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## Innovation

### Software Cracks Da Vinci's Coded Smile



By Syndication  
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The study used "face tracking" software to create an "average neutral expression" from a database of young female faces. By comparing this image with key facial features of a picture, such as the curve of the lips and the crinkles round the eyes, the computer program is able to give a score for six basic human emotions: happiness, surprise, anger, disgust, fear and sadness.

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➤ A femme fatale with a mocking smile, a man in drag, an expectant mother, or simply a housewife trying to hide the appalling state of her teeth. The true meaning of Mona Lisa's enigmatic smile has haunted art lovers for years, but scientists now believe they have hit upon a breakthrough.

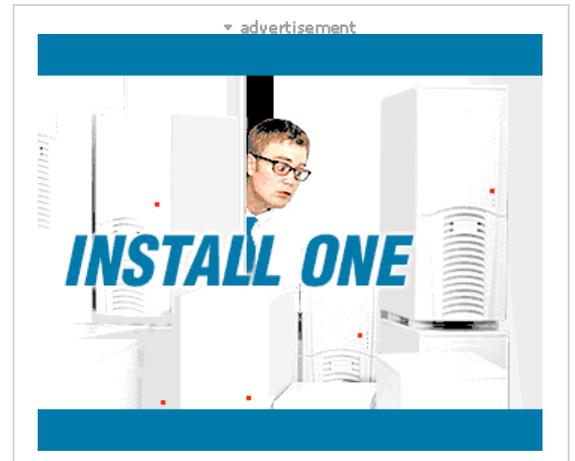
Using a computer program designed to reveal the emotions of a face, they have worked out that Leonardo da Vinci's muse was 83 percent happy, 9 percent disgusted, 6 percent fearful and 2 percent angry.

The study, which was carried out by Professor Nicu Sebe at Amsterdam University using "face tracking" software developed with Professor Tom Huang at Illinois University, involved creating an "average neutral expression" from a database of young female faces.

By comparing this image with key facial features of a picture, such as the curve of the lips and the crinkles round the eyes, the computer program is able to give a score for six basic human emotions: happiness, surprise, anger, disgust, fear and sadness.

According to New Scientist, the technology could be used to create computers that change how they react in accordance with the user's mood.

Prof. Huang said the findings of the Mona Lisa study "validate the algorithm in terms of the dominant emotion" of happiness, but



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added that more was necessary to work out her deeper thoughts.

"If you're interested in things like enigma or mystery, maybe these six categories are not enough," he said.

"But this is just for fun. We really need to talk to psychologists or artists to find out how you model those more subtle aspects of facial expression."

There have been numerous theories about both the identity of the sitter and what her smile means. They range from the plausible -- a leading candidate to be Mona Lisa was pregnant at the time -- to the more fanciful: that it was da Vinci's alleged gay lover or a self-portrait in drag.

Entering into the spirit of the work by Prof. Huang and Prof. Sebe, Dr. Cynthia McVey, a psychologist at Glasgow Caledonian University, tried to explain the apparent conflict in the emotions they found in the Mona Lisa's face.

"She could have been chuffed he wanted to paint her and ... a wee bit disgusted by the old man doing the painting. He might have been in the nude or have come on to her for all we know," she said. "Or maybe she was annoyed because she had been sitting there for ages and he's still not finished."

Professor Donald Sassoon, of London University and author of *Mona Lisa: The History of the World's Most Famous Painting*, said da Vinci had deliberately tried to obscure his model's real emotions.

"One of the most important things about the portrait is that Leonardo uses a technique -- that he didn't invent, but certainly developed -- called *sfumato*, which means 'smoky'," he said.

"It keeps unclear the corners of the face, particularly the corners of the smile. If you leave these undetermined, we are not quite sure what the expression is, which means we can put our fantasies onto it."

Prof. Sassoon said French academics had started the craze for analyzing the smile in the 19th century; previously, it was not considered to be so enigmatic.

Asked why Mona Lisa was smiling, he said: "How the hell do you know why someone is smiling in a photograph? In the 15th century, teeth are terrible so they not going to show them."

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