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CRITIC'S NOTEBOOK

The Boston Globe

A new kind of experimental music

By Richard Dyer, Globe Staff | April 16, 2006

Keith Lockhart looked as if he were wired up for a journey into space last week before leading the Boston Symphony Orchestra in a family concert. Camera crews documented the backstage process of attaching sensors to his body and fitting him with a special Lycra biking jersey that held wires in place. A scientific experiment had become a media event even before any data had been recorded.

The researchers aren't interested in outer space. Instead they want to explore inner space, to study the physiology that lies behind the psychology of music and its effect on the mind and emotions. Everyone knows that music does exert such an effect, but exactly how this process functions remains a mystery.

But at points in Symphony Hall last week I wondered how the scientists could measure anything meaningful. An audience full of restless children creates a special dynamic, wonderful in its way, but not conducive to sustained, involved, responsive listening. The slow movement of Mozart's Clarinet Concerto is profoundly emotional music, but it is difficult to enter fully into its world when a child is crawling behind your legs, ignoring the hissing command center of his mother.

"The purpose of the experiment that we undertook in Symphony Hall was to explore the communicative signals a conductor gives to the musicians and the audience, and how the musicians and audience respond to them," says Daniel J. Levitin, a professor of psychology at McGill University in Montreal. "Nobody has ever done anything like this, ever, but knowing more about how the brain is organized and hooked up could be a long-term result of this kind of work."

A conductor's job, like an actor's, is not to experience an emotion directly but to know what it is and how to communicate it to others. Lockhart is a physically active conductor, and a sensor flew off his arm into his hand while he was leading the overture to "The Marriage of Figaro." Before the next piece an assistant came onstage to tape it back into place.

One wondered how different the results of this experiment might be if the BSO's minimal-motion music director James Levine were on the podium, if a regular subscription audience were sitting quietly and receptively in its seats, and if a Mahler slow movement were on the

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program instead of "Green Eggs and Ham."

Saturday's experiment measured Lockhart's respiration, muscle tension, heartbeat, galvanic skin response, and other physiological factors as he conducted a program of short pieces by Mozart and Rob Kapilow's Dr. Seuss operas "Gertrude McFuzz" and "Green Eggs and Ham." The responses of five members of the orchestra and of 15 members of the audience were measured simultaneously by the same means; an additional 35 audience members recorded their emotional responses by activating a sliding mechanism. A further stage of the experiment will take place next month in Montreal, when an audience will watch a video of the Symphony Hall concert. Selected members of that audience will again be wired so researchers can study the differences between the way the public responds to an electronic performance and to a live one.

It will be months before Levitin, MIT-trained Teresa M. Nakra, and the other collaborators on the project can analyze the data they have assembled, draw conclusions, and publish them. They are not in a hurry to predict the results of their analysis, and while they are careful to express their gratitude to Lockhart and the BSO, they are aware of the built-in limitations of what they regard as a first step in their research.

"The true value of the research will emerge," Nakra says, "only when we repeat and refine the experiment, working with different conductors, performers, and audiences under different conditions."

Levitin nevertheless believes in the validity of "working in realistic environments at the cost of some experimental rigor," quoting Alan Watts's observation that if you want to study a river, you can't just fill a bucket and carry it to the bank to study it -- if you do that, you lose the essence of riveriness.

"Given the opportunity to go into an actual concert hall, with a great conductor and a great orchestra, and a conductor who is really fascinated by the science, we jumped at it," he says.

Both Nakra and Levitin were intrigued by the question of minimalist conductors like Levine, or the late Herbert von Karajan, who in his last seasons was virtually motionless on the podium. Karajan also often conducted with his eyes closed, although most conductors and orchestral musicians will tell you how important eye contact is to communication. Nakra points out that the technology to study eye contact does not yet exist, because the only ways to measure eye activity interfere with making visual contact.

"Regardless of the gestures a conductor is making as the external, motoric manifestation of their feelings, those feelings would be the same from one conductor to another," Levitin says. "I would expect muscle activity as measured in tension to be the same in Lockhart and Levine, even though the movements might be entirely different."

Nakra says, "The emotional impact of a performance sometimes correlates with the level of physical activity, but it doesn't have to." And she points to a study made more than three decades ago by the Austrian Gerhart Harrer, in collaboration with Karajan.

Harrer compared electrocardiograms of the conductor when he was conducting Beethoven's overture "Leonore, No. 3" and when he was piloting an airplane under dangerous conditions.

"The musical EKG," Nakra says, "has a tremendous gradation

between high and low, and the peaks line up with the peak moments in the music. The gradations when piloting are much lower, and the peak during three dangerous maneuvers is lower than the peak in conducting."

That's not a surprise, given the intensity with which many people respond to their music of choice. Magic and mystery are integral and probably essential aspects of musical experience, just as they are in other intellectual and emotional experiences, like sex.

"It's hard to imagine that there would be a definitive answer to the questions about emotion and music," Nakra says. "So I don't purport to have the answers; just perhaps a new way of framing and asking the questions."

Science may illuminate magic and mystery, but it isn't going to eliminate them anytime soon. ■

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