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**Subject:** my friend george

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I am a machine that thinks, made of atoms—a perfect quantum simulation of a many-body problem—a  $10^{29}$  body problem. I, robot, am dangerously capable of self-reprogramming and preventing others from cutting off my power supply. We human machines extend our abilities via symbiosis with other machines—expanding our vision to span wavelengths beyond the mere few nanometers visible to our ancestors, out to the full electromagnetic range from picometer to megameter. We hurl 370 kg hunks of our hive past the sun at 252,792 km/hr. We extend our memory and math by a billion-fold with our silicon prostheses. Yet our bio-brains are a thousand-fold more energy efficient than our inorganic-brains at tasks where we have common ground (like facial recognition and language translation) and infinitely better for tasks of, as yet, unknown difficulty, like Einstein's *Annus Mirabilis* papers, or out-of-the-box inventions impacting future centuries. As Moore's Law heads from 20-nm transistor lithography down to 0.1 nm atomic precision and from 2D to 3D circuits, we may downplay reinventing and simulating our biomolecular-brains and switch to engineering them.

We can back-up petabytes of sili-brains perfectly in seconds, but transfer of information between carbo-brains takes decades and the similarity between the copies is barely recognizable. Some speculate that we could translate from carbo to sili, and even get the sili version to behave like the original. However, such a task requires much deeper understanding than merely making a copy. We harnessed the immune system via vaccines in 10<sup>th</sup> century China and 18<sup>th</sup> century Europe, long before we understood cytokines and T-cell receptors. We do not yet have a medical nanorobot of comparable agility or utility. It may turn out that making a molecularly adequate copy of a 1.2 kg brain (or 100 kg body) is easier than understanding how it works (or than copying my brain to a room of students "multitasking" with smart phone cat videos and emails). This is far more radical than human cloning, yet does not involve embryos.

What civil rights issues arise with such hybrid machines? A bio-brain of yesteryear with nearly perfect memory, which could reconstruct a scene with vivid prose, paintings or animation was permissible, often revered. But we hybrids (mutts) today, with better memory talents are banned from courtrooms, situation rooms, bathrooms and "private" conversations. Car license plates and faces are blurred in Google Street View—intentionally inflicting prosopagnosia. Should we disable or kill Harrison Bergeron? What about votes? We are currently far from universal suffrage. We discriminate based on maturity and sanity. If I copy my brain/body, does it have a right to vote, or is it redundant? Consider that the copies begin to diverge immediately or the copy could be intentionally different. In addition to passing the maturity/sanity/humanity test, perhaps the copy needs to pass a reverse-Turing test (a Church-Turing test?). Rather than demonstrating behavior indistinguishable from a human, the goal would be to show behavior distinct from human individuals. (Would the current US two-party system pass such a test?) Perhaps the day of corporate personhood (*Dartmouth College v. Woodward* – 1819) has finally arrived. We already vote with our wallets. Shifts in purchasing trends result in differential wealth, lobbying, R&D priorities, etc. Perhaps more copies of specific memes, minds and brains will come to represent the will of "we the (hybrid) people" of the world. Would such future Darwinian selection lead to disaster or to higher emphasis on humane empathy, aesthetics, elimination of poverty, war and disease, long-term planning—evading existential threats on even millennial time frames? Perhaps the hybrid-brain route is not only more likely, but also safer than either a leap to an unprecedented, unevolved, purely silicon-based brains—or sticking to our ancient cognitive biases with fear-based, fact-resistant voting.

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