

## What Is Life, Really?

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An interesting convergence is taking shape these days. On one side, we have the successful biotechnological efforts to insert a completely synthetic genome into a living cell to produce a living, respiring, and reproducing new life form, an organism that has never existed before and did not evolve in the natural way. By anyone's definition of life, these scientists have created new life. The reason, the scientists give, is to transform common bacterial cells, such as *E. coli*, into efficient biofuel factories capable of producing in a bioreactor all the fuel we could want or use.

On another side are the creations of engineers building robots with ever-increasing useful capabilities. There is agreement that robots will find very useful service in the field of health care. Robots can already sense their environments, make simple decisions, and follow commands, but can they actually think and make sound judgments? They must become more autonomous if they are to truly serve to improve health care. Their programming is moving in the direction of incorporating ethical principles into their decision-making. That way, a robot ought to be able to think its way out of a command conflict in the same way that a human would.

Coming at the same issue from another direction, we are on the threshold of a prosthetic device revolution, where implanted parts become indistinguishable from the host person into which they are implanted; the person will be unable to function properly without these parts, and they will become essential components of the human beings who harbor them. Artificial organs, circuits to replace lost brain functions, prosthetic limbs, bioelectric sensors, and enhancer medicines will become at one with the human persona, influencing not only physical capability, but also building confidence, and changing personality.

It is not hard to see the future for synthetic biology. Whether programming cells to perform the way we want them to, or programming robots to perform the way we want them to, the only real difference between them is their starting points – one starts with something clearly living and the other starts with silicon and steel – but they both could end up in the same place, where life is indistinguishable from nonlife. Perhaps the two sides may hybridize, with the robot providing a matrix for the growth of synthetic neurons to form a brain of sorts for the humanoid robot.

There has never been a good definition of life. There are attributes, but no definitive demarcation between the living and the nonliving. Even harder is to try to define a sentient being from one that isn't. We are about to enter an era where no demarcation will be possible. When these trends finally do converge, there will be acting, moving, thinking beings with some living parts and some nonliving parts, neither clearly distinguishable from the other.

This brings me to one of my most memorable episodes of Star Trek: The Next Generation. It is entitled “The Measure of a Man”. In this episode, Lieutenant Commander Data, a remarkable android, is very human-like and an indispensable member of the command structure of the starship Enterprise. Data was created by a brilliant human who made only one model like him. That human had since died, taking the knowledge of Data’s creation with him. There were those in Star Fleet who would like to clone Data, but, in order to do that, they had to completely disassemble Data, and there would be no guarantee that they could reassemble him (it?) exactly as he was before.

Right now, Data is self-aware, and disassembling him would be humanly equivalent to death. He has been ordered by Star Fleet to submit to the disassembly process, but he is conflicted between following orders given by his human superiors and his own self-preservation.

The case goes to trial, with Commander Riker (the second in command) forced to prosecute and Captain Picard defending Data’s right to refuse the order. The dramatic courtroom defense delivered by Picard has meaning for our own future:

*PICARD: Commander Riker has dramatically demonstrated to this court that Lieutenant Commander Data is a machine. Do we deny that? No. Because it is not relevant. We too are machines, just machines of a different type. Commander Riker has also reminded us that Lieutenant Commander Data was created by a human. Do we deny that? No. Again it is not relevant. Children are created from the building blocks of their parents' DNA. Are they property? I call Lieutenant Commander Data to the stand.*

*(Picard has Data's case with him. He opens it)*

*PICARD: What are these?*

*DATA: My medals.*

*PICARD: Why do you pack them? What logical purpose do they serve?*

*DATA: I do not know, sir. I suppose none. I just wanted them. Is that vanity?*

*PICARD: And this?*

*(The book)*

*DATA: A gift from you, sir.*

*PICARD: You value it?*

*DATA: Yes, sir.*

*PICARD: Why?*

*DATA: It is a reminder of friendship and service.*

*(Picard activates the hologram of Tasha)*

*PICARD: And this? You have no other portraits of your fellow crew members. Why this person?*

