

Silence of their world has been broken by a computer

By Cecelia Goodnow
P-I Reporter

Imagine a life in which you could never cheer on the home team, tell a joke, chat about the latest movie or pour out your frustrations to a sympathetic ear — a life in which you could only listen passively to the world around you.

Then one day your silence is broken by a kind of magical black box that translates your thoughts into printed words and images. For the first time, you can write notes behind the teacher's back, draw pictures, play games with other children and do your homework without your parents' help.

Four Seattle-area children, severely disabled by cerebral palsy, have enjoyed just that kind of liberation, thanks to an innovative portable computer that translates head movements into written English.

The computer, developed by University of Washington researchers, has the potential of liberating thousands of victims of cerebral palsy, strokes and paralyzing accidents who lack the motor coordination to speak or write normally. Researchers hope that the computer, now used only by a few test subjects, will be widely available in a few years.

No keyboard

"It's another step toward giving them some of the independence that all the rest of us simply take for granted," said Wesley R. Wilson, who heads the Alternative Communication System Project at UW's Child Development and Mental Retardation Center.

The specially designed computer is encased in a black box mounted on a swivel tray on the front of a wheelchair. Unlike standard computer terminals, this device has no keyboard, since the disabled children lack the motor control to type with their fingers.

Instead, the children use simple side-to-side head movements to activate Morse code switches housed in padded earphones several inches from their heads. The computer translates the electronic dits and dahs into writing that appears on visual displays facing the reader and the user.

"There are about 90 different codes that they have learned," said Judy McDonald, a speech and language pathologist involved in the project. "That includes the alphabet, numbers and punctuation and turning the machine on and off."

All of the computer's operations, such as backspacing for corrections or adjusting the speed of the coded signals, are controlled by head movements, McDonald said.

Four times faster

For even more versatility, the portable model can be hooked up to a printer, television screen or home computer, enabling the children to use a variety of computer software ranging from slow-paced arcade-style games to a special graphics programs that enables them to "draw" computer pictures.

The children's computerized conversation is slow by normal standards — typically about eight words per minute. Still, Wilson said, that is about four times as fast as the cruder communications systems most cerebral palsy victims use, such as head wands by which they laboriously peck at special keyboards.

The computer has made a big difference in the children's attitude, their parents say. One father commented in a UW videotape, "Bob, who's 9 years old, is really a lot less frustrated. He's able to make his needs known to us." The mother of another participant, Steve, 14, said, "Now nothing holds him back."

Tania Nott, 14, a freckle-faced Kirkland girl with an infectious smile, was eager to tell a reporter all about her computer one recent afternoon. Once settled in her wheelchair, Tania assumed a purposeful look and began bouncing her head against the earphones. Computer blips sounded as red letters appeared, one at a time, on the display.

"Hi!" Tania had written. She smiled broadly.

The rest of the conversation went like this:

'Wow, neat'

