



F A C E D *with* MISUNDERSTANDING

Brain-injured patients are relearning how to recognize emotions



THE VISITOR IN BARRY WILLER'S OFFICE in the School

of Medicine and Biomedical Sciences was frustrated and deeply depressed. His wife had sustained a relatively mild traumatic brain injury, and he was doing all he could to support her and help her make the best of the situation. But despite his efforts, he explained to Willer, his wife describes him to friends as being “indifferent.” He was at his wits end.

BY LOIS BAKER

WILLER, A UB PROFESSOR of psychiatry who specializes in traumatic brain injury (TBI), listened to this scenario with great interest. He was pilot testing a computer-based diagnostic and treatment program he and a graduate student had developed for brain-injured adults to help them regain their emotional lives, so he had the man's wife take the test.

In the pilot study, participants viewed photos of faces expressing a variety of emotions and attempted to name each emotion. Persons with no brain injury easily can distinguish frightened from annoyed, or disappointed from gleeful. But when a sad, or angry, or surprised face appeared on the screen, this TBI patient saw only “indifferent.”

It was eye-opening for the couple and a rewarding moment for Willer. “His wife didn't know she wasn't recognizing his emotions,” Willer recounts, “and he had no idea what was going on.”

The ability to interpret and express emotion is one of the defining characteristics of being human because of its role in interpersonal relationships.

“This couple was a prime example,” explains Willer. “When the husband felt sad, she did not respond.

When she was feeling down, she did not recognize his sympathetic understanding.

Not surprisingly, Willer and his team uncovered a number of relationship issues with virtually all of the participants with impaired affect recognition, and rarely did anyone realize that the problems stemmed from a perceptual impairment.

Only in recent years has the psychiatric rehabilitation community confirmed that as many as 50 percent of TBI patients lose the ability to recognize emotions and respond appropriately. In the past, people with TBI who reacted inappropriately—such as joking at a funeral or not reacting at all—were considered to have behavior problems. This capacity, or lack of it, now is known as “affect recognition.”

Based on his promising pilot-study results, Willer received \$600,000 from the National Institute on Disability and Rehabilitation Research to carry out a three-year controlled trial of his affect recognition training program. It is the first structured intervention designed to treat this disability among those with brain injury.

Recruitment currently is underway at the Carolinas Healthcare System in Charlotte, North Carolina; Brock University in St. Catherines, Ontario, Canada; and Massey University in Wellington, New Zealand. Willer and his coprincipal investigator, Machiko Tomita, PhD, UB clinical associate professor of rehabilitation sciences, are overseeing the three sites.

Dawn Radice Neumann, PhD, a former graduate student of Willer, is principal investigator at the North Carolina site; Barbra Zupan, PhD, also a former graduate student, is principal investigator at the Canada site.

Puzzling Responses

WILLER'S INTEREST in affect recognition was inspired by the PBS series “The Secret Life of the Brain.” One of the episodes showed a man watching a horrific scene from a “slasher” movie that would make most viewers cringe. But this man simply was puzzled because he couldn't produce the fear emotion and, therefore, did not understand what was happening, recounts Willer. “I was watching that, and I thought, ‘My gosh! I see that all the time in brain injury.’”



THE WAY WE

UNDERSTAND HOW SOMEONE IS FEELING, WILLER EXPLAINS, IS BY EXPERIENCING THE EMOTION

ourselves via instantaneous messages transmitted to the brain's limbic system. "It's been very nicely studied with functional imaging studies. There's a switching mechanism that occurs in the insula and the amygdala that allows us to recognize what those emotions are—to feel them and then to recognize them. We literally empathize. We feel the same thing that we are seeing, and that is how our body knows what that person is expressing."

The insula is a brain region that is primarily known for its role in

determining taste. Only recently have neuroscientists recognized the role of the insula in recognizing emotions.

"It is ironic since we use phrases like 'in poor taste' or 'good taste' to refer to something associated with an emotional outcome," notes Willer. "Now we realize the insula is involved in creating moral intuition, empathy, and the capacity to respond emotionally to music and other stimuli."

