

A Future Lesson in History

Welcome to *Seventh Grade History: Technological Development*. The Class of 2015 is attending. You're late: the lecture is half over ...

"... and so, when the general theory of relativity was finally developed in 2010, the human race was able to overcome atomic structure limitations and soon learned to manipulate both the component particles of subatomic structures – notably quarks – and subatomic forces, including both the weak and strong forces of gravity. Overcoming the atom's physical engineering limits made both nanobots and invasive liquid chips possible."

Question: "But how were tissue repairs effected back then?"

"In a word, clumsily. Humans could only repair the results of disease and injury by using harsh pharmaceuticals to stimulate the immune system. In fact, until the twentieth century, even these were unavailable, and people suffered immeasurable misery and early death. Later, various pharmaceuticals could hinder the multiplication

of disease organisms or promote tissue regeneration, but often these substances caused problems that were worse than the cures. For some diseases – those borne by viruses and cancers – there was no cure.

"This is why that atomic barrier was so important. Had that not been breached, the nanobot machines we now have, capable of repairing individual cells, would not exist; the bulky world of molecular electronics could not produce machines their size – which as you know is at most a few atoms."

("Jeffrey, I'm not projecting virtual video images into your optic nerve for my benefit. Don't think I can't see what you're 'looking' at behind that firewall.")

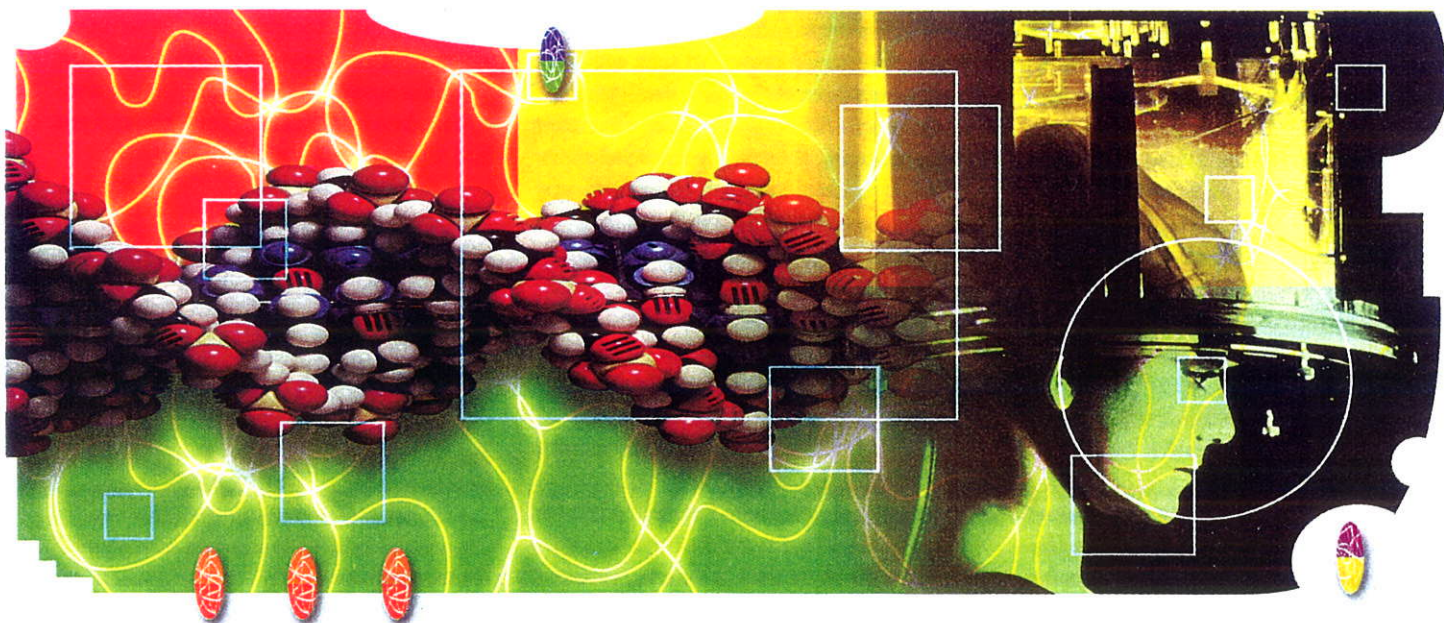
Question: "If electronics were based on molecules, they must have had severe limitations, too?"

"Absolutely. Everything you see before you now – moving images, written material and so on – only existed in tangible form. Students had to actually travel to and from their dwellings to central locations, and hundreds of thousands of teachers stood in front of perhaps 30 or so students in each

room at a time, to instruct them using physical equipment. Students viewed moving images through large boxes with solid-state electronics. 'Computer' systems had speeds measured in only a few hundred megahertz, and had storage capacity in the tens of gigabytes. Miniaturization techniques of the time made the direct interfaces you all now have implanted in your neurons impossible.

