

Invited to appear in *One Letter at a Time* by Dick and Rick Hoyt with Todd Civin, Mascot Publishing, 2012.

“Rick Hoyt: Consultant, Test Pilot, Teacher”

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Back in 1993 colleagues and I at Boston College invented a technology called EagleEyes. EagleEyes allows you to control the mouse pointer on a computer screen by moving your eyes. EagleEyes works through five electrodes placed on your face, around the eyes.

In 1993 I knew little about people with disabilities. I had never worked with anyone with disabilities. Truth be told I felt uncomfortable around anyone in a wheelchair.

We didn't invent EagleEyes for any real purpose. I just thought it was cool to be able to control the computer strictly through electrodes on my face. I could play simple video games and spell out messages just by moving my eyes around and having the signals sensed through electrodes.

The technology was written about in the press and we were up for a Technology of the Year Award from Discover Magazine. A brief television piece was done on the technology. Along the way it became clear that EagleEyes might be more than a toy. It might actually be useful for people with severe disabilities. We began trying the technology with children and adults with severe disabilities. Parents and schools began requesting systems to use at home and in school.

I don't remember how I connected up with Rick, but he came over to try an early version of EagleEyes in our lab. EagleEyes wasn't really appropriate for Rick for full time use. He could use it but he already had a communication system that works for him, both a switch-based computerized system and a communication system he used with his aide. It began to dawn on me what a great contribution Rick could make to our project. Students were developing applications software to use with EagleEyes. We were trying to develop a portable EagleEyes system that would work well in homes and schools. But our primary users could barely communicate with us. Rick could become our expert user, a consultant on the project who could test the technology and advise us on what was working and what needed to be improved or added.



Rick and I met in my office with his aide to work out arrangements. First I was fascinated by the spelling system that Rick uses. I had been reading about spelling systems that might be used with EagleEyes. Rick's is a two-level system where the aide runs through groups of letters "Group A", "Group E", "Group I", ... Rick gives a slight shake of his head at the correct group. If it's "Group I" then the aide goes through the letters in the group: "I", "J", "K", ... Rick gives a slight shake of his head at the correct letter. At first it seems like it takes a long time for Rick to communicate. It does, but with one reliable motion spelling is a tough problem. Rick's is perhaps the best system I've seen. Dividing the alphabet groups at the vowels is genius. It's really easy to remember. It works over the long haul. There is a whole academic literature on spelling systems. We have written a couple of programs based on Rick's method. One is on the web for free download at staggeredspeech.org. We have taught Rick's system to many people with disabilities and their caregivers.

Rick began coming in to our lab a couple of times a month to work with our students and advise on our projects.

Before I started working on EagleEyes and before I met Rick I had assumed that people in wheelchairs are fragile. They are, in a sense. But Rick is one of the toughest guys I've ever met.

If Rick weren't born with CP I imagine he'd be a hockey player or a fighter pilot or a race car driver. Whenever he came into the lab he'd want to use EagleEyes to play flight simulator. EagleEyes just substitutes for a mouse so it doesn't provide all the controls you need for flight simulator. Rick didn't care. He'd fly as long as he could and then crash and laugh. It wasn't just in the virtual world. I know all those marathons and triathlons are tough for Dick, but they're tough for Rick also.

I recall once when Rick had a new aide. After his time with us at BC she wheeled him out to the van. He was in his wheelchair as the lift at the back of the van was raised. Unfortunately the aide had forgotten to lock the chair in the lift. The chair rolled slowly off the back of the lift and flipped with Rick falling face first into the parking lot. We ran over there and lifted Rick up. His face was all scraped but he was laughing. Just another adventure in the life of Rick Hoyt.

I was lucky to get to know Rick a bit. I went to his apartment in Brookline to see if we could rig up a system for his TV. We went out for a beer with some students at a bar in Newton Center and down to Faneuil Hall for a fundraiser at a comedy club.

I learned to listen. I try never to predict what Rick is spelling. I tell myself to let him finish his own thoughts. Don't cut him off. If I guess then he might just agree and I'll never know what he's really trying to say.

I remember meeting with Rick for an hour in my office. Joking around with him. Listening to his insightful suggestions for improving our technologies. Then when Rick left, I met with a former student who was about Rick's age. This former student was doing well in his high-tech career. He was married. Had children. A house in the suburbs. Money. And he was miserable.

How do I square this? What are the sources of human happiness? Rick seems to have nothing. He can't even move his arms or legs. Yet he's always laughing and genuinely seems to be happy and enjoy and embrace life and its challenges. My former student seemed to have everything, but he was miserable. Is happiness just an innate disposition? Are people born happy or unhappy? If it's dependent on the circumstances of one's life, what is it that determines whether one is happy? If I had to trade places with one of these people, with Rick or with this former student, which would I choose? Which would you?

Rick seemed to have a positive impact on everyone he came into contact with. Certainly on my students. His positive outlook is infectious. Rick is one of the most interesting and vital people I have ever met.

A parent donated a power wheelchair to us. We had an experimental version of a portable EagleEyes system. A small group of students decided to design an interface between EagleEyes and the wheelchair that would allow a person in the wheelchair to control the chair just with his eyes. Great project for a group of undergraduates.

Here's the way the user controlled the wheelchair: Look up and the wheelchair moves forwards. The higher you look the faster it goes. Look down and the wheelchair stops. Look to the left and the wheelchair goes left. Look right and the wheelchair goes right.

When the students had a working system I gave the eye-controlled wheelchair a try in the corridor. It was tough to control. We are not used to using our eyes to control where we go. The powered wheelchair could go real fast. If you look at an obstacle that is where the chair goes. The best I could do was to look up for a bit and then look down. The wheelchair would go forward a little and then stop. I moved in brief chunks.

Of course right at the beginning of the project Rick started asking if he could drive the chair. He'd get that gleam in his eye.

Towards the end of the semester I decide to let Rick give it a try. I emphasize to Rick the need for caution and tell him just to raise his eyes a little and then drop them down. He smiles at me. We lift him into the chair and then put the five electrodes on his face around his eyes. We connect the electrodes to the EagleEyes box and the EagleEyes box to the notebook computer and the notebook computer to the student interface box and the interface box to the wheelchair controller. We are in the 4th floor corridor of Fulton Hall outside my office. We point the wheelchair down the corridor.

OK, I tell Rick. You're in control. Rick gives that screech of pure joy he does when he's really happy.

Immediately Rick raises his eyes as much as he can and the wheelchair accelerates like crazy down the hallway. Now I realize a crucial design flaw. There is a "kill switch" on the wheelchair that would shut it down. But we do not have a remote kill switch.

This all happens in a flash. All of a sudden I see this very good looking young female student walk around the corner at the far end of the corridor. It's hard not to notice from our past meetings that Rick has a real eye for the ladies. As soon as she turns the corner Rick starts staring at her. Of course, wherever Rick looks that is where the wheelchair goes. I imagine Rick's plan. He is going to scoop up the young lady into his lap and take off down the corridor and worry later about what happens next.

I don't know what to do. I can try to explain to the student that there is an experimental eye controlled wheelchair barreling down the hallway at her. Unlikely and there is very little time. But even if I do, what can she do? If she tries to move out of the way Rick will just keep staring at her and the wheelchair will redirect at her anyway.

Luckily one of the students has the presence of mind to go racing down the hallway and hit the kill switch stopping the chair before it reaches the student.

Rick gets to drive a wheelchair with his eyes. The students and I learn some valuable lessons about system design. We get another lesson from Rick about living life at full tilt and seizing the day.