Name That Emotion

THE PBS PROGRAM on the brain set in motion the wheels of Willer's group. A search they conducted produced two published literature reviews that revealed many articles on this type of deficit, but none documented the proportion of persons

with TBI who could not recognize emotions, and no one had developed a program to treat the problem.

Working with his graduate students, Willer took two interventions shown to be successful in helping autistic children recognize emotions and modified them to be appropriate for adults with brain injury, then tested them in the pilot study.

These interventions, which now are being tested in the three-year trial, are titled "facial affect recognition" (FAR) and "stories of emotional inference" (SEI). Timothy Bleiler, PhD, an instructional designer in the UB medical school, has put both interventions into a single piece of

software ready for the multisite trial. The new investigation will randomize 108 participants with TBI into one of these two groups or to a control training group.

Participations in the FAR group, as the "facial affect recognition" name implies, will focus on specific elements of the face. "The research suggests that the majority of the information we gather about somebody else's emotional state is based on their facial expression," says Willer. "We gather a little from the voice, we gather a little from body language, but the majority comes from the face."

FAR participants view faces on a computer screen equipped with cues that direct them to concentrate on specific elements of each face—"Look at the eyes. What are the eyes doing? What is the mouth doing?"—and asks them to name the emotion.

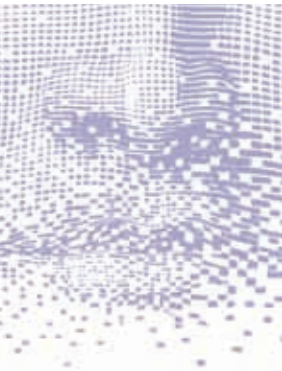
"To know what the other person is feeling," notes Willer, "you have to know what you're feeling. Individuals who don't know how to recognize anger won't recognize it in themselves and, in fact, can't produce it. If you hold a mirror in front of them and say, 'Show me an angry face,' it's really interesting to watch them moving their face around and trying to come up with an angry face, and they can't."

The SEI intervention uses examples to teach what a person is likely to be feeling in various situations. Participants randomized to this group are asked to read stories on the computer that describe events, along with characters' beliefs, wants and behaviors. From this information, participants are asked to infer the emotions imbedded in the story. Willer uses the admittedly simplistic joking-at-

the-funeral example to describe how a story intervention works. "These stories might say: 'You're going to a funeral and you're meeting the person whose husband died. What is that person likely to be feeling?'"

People with TBI, however, likely will not regain the speed with which people without brain injury can process emotional stimuli. Persons without TBI who take Willer's affect-recognition test can identify

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The control group will receive computer-based educational instruction in such areas as banking or applying for a job and will learn how to use Word and Excel programs and how to search the Internet.

All participants will receive treatments three times a week for three weeks. They will be tested immediately at the end of the treatment, and at three and six months post-treatment. Willer and colleagues will evaluate participants' recognition of emotion from faces and written text, changes in empathy and emotional behavior and any changes in the quality of their personal relationships.

