PHYSIOLOGY

A Matter of Muscles

Facial Expression of Athletes in Competition is Studied By a Sculptor-Physician Who Molds Results in Bronze

By JANE STAFFORD

DID YOU ever wonder why an exhausted runner nearing the finish line looks so surprised? It is true that exhaustion and surprise produce nearly the same expression on the human face, even though they do not feel at all alike.

The reason is that you use the same muscles, when you raise your eyebrows in surprise, that the sprinter uses when he is making his last desperate effort to pull his drooping lids open before utter weariness shuts them.

Dr. R. Tait McKenzie, professor of physical education in the University of Pennsylvania, has made a special study of facial expression in athletes. Because Dr. McKenzie is also a sculptor, he has learned the skillful tricks that artists use to portray emotion on canvas and in bronze and marble. It is all a matter of knowing which muscles are called into play by different feelings.

These muscles which produce such striking and extraordinary changes in expression differ from the general muscular system in that they have the power to move the skin in various directions. They are the remnants of the great muscle sheet that the horse or cow uses in summer to flick flies that bother him.

This relation between human facial muscles and muscles of other animals appears in the human expression of scorn, which, according to Dr. McKenzie, is a pale reflection of an expression seen in lower animals. You will see what he means if you watch a snarling dog "bare his fangs as he walks stiff-legged and bristling toward his enemy." When a haughty lady curls her lip in contempt and dislike, she is merely making a poor attempt at what the dog does, according to the sculptor-physician.

Worked by Electricity

That the mechanism of facial expression is more a matter of muscles than feelings was shown by an experiment of a French scientist, Douchez. He worked with patients who had no sensations in the region of the face. Yet he could contract their muscles by electrical stimulation and so produce various expressions. In this way he saw just which muscles were responsible for each expression of the face.

For example, it is a circular, purse-string muscle of the mouth that puckers the lips for whistling or kissing. The corrugator muscle that wrinkles the forehead is the one that produces the expression of pain. In fact, the French name of this muscle means, literally, muscle of pain.

No matter how different the emotions behind them may be, weeping and fury are not far apart. The chief difference between these expressions is in the fact that the eyes are closed in weeping but opened wide in fury.

Weeping and Laughing

Weeping and laughing, on the other hand, both involve violent action of the respiration, but the combination of muscles used is slightly different. There is a sketch by Rubens which clearly shows how laughter interferes with breathing. In this picture you can see that the man's blood pressure is rising and tears are coming from the pressure of the eyelids over the eyes. Rodin, the famous French sculptor, has shown how the muscles are used in producing the expression of weeping in his study of the Weeper.

Muscles are accountable for that elusive expression known as "looking pleasant" without definitely smiling. The artists have tricks for portraying this, too. The famous and much-discussed expression of the Mona Lisa, for instance, was achieved by the simple trick of painting the lady with a smile on one side of her face only, Dr. McKenzie explained. Leonardo Da Vinci, who painted her, would have been much surprised at all the discussion and controversy over his masterpiece, in Dr. McKenzie's opinion. If you look at only one side of the lady's face at a time, covering the other or varying your concentration, Dr. McKenzie says, you will see that the difference is merely that one side of the mouth is raised in a slight smile, while the other is not.

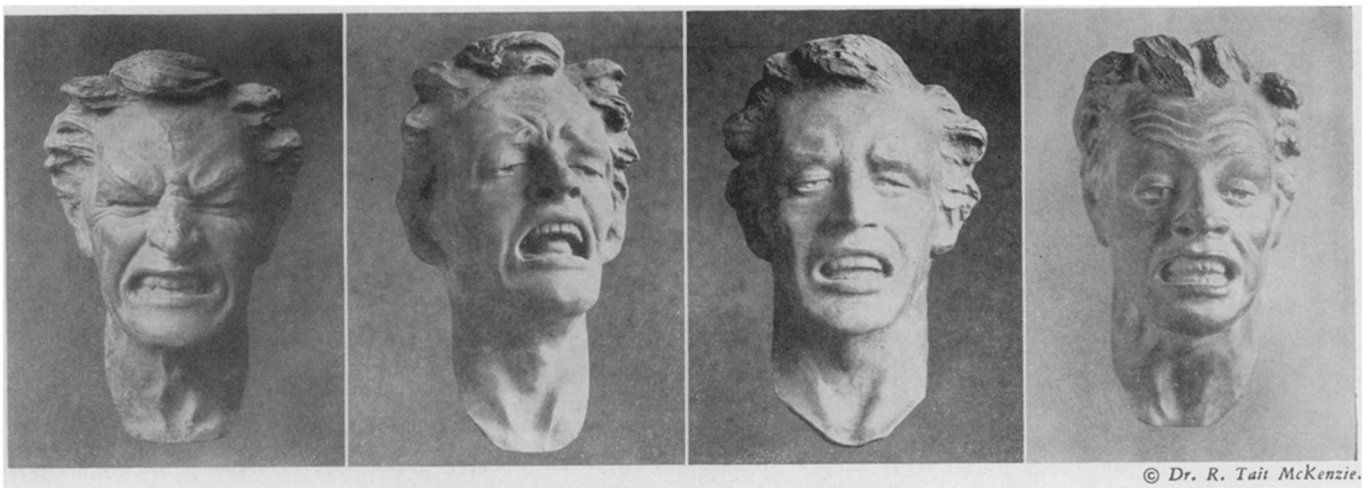
"To the layman, this is a mystery," Dr. McKenzie said, "just as is the fact that the eyes of a front-face portrait have the disconcerting power of following you about the room."

