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Brain science symposium delves deeply into big questions

The Future of the Brain
Tim Denison, a senior engineering manager at Medtronic, discusses neurological devices that already provide treatments for Parkinson's disease, obsessive-compulsive disorder, severe spasticity, and other conditions.

Credit: Frank Mullin/Brown University

Large audiences heard presentations yesterday on treating brain disorders and injury, neurotechnology, and the unique qualities of the human brain. Science writer David Orenstein reports on Day One of an international symposium marking the 10th anniversary of the Brown

Institute for Brain Science.

By David Orenstein | October 14, 2010 | **Email to a friend**

On the first day of the two-day symposium celebrating the 10th anniversary of the Brown Institute for Brain Science, the meaning of the event's title, "The Future of the Brain," became manifest as top speakers from around the country grappled with four basic questions:

- What can people do for those who are suffering from brain damage and disease?
- What can technology do for the brain?
- What can the brain do for technology?
- What really makes human brains special?

U.S. Rep Patrick Kennedy (D-R.I.) began the event with a passionate call for the country to value brain science, particularly for its potential to help wounded veterans, as highly as it valued his uncle's quest to go to the moon. He said that service member suicides related to the war in Afghanistan exceed the number of battlefield deaths. He attributed the epidemic to neurological injury, and criticized officials who've suggested the cause is psychological.

"Where is the urgency? If we don't have urgency for our veterans, who do we have it for?" Kennedy asked. "And what about [Neil] Armstrong's quote? One small step. That small step could be repairing

spinal cords so that they can step out of the wheelchair. That imagery could be enough to motivate a nation."

The idea that stating challenges with easily understood, measurable goals such as repairing or bypassing spinal cord injuries, could catalyze brain science progress was seconded by Eileen Bartholomew, a senior director at the X-Prize Foundation. In her remarks on a panel that discussed neurotechnology — implants and other devices that can restore or extend nervous system function — she laid out several accomplishments that the foundation might consider prizeworthy, including getting medicines through the blood-brain barrier, improving Alzheimer's disease diagnosis, and restoring sensory input, such as a sense of touch, to the brains of paralyzed people.

While Bartholomew projected what might someday be accomplished, Tim Denison, a senior engineering manager at device-maker Medtronic, showcased what neurotechnology is already doing to help patients. He pointed to devices that provide treatments for Parkinson's disease, obsessive-compulsive disorder, and severe spasticity, among other conditions.

The discussion of current and future neurotechnology implants evoked ideas of a blending of human and machine. It was no surprise that the next set of panelists talked about how the brain, as a kind of biological computer, provides inspiration in the development of computer science

pursuits such as robotics and artificial intelligence. Famed MIT roboticist Rodney Brooks, Google research director Peter Norvig, and Daimler senior research scientist Dairu Gavrila debated how closely computer systems can and should resemble real thought.

Brooks said he's based much of his work on models of various creatures' brains. The Roomba vacuum cleaner, for example, is based on an insect's intellect. He's working on humanoid robots, with the goal of at least replicating the object recognition of a two-year-old, the language skills of a four-year-old, the dexterity of a six-year-old and the social understanding of a nine-year-old.

Norvig, a Brown alumnus, said Google has taken a more pragmatic, "brute-force" tack in developing intelligence for its search systems and other products. Because the company indexes huge stores of data, it has been able to make advances in language translation, speech recognition, object recognition and other mind-like functions, not by emulating fundamental brain functions, but by presenting millions of examples to its software with the capacity to learn.

"Computers are not brains and brains are not computers," Norvig said.

The day's keynote speaker sought to clarify the differences not between people and machines, but people and other animals. Robert Sapolsky, a Stanford biology and neurology professor, told a packed house at the Salomon Center for Teaching that humans and other animals share the

same basic neural infrastructure. It's just that humans, who have a lot more of it, manage to use it in ways that have no precedent elsewhere in nature.

"We have the same nuts and bolts physiology, yet we are using it in very novel ways," he said.

In a substantial but humorous talk that frequently evoked sustained peals of laughter from the audience, Sapolsky offered many examples of how humans are distinct from the rest of the animal kingdom (sample: "Hardly any animals out there have non-reproductive sex, night after night, and nobody else talks about it afterward").

At the same time, however, Sapolsky pointed out how many similarities exist between people and other animals. People are not the only ones who organize to commit murder (chimpanzees do), they aren't the only ones with a "tit-for-tat" sense of morality (vampire bats have it), or exhibit empathy (chimps do that, too).

The discussions continue on campus today, as experts continue to engage in that singularly human endeavor: spirited academic discussion of the Future of the Brain.