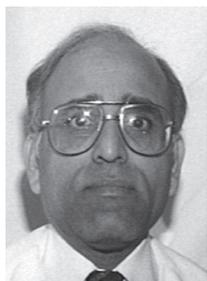


THE LAUGHTER BEHIND THE MASK: FAKE OR GENUINE?

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s that smile fake or real? This has been a question that people have wondered about for centuries. Now in the era of the coronavirus, wearing a mask has become the norm. Does “masking” make it more or less difficult to distinguish between a fake and a real smile?

The art and science of medicine has long been interested in the study of the smile and the laughter. The person who first made significant contributions to the understanding of emotions and facial expression was Guillaume-Benjamin-Amand Duchenne de Boulogne (known as Duchenne of Boulogne). He was born in 1806 in Boulogne, France and studied medicine in Paris. He became interested in electrotherapy and started meticulous evaluations of patients with various neurological disorders. He went from one hospital to another carrying a device which generated faradic current, with which he stimulated muscles in the hands and face of patients with various diseases. He even developed a technique to do muscle biopsy percutaneously (“the harpoon”), enabling him to describe the histopathology of many neuromuscular disorders.

Some, including myself, believe Duchenne is the father of neuromuscular medicine and electromyography. Consider the number of neuromuscular disorders he described, and his use of electrical stimulation technique. In fact, many neurological disorders bear his name with the most famous (or notorious) being a form of muscular dystrophy that affects boys (Duchenne muscular dystrophy), which more than 100 years later was found to be caused by a mutation in the gene for dystrophin. This has the distinction of being the largest gene yet identified. Duchenne also described in great detail the clinical picture of progressive muscular atrophy (Duchenne-Aran muscular atrophy), a form of motor neuron disease.

The term “Duchenne smile” is popular among performers as it denotes a genuine smile or laugh. Duchenne provoked it in his subjects by stimulation of multiple muscles including the orbicularis oculi and the zygomaticus major bilaterally and simultaneously by his “faradization” device. In fake smiles, only the zygomaticus muscles take part, while in emotional smiles, the orbicularis oculi also contract simultaneously causing narrowing of eyes. Duchenne made such detailed studies including photographs of facial muscles and accompanying facial expressions that he was able to publish the first book in medical photography in 1862 (a photo album

accompanied his book *Mecanisme de la Physionomie Humaine*).

Many more in-depth studies have been done to understand the mechanisms of the smile and laughter since Duchenne’s death in 1875. Clinicopathological and brain stimulation studies have contributed to our current understanding. In this context, it is interesting to look at disorders where laughter occurs as part of manifestations of certain neurological disorders (pathological laughter). The disorder termed gelastic (gelos means laughter in Greek) epilepsy, characterized by ictal laughter, has been known to be associated with hypothalamic hamartomas in children. A much less well-known condition is pathological laughter heralding stroke, especially pontine infarct, described as “fou rire prodromique” (prodrome of crazy laughter). Pseudobulbar affect (PBA) is one of the more common causes of pathological laughter and crying. All these observations have led to the concept (a simplistic view) of dual pathways for laughter: one volitional and the other emotional. The volitional component is believed to originate in the premotor frontal cortex and descend to the pons via the corticobulbar tracts. Lesions in this system can lead to volitional facial paresis (weakness of facial muscles on voluntary effort) and may be accompanied by pathological laughter. The emotional path is more complex, with a connection to multiple areas of brain, including the amygdala, the basal ganglia, the hypothalamus and the brainstem.

It is possible to initiate smiles or laughs volitionally, but it is seldom a Duchenne smile, one that genuinely reflects the emotion of mirth and happiness. So how do we distinguish real and fake smiles and laughs when we are wearing our masks? We can look at the eyes alone: do they crinkle a bit? Do they narrow? It’s a real smile!

We know that masks can prevent the spread of the coronavirus, but they may have an added effect: they can hide our fake smiles from each other. ❁

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