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Tales of the Tape

Researchers in psychology have found new ways to listen in on everyday human behavior

By DAVID GLENN

Austin, Tex.

One morning in 2004, a pair of undergraduates at the University of Texas at Austin walked down a street, perhaps on their way to class. They talked to each other in a low and sleepy murmur, using affectionate, melodic tones, bantering in a private idiom.

"But you want to love me, yes?" said the young woman.

"But you whine," said her boyfriend.

"No, I just require kisses," she said.

"Oh, but you *whine*," he repeated. She gave a short, derisive laugh. They kissed and then continued down the street in silence, their heels clip-clopping on the sidewalk.

It was a fleeting exchange, the kind of thing that slips out of memory within hours. But this particular moment escaped the abyss: It was captured by digital audio recorders that the lovers were wearing on their belts.

These students were not fevered audio bloggers or diarists. They were taking part in a psychological study that invited long-term couples to carry cleverly engineered recording devices for six days. Every 12 minutes, the recorders switched themselves on for 30 seconds, capturing whatever happened in that brief interval.

During the past six years, researchers at Texas have employed the gadgets — which they call electronically activated recorders, or EAR's — in nearly a dozen studies. They have collected tens of thousands of 30-second audio fragments, which have been used to shed light on, among other things, romantic couples' dynamics, cross-cultural variations in sociability, and how students coped after the September 11 attacks.

It has not been easy. The early versions of the EAR were awkward, bulky, and prone to breakdowns. (The current model is much more compact, roughly the size of an iPod.) And the researchers have had to deal with the legal and ethical questions raised by a technique that inevitably records the voices of unknowing bystanders as well as those of research subjects.

"This methodology is not for the faint of heart," says James W. Pennebaker, a professor of psychology at Texas and the ringleader of many of the EAR researchers. "The transcribing process is truly difficult." Even with a small army of research assistants, it can take many months to transcribe and analyze a single study's set of EAR recordings.

Despite that headache, Mr. Pennebaker and his colleagues see great promise in the technique. "What really got me hooked on the method is the ability to do research that has a high degree of ecological validity, if you want to put it in scientific terms," says Matthias R. Mehl, an assistant professor of psychology at the University of Arizona who helped to invent the EAR when he was a graduate student at Texas a decade ago. "But part of what I mean is immediacy. You listen to those sound files and they are really vivid."

The EAR projects are a small part of a broader movement toward naturalistic studies in psychology — that is, studies that attempt to capture human behavior in real-world environments. Research psychologists have become increasingly aware of the limitations of, on the one hand, questionnaires and other so-called self-reports, and, on the other hand, laboratory studies in which people are observed within highly controlled conditions. Some scholars are now trying to transcend those limits by designing studies that offer, in Mr. Mehl's phrase, ecological validity.

"The secret, which we hardly ever talk about, is that self-reports are not very highly correlated with any kind of behavior," says Mr. Pennebaker. "And that's a really nasty problem." With the EAR projects and other studies of natural behavior, he adds, "we can begin to answer the question: What are the psychometrics of life?"

Behavioral Codes

If the two students captured on the "Oh, but you whine" recording listen to it 20 years from now, they might find it poignant, cringe-inducing, or both. But Richard Slatcher, a graduate student at Texas who has listened to thousands of such audio fragments, has become relatively immune to their emotional power.

As he sits at his computer explaining how this particular recording has been "coded" for purposes of the study, he seems vaguely like the lackadaisical memory-erasing technicians in the film *Eternal Sunshine of the Spotless Mind.*

"Let's see," says Mr. Slatcher, scrolling across the spreadsheet on which he and his research assistants have analyzed this fragment along dozens of different dimensions. "It's a neutral conversation. They're talking about their relationship a little bit, in that there's some affection involved. We coded that as interest, as validation. ... And let's see. They're talking. They're talking with their boyfriend/girlfriend. There's baby talk going on. They're in transit. And so on."

Mr. Slatcher, who designed this study of couples' dynamics, came to Texas in 2002 specifically to study with Mr. Pennebaker. He had heard of the Austin team's studies of natural language, and he thought that the technique could be applied to the study of intimate relationships — a topic that Mr. Pennebaker himself had not addressed.

"It's been a really nice match," Mr. Slatcher says. "He's an expert on the methodology, and I've hopefully brought some unique perspectives on the relationship side."

Among other things, Mr. Slatcher hopes to use this particular EAR study to learn how to forecast the long-

term stability of a given relationship. For decades psychologists have known that couples' "conflict strategies" — that is, the tactics they use when they argue — are strongly correlated with their likelihood of breaking up. That correlation was discovered largely through laboratory studies in which couples talked about their conflicts in the presence of researchers. (Couples in which one partner tends to escalate conflict while the other withdraws are often headed for divorce.)

Mr. Slatcher, by contrast, would like to get at phenomena that are too subtle and elusive to capture in a laboratory setting. What happens, he wonders, when couples are *not* fighting? Do their emotional expressions during mundane, everyday conversations contain hints about their long-term prospects?

