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BACH'S EMI CONCERTO

Are computers approaching human-level creativity? If there were any doubts in the audience at "a series of symposia prompted by some striking recent developments in artificial intelligence," EMI was brought to dispel them. EMI (Experiments in Musical Intelligence) is "the most thought-provoking project in artificial intelligence that I have ever come across," according to Douglas Hofstadter, organizer of the event that was sponsored by the Center for Computer-Assisted Research in the Humanities. Hofstadter, a professor of cognitive science at Indiana University, is a visiting scholar at the Stanford-based center.

Invented by David Cope, a composer at the University of California-Santa Cruz, EMI came to Stanford after beating composer Steve Larson in a contest to create music more faithful to the style of Johann Sebastian Bach. Three entries, one by Bach, one by Larson and one by EMI, were submitted to an audience that mistakenly concluded that Larson's piece was EMI's and that EMI's composition was Bach's.

But EMI's more well-matched competition was JAPE, a "funny machine" presented to a panel of experts exploring the theory of humor and whether computers are coming closer to understanding it. JAPE, a program authored by Kim Binsted, can create puns that many find hilarious.

The Stanford symposium that brought world experts in different fields to deliver talks on the degree to which computers have become genuinely creative included two live concerts of EMI's music. EMI's efforts to mimic the style of Beethoven were less successful. In any case, the implication rejected by many composers and musicians is that musical style may consist of just a collection of simple recipes and that feelings and intent are not as important after all.

In his book, *Gödel, Escher, Bach*, which won a Pulitzer Prize in 1980, Hofstadter speculated whether music would ever be composed by an artificial

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Computer Music

intelligence machine. The machine would have to learn what it feels like to be alive, he wrote then. It "would have to wander around the world on its own fighting its way through the maze of life and feeling every moment of it." Now he is not quite so sure. "I find myself baffled and troubled by EMI," he said at Stanford. "The only comfort I can take at this point comes from realizing that EMI doesn't generate style on its own. It depends on mimicking prior composers."

Music Professor Jonathan Berger, a composer and researcher at Stanford's Center for Computer Research in Music and Acoustics, compared EMI's music to words spoken by an aphasic speaker: "They are in the right grammatical order, but devoid of meaning."

JAPE, on the other hand, was matched to the witty expertise of comedian Steve Martin. Martin's funny rejoinders to JAPE's jokes kept the audience of the fourth symposium laughing. Although a survey showed no one could really tell the difference between computer-generated and human-generated puns, Martin's humor, everybody agreed, seemed more natural.

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