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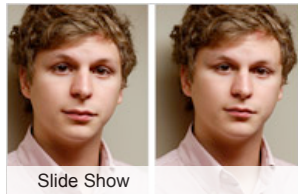
Lars Klove for The New York Times, manipulation by Tommer Leyvand

BEFORE AND AFTER Martina Eckstut, left, and the image produced by a "beautification engine." More Photos

By SARAH KERSHAW Published: October 8, 2008

IS the woman pictured on the right more attractive than the woman on the left? Do her wider-set eyes, the longer distance between her hairline and the bridge of the nose, and the rounder shape of her face make her more beautiful?

Multimedia



Before and After

The photograph on the right was doctored by the "beautification engine" of a new computer program that uses a mathematical formula to alter the original form into a theoretically more attractive version, while maintaining what programmers call an "unmistakable similarity" to the original.

The software program, developed by computer scientists in Israel, is based on the responses of 68 men and women, age 25 to 40, from Israel and Germany, who viewed photographs of white male and female faces and picked the most attractive ones.

Scientists took the data and applied an algorithm involving 234 measurements between facial features, including the distances between lips and chin, the forehead and the eyes, or between the eyes.

Essentially, they trained a computer to determine, for each individual face, the most attractive set of distances and then choose the ideal closest to the original face. Unlike other research with formulas for facial attractiveness, this program does not produce one ideal for a feature, say a certain eye width or chin length.

They ran the photographs of 92 women and 33 men through the engine, creating before and after shots

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— essentially, a computer-generated version of hot or not. Changes were made only to the geometry of the faces; unlike the digital retouching done for fashion magazines, wrinkles were not smoothed and hair color was not changed.

The research, published in the August proceedings of Siggraph, an annual conference on computer graphics, is one of the latest studies in a growing field that merges beauty and science, a subject that has drawn mounting interest in academia in the last decade.

Studies have shown that there is surprising agreement about what makes a face attractive. Symmetry is at the core, along with youthfulness; clarity or smoothness of skin; and vivid color, say, in the eyes and hair. There is little dissent among people of different cultures, ethnicities, races, ages and gender.

Yet, like the many other attempts to use objective principles or even mathematical formulas to define beauty, this software program raises what psychologists, philosophers and feminists say are complex, even disturbing, questions about the perception of beauty and a beauty ideal.

To what extent is beauty quantifiable? Does a supposedly scientific definition merely reflect the ideal of the moment, built from the images of pop culture and the news media?

“How can they prove it?” said Lois W. Banner, a historian who has studied changing beauty standards, referring to scientific efforts to define attractiveness. “They are never going to locate it on a gene. They are never going to get away from the cultural influence.”

Tommer Leyvand, who developed the “beautification” software with three others at Tel Aviv University and who works in development for Microsoft in Redmond, Wash., said the goal was not to argue that the altered faces are more beautiful than the originals. Instead, he said, it was to tackle the challenge of altering a face according to agreed-upon standards of attractiveness, while producing a result that left the face completely recognizable, rather than the product of cosmetic surgery or digital retouching.

“This tool shows in the most simple fashion how easy it is to manipulate photographs and make people more attractive,” Mr. Leyvand said. “But the difference is so subtle that it just shows how insignificant it is. We’re talking about a few inches maybe and a slightly changed perception.”

For most faces, the software made subtle changes, with the person’s essence and character largely intact. In the case of the woman pictured on the front page of this section, the changes were more striking, probably because her features, Mr. Leyvand said, do appear more ethnic than many of the other women and men he photographed. (The researchers have not yet created a program that would be designed with what they call a beauty estimator for nonwhite racial and ethnic groups.)

The woman, Martina Eckstut, 25, an account executive for Kay Unger New York/Phoebie Couture, volunteered to be photographed for this article and have her image beautified by Mr. Leyvand’s computer program. She said she was struck by how different she looked in the second shot.

“I think the after picture looks great, but it doesn’t really look like me at all,” she said in an e-mail message. “My entire bone structure, face shape and eye size is different, and my lip color looks changed as well.”

She added, “I would like to keep my original face.”

While several psychological studies over the last few decades also suggest that perceptions of beauty and attractiveness tend to be universal, critics of that work say it is debatable whether a person’s beauty is actually enhanced by such changes. Character can be lost. A blandness can set in. The quirky may become plain.

When Mr. Leyvand put a photograph of [Brigitte Bardot](#) through his program, her full and puckered lips were deflated, and the world-famous beauty seemed less striking — less like herself.

(By contrast, the before and after shots of the actor James Franco were almost indistinguishable, suggesting his classically handsome face is already pretty perfect.)

After viewing the before and after photographs of anonymous subjects in Mr. Leyvand’s research paper, Dr. Banner, who is a professor of history at the [University of Southern California](#), said the original faces were more attractive.

“Irregular beauty is the real beauty,” said Dr. Banner, adding that such attempts to measure beauty are driven culturally by sameness, making everyone look alike.

For centuries, philosophers and scientists have tried to define a universal ideal of beauty. St. Augustine said beauty was synonymous with geometric form and balance, according to Nancy Etcoff, a psychologist at Harvard Medical School and the author of “Survival of the Prettiest: The Science of Beauty.” Aristotle defined beauty, in part, as “order and symmetry and definiteness.”

Artists and architects since the Renaissance — and more recently, plastic surgeons — have tried to



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quantify beauty using the theory of the golden ratio, which holds that there is an ideal relationship between two measurements that can be expressed as a mathematical constant. Da Vinci, Dalí and Mondrian all are said to have used the golden ratio in their art.

“The first reaction we have to faces will be based on face symmetry, health, averageness,” said Alexander Nehamas, a philosopher and professor of the humanities and comparative literature at Princeton, who has written about beauty. “But we never see a face like that in real life. We see faces in connection with people expressing emotions and ideas, all those aspects of the face are essential to our deciding whether a face or a person is beautiful.”

He added: “Lauren Hutton’s face is asymmetrical. One eye is below the other, her teeth have a gap. But it’s not just her face, it’s everything about her.”

Mr. Leyvand suggested there were practical applications for his software, including advertisements, films and animation. He also said he had heard from plastic surgeons interested in the software. That did not surprise those who have studied the history of beauty.

“We have always had a huge industry to make people look better,” Dr. Etoff said. “Everyone wants to look better. And we keep taking it further and further to all these images that have been doctored. There is a whole generation of girls growing up who think it’s normal not to look the way they really look.”

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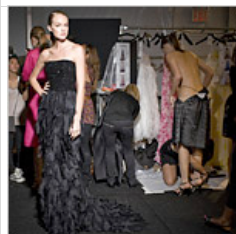


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