Q. How long have you had your computer?

A. About two years.

Q. How hard was it to learn the Morse Code?

A. It was kinda easy.

Q. What kinds of things can you do with your computer?

A. Well, I can do my schoolwork.

Q. Is it easier to do that now that you have your computer?

A. Much!

Q. What do the other kids at school think of your computer?

A. Wow, neat.

Q. Do they ask you to write them messages?

A. All the time.

Q. What kinds of computer games can you play?

A. Tic-tac-toe.

Q. Do you expect to use the computer for many years to come?

A. The rest of my life.

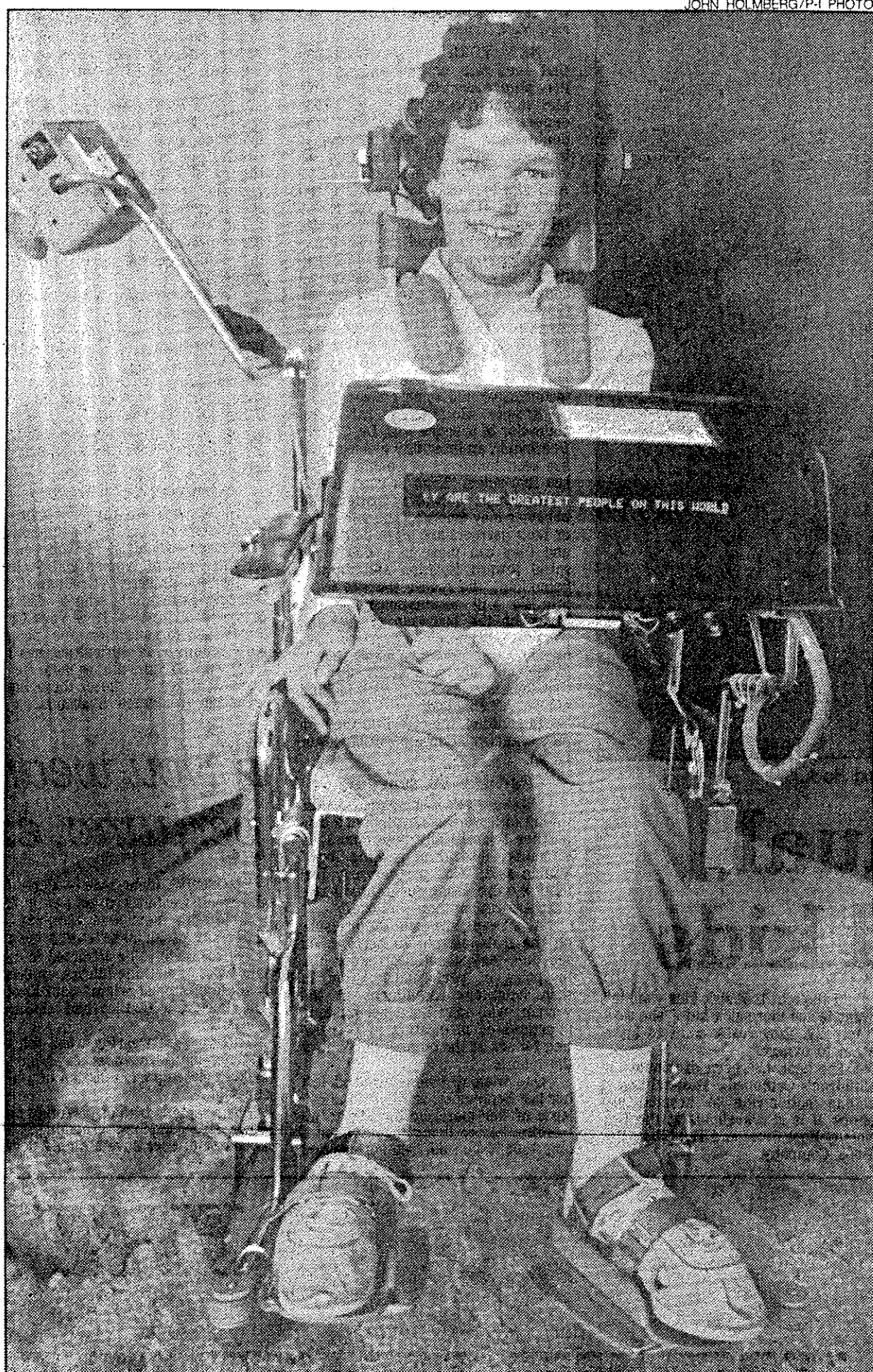
Q. Is this something you could use on a job?

A. Oh yes.

Q. Do you have any specific career in mind?

A. Teacher.

Q. Is there anything you don't like about the computer?



Tania Nott is one of the disabled children learning to communicate through a portable computer developed by UW researchers. Tania's head movements activate Morse Code signals in the earphones.

A. Well, I would like to make my code faster.

Q. You mean you wish you could improve your speed in Morse Code?

Tania smiled and nodded haltingly.

Q. What difference has the computer made to your life?

A. Before, I couldn't get my feelings out and now I can.

The eighth-grader's responses were rapid-fire, slowed only by the inherent mechanical limitations of the system.

Tania's mother, Tina, has nothing but praise for the project.

Stock messages

"I'm really, really, just really excited about this project," Tina said. "Something like this can really unlock her mind."