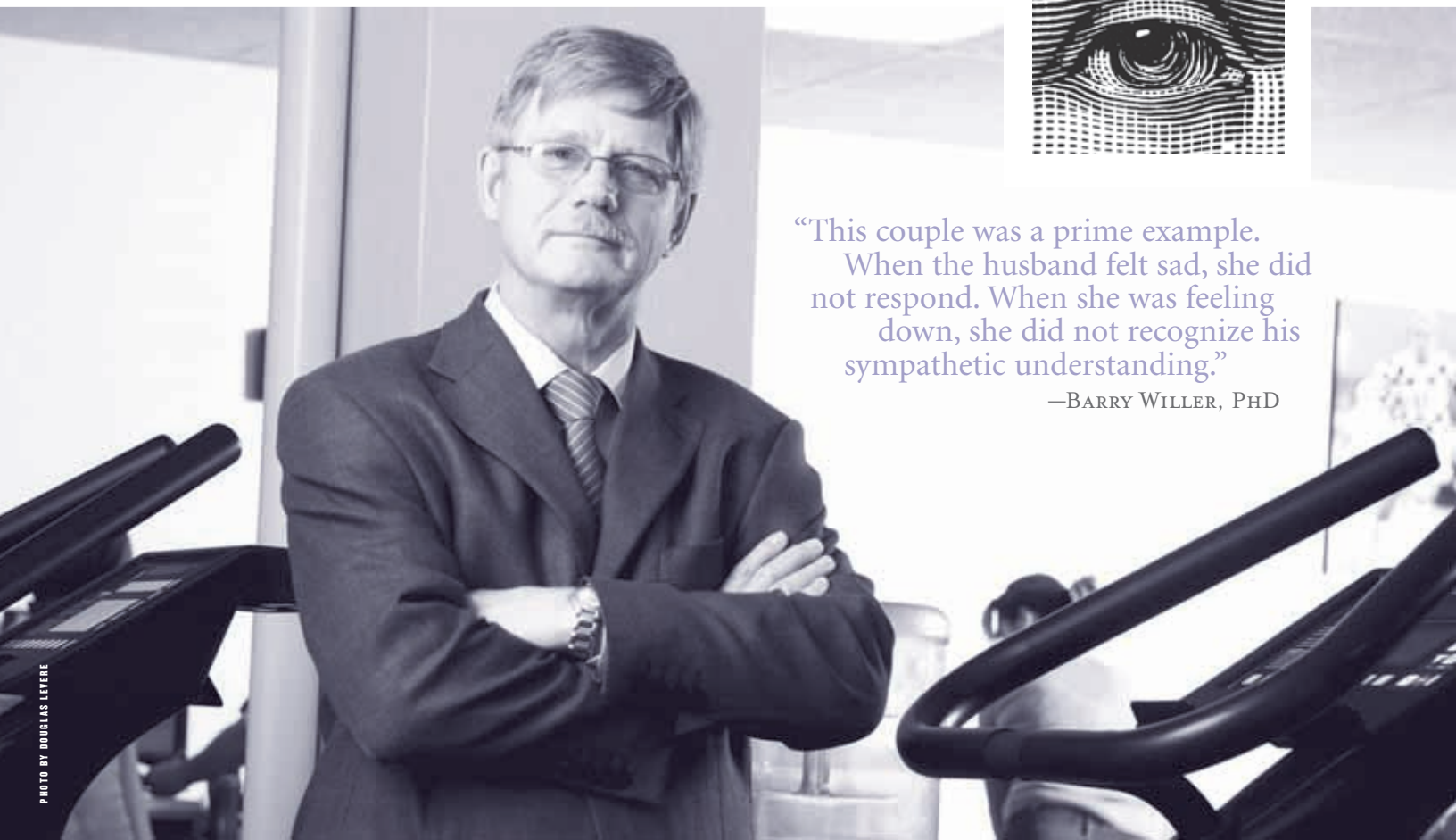
Neural Plasticity and Commonality

PERHAPS THE MOST important observation from Willer's research is the plasticity of the neural structures involved with affect recognition. "What was so exciting about our preliminary study," he says, "is that someone may lose the ability to recognize emotions, but even 10 years later, they can relearn the skill if given the right assistance."

emotions with the two-second time limit. "We give people with brain injury 15 seconds to respond to the facial images, because they process information more slowly. We can't do much about the speed."

In researching and developing this project, Willer also learned that emotional expressions appear to be universal. "It's completely cross-cultural," he says. "No matter what culture you enter, it's the same expressions, the same interpretation. The only exception is in some Muslim areas where women's faces are covered. In these settings, much more expression is communicated in the eyes because only the eyes are visible."

Then there is "happy," which is the only emotion that TBI does not erase, says Willer. "Happy has so much redundant circuitry, so much additional wiring in the brain, that persons with brain injury always recognize happy. I don't know how that happened, but we all can be glad it did." **BP**



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