Ray Kurzweil and Neil Gershenfeld: Two Paths to the Singularity

By Tekla S. Perry

This is part of IEEE Spectrum's SPECIAL REPORT: THE SINGULARITY

MIT professor Neil Gershenfeld and technology futurist Ray Kurzweil have long worked at the leading edges of physical science and computer science. Today, in their own ways, both believe that we are on the event horizon of a technological singularity. But they arrived at this conclusion from two very different directions, discovered one child prodigy who has both of these luminaries as mentors.

Well before Gershenfeld and Kurzweil's different visions of the future merged, their thoughts came together to influence the mind of David Dalrymple, now age 16 and an MIT graduate student. Dalrymple began corresponding with Gershenfeld in 1999 at the tender age of 8. Later that year, Gershenfeld invited him to a White House event to demonstrate a device he had built using Lego Mindstorms. There Dalrymple met Kurzweil, who had built some of the earliest music synthesizers and the first text-to-speech synthesizer. At age 9, Dalrymple joined Kurzweil as a presenter at TED, the conference on Technology, Entertainment, Design. Dalrymple worked with Kurzweil for three summers while an undergraduate at the University of Maryland Baltimore County; he graduated at age 13. Dalrymple is now working toward his Ph.D. under Gershenfeld.

Gershenfeld, director of MIT's Center for Bits and Atoms, studies the boundary between computer science and physical science, looking toward a future in which they merge, computers essentially disappear into the physical world, and everything becomes programmable. Kurzweil has been fascinated with modeling the physical world in computers—simulation, artificial intelligence, and virtual reality—and believes if he takes good care of his health, he may just survive long enough to see computers that are far smarter than people.

For years, Dalrymple has been trying to reconcile these two visions of the future: Gershenfeld's future in which computers collapse and simply become part of reality, and Kurzweil's future in which reality as we know it collapses and simply becomes part of computers. In an e-mail exchange prompted by a lunchtime discussion in Gershenfeld's laboratory during which another student referred to Kurzweil's work, Dalrymple asked his mentors, "Is it possible for both to happen at the same time?"

Says Kurzweil, who is involving both visions in the making of two films about the singularity
(Transcendent Man is in post-production; The Singularity is Near will complete filming this summer):

"We see these apparently opposing trends in many contexts. Studying natural intelligence gives us the insights to create artificial intelligence while at the same time artificial intelligence is extending our natural intelligence. Reverse-engineering biology is giving us creative new designs for advanced technologies, while those same technologies overcome the limitations of biology.

"As Neil points out, we will be infusing physical reality with embedded, distributed, self-organizing computation everywhere. And at the same time we will be using these massive—and exponentially expanding—computational resources to create increasingly realistic, full-immersion virtual reality environments that compete with and ultimately replace real reality.

"We get from today's world to the remarkable world of the future not in one giant leap but in thousands—millions—of little steps which go in apparently disparate and even contradictory directions."

Indeed, Gershenfeld says that he and Kurzweil are no longer predicting a different future:

"I had always considered Ray and me to be headed in opposite directions: he developed artificial intelligence and virtual worlds while I was interested in the 'natural' intelligence of physical systems; he forecast the future while I was investigating technologies that are possible in the present.

"The result for me has been an increasingly close integration of physical science and computer science, bringing the programmability of the digital world to the physical world. But whether computers are merged with reality or reality is merged with computers, the result is the same: the boundary between bits and atoms disappears.

"It's as if Ray went east and I went west, but we arrived at the same point, which is exactly the definition of a singularity."

For more articles, videos, and special features, go to The Singularity Special Report

To Probe Further

You can watch an online video of Neil Gershenfeld's presentation at the February 2006 TED conference, in Monterey, Calif.

You can also watch an online video of Ray Kurzweil's keynote address at the May 2006 Singularity Summit, at Stanford University.