Mr. Slatcher is not sure exactly what he is looking for; like many of Mr. Pennebaker's students, he prides himself on his inductive method.

Before he can attempt such an analysis, however, Mr. Slatcher must complete the laborious process of transcribing and coding the more than 50,000 audio files generated by his 70 couples. He has drafted an elaborate coding manual, which draws on previous coding work by other psychologists, and he takes at least two months to train each of his undergraduate research assistants. It is vital, he says, that the transcripts are coded in a consistent and nonarbitrary fashion. For example — to take just one of his 12 emotional categories — he trains his assistants to distinguish among mild scorn ("Why are you doing it that way?"), moderate scorn ("I really don't like it when you do that"), and strong scorn ("That is such a stupid thing to say").

Sounding Boards

The EAR studies are still in their relative infancy, but they have already generated striking findings about how people spend their time and how their social worlds are organized.

One of the first EAR projects, which was led by Mr. Mehl and Mr. Pennebaker in the late 1990s, found that people spend much more time watching television than they admit to on questionnaires. But Mr. Pennebaker says that such self-deceptions are not the major shortcoming of self-reports. Rather, he is interested in capturing data that people couldn't possibly be expected to recall accurately on a questionnaire. "If I asked you how often you laughed last week," he says, "I don't think you'd have any idea. That's why we needed to get some kind of natural sampling of behavior."

Mr. Pennebaker is especially interested in people's use of pronouns, which he has linked (in the EAR studies and elsewhere) to various elements of personality. For example, he has found that people who are depressed tend to use "I," "me," and "my" relatively frequently.

These data, too, are something that is difficult to capture in a lab or on a self-report. "You have no conception of how often I've used various pronouns in this conversation," Mr. Pennebaker says. "Nor do I, even though it's something that I study. It's almost impossible to pay attention to pronoun frequency unless you kind of turn off your brain and stop paying attention to what people are actually saying."

Mr. Pennebaker and Mr. Mehl happened to begin an EAR study of students' social behavior on September 10, 2001. After the terrorist attacks the following morning, the participants in that study agreed to wear the devices for 10 days instead of two. (Mr. Pennebaker won emergency approval from his human-subjects review board to extend the study.)

Among this study's most interesting findings was that students who spent relatively large amounts of time talking about the attacks in one-on-one conversations, as opposed to group conversations, appeared to cope with the emotional trauma more effectively. (The students' coping was measured by a questionnaire that was administered on September 26.)

Mr. Pennebaker's protégés are using the technology to explore many different avenues. Nairán Ramírez-Esparza, a Ph.D. candidate in psychology at Texas, asked 54 U.S-born students at Texas and 45 students at the Autonomous University of Nuevo León, in Monterrey, Mexico, to wear the EAR for a three-day period. She found that the Mexican students spent much more time in conversations with people of the opposite sex, although the two groups had spent nearly equal amounts of time in same-sex conversations. More generally, she says, "Americans spend much more time alone. They talk much less. Mexicans spend more time talking and doing general social activities. Mexicans spend more time laughing."

Ms. Ramírez-Esparza is quick to add, however, that these differences have at least as much to do with structure as with culture. The Monterrey students' relative poverty, for example, means that many of them live at home with their parents and siblings. A forthcoming study of Mexican-born students at Texas, she says, suggests that, away from home, they talk and socialize less than U.S.-born students do.

Mr. Mehl, meanwhile, is about to begin work on an EAR study of newly diagnosed cancer patients and their spouses. He is curious to learn how, in their private moments, these couples attempt to make meaning out of the threat of mortality.

"Given that most of what coping is about is conversation-based," he says, "most emotional disclosure isn't done in a diary. People naturally do it with their friends, with their social network, with their partners."

And that level of everyday support, Mr. Mehl says, is very difficult to measure and analyze unless you have naturalistic data. He hopes to use the EAR "as a way to study how people cope with upheaval — to study how people's mundane daily behaviors are critical for how they do."

Hearing Aids

The EAR was born in the mid-1990s, when Mr. Pennebaker was studying the relationship between social support and general health. In a widely publicized series of studies, he had discovered that people who are asked to write about past traumatic events have fewer medical problems during the following year (as measured by visits to a doctor) than people who are asked to write about a neutral, unemotional topic.

That phenomenon has held up under a number of subsequent studies, but Mr. Pennebaker was having trouble identifying the mechanisms that might explain it. Among other things, he started to look for, as Mr. Mehl puts it, "fairly subtle indicators of a person's degree of social support and social environments. How much do they talk? Who do they talk to? Do they talk in dyads or in groups?"

It took months to create a device that would do the job. "The first EAR was an old analog Radio Shack tape recorder," Mr. Mehl says. A colleague in Georgia created a piece of hardware that coaxed the machine to turn on for 30 seconds and then shut off for 11 and a half minutes (which meant that a 24-hour period exactly filled a 60-minute cassette tape). "It was a major hassle," Mr. Mehl says. "These things had a battery pack on the outside, and the computer chip was on the outside, so it was very cumbersome."