"Think about what that meant. A student with poor eyesight or hearing, which were not correctable with the microsurgery we have now, could sit in one of these tangible classrooms and miss half a lecture simply because he or she could not see or hear clearly. Poor weather conditions could make physical travel difficult, so schools were closed for days at a time in some places (yes, yes, a teacher in those days probably couldn't have heard all that nostalgic groaning I'm now sensing – you had to make noise to be heard, not just trigger your cerebral voice center.")

Question: "With such paltry storage capacity, how did they find information? A



computer couldn't have held more than a few dozen volumes."

"True. In fact, a device now on display at the Tech Museum, the 'CD-ROM,' was a wonder back then, because it could store perhaps a thousandth of what even an elementary level student's Supplemental Memory Enhancement Processing Cache Chip now holds (except for yours, Jeffrey, which I sometimes think could use adjustment). Those 'retro-books' that I see are all the rage now were the common means of data transmission — which, again, should be a clue to their problems: think about the huge structures needed to house the paper that contained what is on even one library disk in your home today. Why, your Library of Congress disk alone contains twice as many books as were in that library in 2000, and in those days the collection was housed in huge buildings in Washington."

Question: "That would mean somebody would have to physically go to a library to learn anything."

"True. Many people had some books in their homes, but a few dozen volumes at best. So, there were 'public library' buildings at centralized locations in various communities. Each school building — where the students physically gathered, remember — had a library room. But even then, cross-referencing was almost nonexistent. One had to look through each book — there were no search engines to help with term papers. (Jeffrey, I'm only accessing part of your visual signal stream, and I suspect your mother would not be proud of whatever you're viewing in the other part, so put it away and give me your undivided attention. Now.")

Question: "Didn't the slow processing speeds of hard-chips choke data transmission?"

"Not really, because all transmission was by wire or dodgy radio waves. The photon had not yet been harnessed, so commu-

nication by light was done through what were called 'fiber optics,' like pipelines for light. People could not convert physical electrons to energy, and the speed of light was considered the upward limit of movement. Once they achieved the ability to manipulate photons and electrons by altering their speeds, they had already progressed beyond hard-chips anyway.

"Technology was primitive at the end of the twentieth century. Cold-fusion was unknown, so power supplies were limited. Electrons and protons, and quarks (once they were discovered) were thought of as hard little pellets — string theory was an esoteric pursuit understood only by a few physicists, and the string theory notion that the tangible world is just a collection of kinks in space-time would have been incomprehensible to a group of seventh-graders in 1999."

Question: "So ... how did they ... like ... play games, and do ... stuff?"

"Brilliantly phrased Jeffrey. Since you don't need your tongue to speak, you'd think you wouldn't be so tongue-tied.

"Young people did play, have parties, dance together, and did all the things you do. Instead of plugging their cerebral interfaces into a worldwide network for virtual events, they would engage in such activities in the flesh (please, Jeffrey, don't giggle). Many people feel it was a more charming way to interact. It certainly required more effort. It was not as safe as it is now: one could not escape aggression by disconnecting one's interface, and incidents such as the unauthorized 'experiments' I understand went on in Virtual Chemistry lab yesterday would have been fatal.

"On the other hand, some feel that the loss of danger, or perhaps it's better to say 'risk,' has deprived you of some necessary emotional experiences. Imagine the terror a person your age might have felt when he or she reached out to hold a boy's or a girl's hand for the first time at a party, or asked

someone to dance for the first time, back when you were in a room full of actual neighbors who knew you by name, and not virtual neighbors who know you only by online profile, and when, if the boy or girl smiled politely and said, 'No,' you couldn't 'blink out' by pulling the plug, but were stuck in the room with that person for the rest of the evening."

Question: "That's not so scary."

"Then why are you and Bob chatting on your secondary channel about the girl you met last night in Club Silicon online, and who she 'likes likes' or just 'likes'? If you're so intimidated by a girl in Indonesia, imagine having to actually physically bump into her each morning in what was called a 'homerom.'"

Question: "So, back to what you said before: Kids got killed in chemistry labs?"

"No, or at least rarely. But actions did have more direct and immediate consequences. Surfers could drown, skateboarders got scraped knees, campers got lost, divers could break their necks, snowboarders wiped out when they hit trees. There were no programming safety delimiters on real life, and carelessness could mean pain. People couldn't pop in and out of each other's virtual lives — emotional choices had consequences too; sometimes hearts got broken and feelings got hurt, and you had to stay around to deal with it."

Question: "Did the teachers like it better then?"

"I don't know, Jeffrey. I've never met a human teacher." ■



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