*DATA: I would prefer not to answer that question, sir. I gave my word.*

*PICARD: Under the circumstances, I don't think Tasha would mind.*

*DATA: She was special to me, sir. We were intimate.*

*(Phillipa sits up)*

*PICARD: Thank you, Commander. I have no further questions for this witness.*

*PHILLIPA [the judge]: Commander Riker, do you want to cross?*

*RIKER: I have no questions, Your Honour.*

*PHILLIPA: Thank you. You may step down.*

*PICARD: I call to the stand Commander Bruce Maddox as a hostile witness.*

*COMPUTER: Verify, Maddox, Bruce, Commander. Current assignment, Associate Chair of Robotics, Daystrom Technological Institute. Major papers*

*PICARD: Yes, yes, yes. Suffice it to say, he's an expert. Commander, is your contention that Lieutenant Commander Data is not a sentient being and therefore not entitled to all the rights*

*reserved for all life forms within this Federation?*

*MADDOX: Data is not sentient, no.*

*PICARD: Commander, would you enlighten us? What is required for sentience?*

*MADDOX: Intelligence, self awareness, consciousness.*

*PICARD: Prove to the court that I am sentient.*

*MADDOX: This is absurd! We all know you're sentient.*

*PICARD: So I am sentient, but Data is not?*

*MADDOX: That's right.*

*PICARD: Why? Why am I sentient?*

*MADDOX: Well, you are self aware.*

*PICARD: Ah, that's the second of your criteria. Let's deal with the first, intelligence. Is Commander Data intelligent?*

*MADDOX: Yes. It has the ability to learn and understand, and to cope with new situations.*

*PICARD: Like this hearing.*

*MADDOX: Yes.*

*PICARD: What about self awareness. What does that mean? Why am I self aware?*

*MADDOX: Because you are conscious of your existence and actions. You are aware of yourself and your own ego.*

*PICARD: Commander Data, what are you doing now?*

*DATA: I am taking part in a legal hearing to determine my rights and status. Am I a person or property?*

*PICARD: And what's at stake?*

*DATA: My right to choose. Perhaps my very life.*

*PICARD: My rights. My status. My right to choose. My life. It seems reasonably self aware to me. Commander? I'm waiting.*

*MADDOX: This is exceedingly difficult.*

*PICARD: Do you like Commander Data?*

*MADDOX: I don't know it well enough to like or dislike it.*

*PICARD: But you admire him?*

*MADDOX: Oh yes, it's an extraordinary piece of*

*PICARD: Engineering and programming. Yes, you have said that. Commander, you have devoted your life to the study of cybernetics in general?*

*MADDOX: Yes.*

*PICARD: And Commander Data in particular?*

*MADDOX: Yes.*

*PICARD: And now you propose to dismantle him.*

*MADDOX: So that I can learn from it and construct more.*

*PICARD: How many more?*

*MADDOX: As many as are needed. Hundreds, thousands if necessary. There is no limit.*

*PICARD: A single Data, and forgive me, Commander, is a curiosity. A wonder, even. But thousands of Datas. Isn't that becoming a race? And won't we be judged by how we treat that race? Now, tell me, Commander, what is Data?*

*MADDOX: I don't understand.*

*PICARD: What is he?*

*MADDOX: A machine!*

*PICARD: Is he? Are you sure?*

*MADDOX: Yes!*

*PICARD: You see, he's met two of your three criteria for sentience, so what if he meets the third. Consciousness in even the smallest degree. What is he then? I don't know. Do you? (to Riker) Do you? (to Phillipa) Do you? Well, that's the question you have to answer. Your Honour, the courtroom is a crucible. In it we burn away irrelevancies until we are left with a pure product, the truth for all time. Now, sooner or later, this man or others like him will succeed in replicating Commander Data. And the decision you reach here today will determine how we will regard this creation of our genius. It will reveal the kind of a people we are, what he is destined to be. It will reach far beyond this courtroom and this one android. It could significantly redefine the boundaries of personal liberty and freedom, expanding them for some, savagely curtailing them*

*for others. Are you prepared to condemn him and all who come after him to servitude and slavery? Your Honour, Starfleet was founded to seek out new life. Well, there it sits. Waiting. You wanted a chance to make law. Well, here it is. Make a good one.*

#### References

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