No matter how small the difference is, people will seize upon it.

We know that people who have human brains and full human bodies sometimes hate each other because of a slight difference in skin pigmentation, or a slight variation in the shape of the nose, eyes, lips, or hair.

We know that people who show no difference in any of the physical characteristics that have come to represent a cause for hatred, may yet be at daggers-drawn over matters that are not physical at all, but cultural—differences in religion, or in political outlook, or in place of birth, or in language, or in just the accent of a language.

Let’s face it. Cyborgs will have their difficulties, no matter what.