The other children in the project also have benefited, according to UW's McDonald. The youngest child, Bob, 10, has difficulty with spelling but uses simple codes to call up stock messages that have been permanently stored in the computer. Steve, 14, has joined the Atari Computer Club at his school and plays Yahtzee at home on his Apple computer with able-bodied friends from school. Kris, 17, now can communicate with teachers and friends without the help of an interpreter.

When the project began three years ago, it also included a 16-year-old boy who had been paralyzed from the neck down by a sports injury.

"He could talk but he had no way of writing," Wilson said.

The boy learned to send Morse Code at a rate of 17 words a minute by alternately sipping and puffing on a straw connected to electronic switches, Wilson said. The boy dropped out of the program because he decided a tabletop Apple computer operated by the sip-and-puff method would serve his needs.

The Morse Code computer is the brainchild of Al Ross, the project's research engineer, who wanted to devise a system to help a severely handicapped teenage boy who was on the verge of being institutionalized. Ross, a ham radio operator and electronics buff, improvised a Morse Code system using surplus Western Union teletype machines. Although the device was not portable, it helped Ross's friend, Dennis, and inspired the project computer.

"Dennis was able to graduate from high school and community college and now is enrolled in a four-year college," Wilson said. "That's a lot different from institutionalization."

The computer also may open up new employment opportunities for cerebral palsy victims, Wilson said, adding that some disabled people could work at home and relay their efforts electronically.

"I wouldn't want to build a huge case that that's what these children will do, but they're just so much closer to that potential," he said.

During the next phase of the pro-

ject, computers will be sent to a Syracuse, N.Y., clinic; a Baltimore institute for cerebral palsy research; and a school district in Mesa, Ariz., to test whether the system can be used successfully by people who were not involved in developing it.

Tania Nott, meanwhile, has no doubts about the success of the computer. As a reporter and photographer said goodbye and started to leave, Tania began furiously batting out one last comment. It was, she indicated, her attitude toward the UW researchers who developed the computer:

"They . . . are . . . the . . . greatest . . . people . . . on . . . this . . . world."



Steve Harper (right) taps out Morse code with his head as he sits next to full-time teacher's aide Barbara West in class

Staff photo by Tim Jewett

Computer speaks for handicapped teen

By PAM WITMER
Herald Staff Writer

Steve Harper has a nearly boundless sense of humor, a penchant for jokes, and a temper when someone assumes he is retarded because he can't speak or control much of his movement.

But most people who are acquainted with Steve didn't know those aspects of his personality until researchers at the University of Washington gave him a way to tell the world what was going on in his mind.

Now when he wants to answer the teacher's question in one of his seventh-grade classes at Alderwood Middle

School, he flashes the red light on his computer and taps out a message on the screen by moving his head from side to side, triggering the computer's switches with Morse code.

Right, left, right, left, left, left — Steve moves his head, little electronic beeping sounds emanate from the switches in his headset.

Letters light up on the front of the black box before him.

"It's easy," Steve's message says. A long row of exclamation points marches across the screen behind the message — Steve's way of emphasizing emotion in his words.

Birth trauma left Steve with cerebral palsy. Now 13 years old, he cannot control his vocal cords to utter distinguishable words or control his arm and hand muscles to write or type.

Before joining the university's research program, Steve's only form of communication was a lap board showing numbers, letters and common phrases. It required an extreme amount of concentration for Steve to control his arm movements enough to point out letters on the board.

And it required someone with a great deal of patience to

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Morse code links teen to computer

STEVE, from Page 1

sit beside him, taking down the letters he pointed out.

Steve balked at using the lap board because it was so frustrating. As an incentive, his speech therapist once encouraged him to write to his football hero, Seahawk's quarterback Jim Zorn.

The two-paragraph letter took Steve five hours to write with the lap board. But when Zorn showed up at the school district's Maplewood School for the handicapped because Steve invited him, the effort had paid off.

"To imagine what it would be like to be Steve, you would have to imagine that you could only speak at the pleasure of someone else," said Wesley Wilson, director of the UW research program. "It would be like you had a switch on you and you could not communicate until someone else turned that switch on."

The electronic beeps start up again as Steve moves his head from side to side, signaling the computer to display another message.

"I can talk faster now," the message read. More exclamation points follow the words. Steve smiles.