Another artistic trick, which has really become a convention, consists in portraying the expression of adoration by raised head and upturned eyes. DuBois, in his famous statue of Jeanne D'Arc in front of the Rheims Cathedral, showed the Maid in this attitude, and you will find it repeated again and again in old paintings of the saints and in the works of modern artists, too.

To go back to the similar expressions produced on the face by exhaustion and surprise, Dr. McKenzie recalled that the eyes are ordinarily held open by the muscles of the eyelids. But when you are completely exhausted, and these tired, perhaps paralyzed, eyelid muscles can no longer hold your lids open, you call on the larger muscles in your forehead that pull up the eyebrows and at the same time pull the drooping lids apart enough for you to see. Accordingly, if an artist wants to show either surprise or exhaustion on his canvas, he paints the eyebrows curved and high in the face, with little wrinkles above them, and with the upper lids covering perhaps half of the eye.

Try It on Yourself

You can see it in the mirror if you watch your own face when you try to keep your eyes open just by pulling your eyebrows up.



The face of physical effort, preceding exhaustion, is the face of rage, Dr. McKenzie has observed. You see it on the faces of sprinters who are exerting themselves to the utmost, particularly those who are not winning the race. In fact, Dr. McKenzie humorously pointed out, if any but the winner comes in without wearing that look of rage and fury he is apt to hear about it from the coach.

The expression is caused by a veritable explosion of energy in which the eyebrows are drawn down, the blood pressure is raised, the veins are enlarged and stand out, and the eyes are closed, if possible; though this is a dangerous procedure as the runner is apt to fall. This same explosion of energy makes the man hold his breath, draw up the upper lip and draw down the lower one, though not at the corners, and clench his teeth. The closing of the eyes is a protective measure, to guard the delicate blood vessels from rupture due to the enormously increased pressure on them. This expression of rage and fury actually helps the runner with his race, Dr. McKenzie explained.

The sculptor-physician has made a long study of the facial expressions of athletes in competition, noting how they reflect the physiological processes of the various stages of exertion. There is strong resemblance between the expressions of the athletic competitors, particularly in track events, and the expressions seen in some stages of illness, he found.

Four Bronze Masks

In the course of his study, he modelled four bronze masks showing the expressions of violent effort and of the progress of fatigue.

One of these masks shows the expression of violent effort which Dr. McKenzie described as being akin to that of rage.

The second mask is that of the breathless runner. This man wears the anxious face of mental distress. The same expression is seen on the patient suffering from double pneumonia or from a rapidly failing heart.

"No form of physical anxiety is more terrible," Dr. McKenzie said of breathlessness.

At this stage in the race, the man's tired eyes tend to close. His eyebrows are wrinkled. His open mouth gasps for breath. During the first part of the race there may be a feeling of exhilaration, but soon the feeling of distress becomes more acute. The runner feels as if a tight band were drawn about his chest and this is exactly the way his face looks. Dr. McKenzie pointed out how, at this stage, the man's nostrils are widely dilated, his lips retracted, the angles of his mouth drawn down and his head thrown back to make a straight way for the air to come down to his lungs.

"Second Wind"

After this stage the runner gets what is popularly called his "second wind." Dr. McKenzie explained this as the moment when the respiration and heart action catch up with the output of waste products in the blood stream. You can see the relief in his face, just as you can see the stupor-like look of intoxication which marks the third stage of fatigue.

Here is seen the dazed expression of semi-consciousness. The expression of the upper eye-brow is softened. The eyes appear very tired. The lips are not drawn back so sharply. In this condition the man may stumble or may unintentionally commit a foul. He fights off exhaustion by closing his eyes and raising his eyebrows, at the same time throwing back his head.

This expression gives way to that of exhaustion. He draws up his lids to keep his eyes open and opens his mouth more widely. At the same time, he attempts to balance his head with the least possible muscular effort. You will see this same tilt of the head in the weary commuter, catching a few minutes sleep on the train, or in the person who sleeps during church services.

"Little Death"

In the athlete, it is part of his last fight to keep off syncope, which Dr. McKenzie called the "little death," and which is a temporary suspension of consciousness due to brain anemia.

For when you see the athlete finally collapse over the finish line you are getting a sudden glimpse of death. At this time if the man's eyelid is raised, it will be seen that his eyeball is turned upward; his nostrils are pinched and his eyes are deep in the socket.

"For the time being, he is dead," Dr. McKenzie said. "It is the little death of syncope."

The expression has been portrayed in art, notably on the face of the Christ as painted by Hans Holbein the Younger in his conception of the entombment.

"Fortunately," Dr. McKenzie concluded, "the syncope of exhaustion is short and the athlete quickly recovers. The heart resumes its function and a healthy color comes back to his face, and he is ready again to show in a future contest the rage and fury of violent effort, the pain and anxiety of breathlessness, the drunken stupor of fatigue and the equivocal, pained pseudo-surprise of exhaustion."