After several cycles of trial and error, engineers created a device that functioned reliably. (Today's digital

versions are much more compact, and the participants have no way of knowing when they are on or off. In the early, analog days, participants could occasionally detect the whirring of the motor.)

The researchers' next step was to win approval from their human-subjects board. This was not a simple matter: The machines routinely pick up speech from friends and bystanders who have not signed any consent forms. "We consulted with a lawyer in Texas," Mr. Mehl says. "The crucial thing is to eliminate any information that might personally identify anyone on the recordings." The 30-second intervals are so short, he says, that bystanders are rarely referred to by name or otherwise identified. In the rare cases where that does happen, however, the information is purged from the transcripts and from the audio files themselves.

The second ethical rule is that the participants are strongly encouraged to wear the EAR in a visible place — not concealed under their clothing — and to explain to their friends and acquaintances what they are doing. "Initially, a lot of my friends did abnormally goofy things, trying to get it caught on tape," says Javier Smith, a Texas undergraduate who participated in Mr. Slatcher's study of couples. (When the researchers detect conversations that appear to be staged, they toss them out.) "But after a few hours, people started to forget about it," Mr. Smith says.

Jessica Briggs, a Texas student who also took part in the couples' study, says she got over her self-consciousness very quickly and was never seriously tempted to censor herself. "If I said something, I don't know, sort of strange, or an inside joke, I would say to myself, Well, they'll never know what *that's* about," she says. "But, no, I was never tempted to change what I said."

When asked whether he worries about self-censorship, Mr. Pennebaker says, "Yes, to some degree. But I think at the end of the day, you end up being yourself. ... Besides, the kinds of things that people censor aren't the kinds of things that I'm looking for anyway. I'm looking at pronouns, prepositions, and emotion words." (That is less true for Mr. Slatcher's study, since he is indeed looking for conflicts about topics like sex, alcohol, and money, in addition to Mr. Pennebaker's usual variables.)

'Closer to the Drama'

The EAR studies are a first cousin of "experience sampling" — a 25-year-old technique in which psychologists ask people to note what they are doing and how they are feeling every few hours. (In the most recent versions, the researchers communicate with participants using BlackBerry-like devices.)

Reed Larson, a professor of human development at the University of Illinois at Urbana-Champaign who was one of the earliest experience-sampling researchers, says the EAR projects seem to hold great promise, although he is not deeply familiar with them.

Traditional experience-sampling, he says, avoids some but not all of the usual limits of self-reporting. "It's people's own accounts," he says. "Even though it's an account in the moment, it's still kind of filtered through their own interpretive process." The EAR studies, by contrast, "might get us closer to the drama of daily life," he says.

Mr. Larson offers two cautionary thoughts, however. First, he points out that many types of studies might legitimately require the gathering of participants' own subjective accounts of their actions and feelings. Second, he worries that it might be difficult for EAR researchers to assemble a representative population sample. Unusually shy or self-conscious people might be reluctant to sign up.

Mr. Pennebaker and Mr. Slatcher say that they are aware of the dangers of selection bias, but that they are confident that their samples have included the full gamut of personalities.

Beyond their work with the EAR, Mr. Pennebaker and his colleagues are pursuing a broad range of studies of "natural language" — often using techniques that are much faster than the EAR. Mr. Slatcher, for example, has asked romantic couples to give him copies of their instant messages over a seven-day period. In one such experiment, he found that his research assistants could successfully use the messages to intuit which couples would later break up and which would stay together. And the couples' actual behavior, as expressed in their IM dialogues, was more strongly correlated with their relationship satisfaction than was, for example, their "agreeableness" ratings on personality questionnaires.

The Texas researchers are also gathering language samples from blogs and other online forums in which people discuss depression. These samples are being harvested from Web sites based in Germany, Mexico, Poland, and the United States. Among other things, the scholars hope to learn whether the linguistic markers of depression that Mr. Pennebaker has identified operate in languages other than English.

Another of Mr. Pennebaker's students, Daniel Conor Seyle, has analyzed online postings and other texts written by political extremists. He hopes to identify linguistic cues that might indicate which extremist individuals and organizations are likely to use violence.

Mr. Pennebaker expects that psychology's turn toward naturalism will accelerate. "If you're picking a dating partner," he asks, "would you rather know what they do, or who they think they are? Ideally you'd like to know both. But if you could only know one, you'd probably want to know: Do they read books and newspapers? Do they drink and smoke? Do they like to go to church a lot? That's going to tell me a lot more, in some ways, than any personality inventory."

This raises a fundamental question that the EAR projects and other naturalistic studies are rubbing up against. Is "personality" a property of the self — that is, something that is best described by our own subjective self-perceptions? Or is personality better understood as a property of outside observers — the friends, colleagues, and acquaintances who see how we actually behave?

"The problem with self-reports isn't that they're inherently wrong or evil," Mr. Pennebaker says. "The problem is that they tell only part of the story. Self-reports are essentially tapping people's self-theories. We're asking people who they believe they are. And who they believe they are is often false."

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