The next time he writes a letter to Zorn, or wants to thank the president of the United States for giving the university more grant money to continue the research he is benefitting from, Steve can write it in 20 minutes with his computer's print-out system.

His equipment fascinates his classmates at Alderwood Middle School.

But some of his seventh grade classmates noticed his handicap before they noticed the computer system.

Barbara West, Steve's full-time aide, recalls one day early this school year when a boy came up to the two of them and asked West: "What's the matter with that kid? Is he retarded or something?"

West was about to reply when Steve started tapping out a message.

"He told him something like 'If I'm retarded, what do you think I'm doing in school here?'" West said. "And then he said, 'Well you wouldn't be able to print it in the newspaper.'"

"We had a long talk about swearing then," West said, adding that she understood Steve can get as frustrated as anyone else and needs to express that frustration.

"But I told him that if he really needs to swear, he should just use the symbols like they do in comic

things."

West is with Steve throughout the school day, feeding him at lunch, taking him to the bathroom, turning pages of his books, writing down his answers on worksheets.

West didn't know Steve before he got his computer system this summer, but she has learned a lot about him with the communication system's help.

"He can be just full of the devil," West said. "He makes fun of my Boston accent and he loves to tell jokes."

If Steve has any hero other than football player Zorn, it is Al Ross from the UW research program. Ross dreamed up the idea of the computer system Steve uses and built the first one to help a friend. That friend is now at one of the state's private universities, studying to be a journalist.

"It all started when I met Dennis Robertson of Tacoma in 1975," Ross said, recalling how his job as media producer for the UW's child development center brought him into contact with the young man who would become his friend.

"Dennis is much like Steve; he has cerebral palsy, too. Dennis was using a headstick attached to a helmet to strike typewriter keys to communicate. It seemed to me there had to be a better way."

Ross began tinkering with computers and drew on his ham radio experience with Morse code, and decided he could get a computer to translate the short-long sequence of the code's electronic switching into written language.

"It worked, although the system I built for Dennis wasn't portable. He was the inspiration for our grant though," Ross said.

Federal grant money for the project was first approved in October, 1979, launching a two-year effort to build a portable version of Ross's creation to see if other severely handicapped people could use it.

That's when Steve, one other Edmonds School District student and three other youngsters from the Puget Sound area were chosen as participants in the research program.

The project required a team of specialists from a variety of academic and research disciplines, including computer programmers, engineers, physical therapists, speech and hearing therapists, social workers and teachers.

The original \$250,000 grant was for research on whether specialists could build a portable system based on the prototype that Ross built for his friend

In the second phase of the project, which just was funded with another \$400,000 grant, researchers will build 10 more of the computer systems and give them to five people within the state and another five in other parts of the country. The object of the next phase of the study is to determine how much training is required before handicapped people can readily use the equipment.

The ultimate goal is to get someone to mass-produce the equipment at an affordable price so that anyone who needs it can afford it. Researchers estimate Steve's equipment would cost \$2,500.

Cerebral palsy victims aren't the only handicapped people who could benefit from the equipment, researchers say. People with multiple sclerosis or paralysis from strokes could also use it.

Steve's mother, Gladys Harper, is just glad she listened to the Edmonds School District specialists who urged her to submit an application for her son to participate in the UW project.

"I remember the first day he got his equipment," Harper said. "He told me it made him feel like a whole person."

"And now, for the first time, there's a chance that he can have a career, something we hadn't been able to hope for before," Harper said.

With the aid of Morse code to communicate with computers, and with Steve's experience in handling the sophisticated system on his wheelchair, project director Wilson believes a career in computer programming is a realistic goal for Steve.

The system is on permanent loan to Steve. And more products of the UW research program soon will be added to his equipment. He will get a voice synthesizer to replace the display screen the computer has and the system will be fitted to an electric wheelchair. Steve then will be able to direct the movement of the wheelchair by tapping Morse code into the headset.

And if he's ever in an emergency situation and needs to call for help, he's got a little siren on his computer system too.

"Now his family can begin to consider options other than planned care in some sheltered environment for Steve's future," project director Wilson said.

"He will still need a sheltered environment to meet his physical needs, but maybe now he can be much more independent. If he can earn a salary, he can make his own decisions about who will care for him."

Everett
Herald.
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