



## Angelo Mosso (1846–1910). Brain's rule in physiognomic. A new face of pathological diagnosis

Omar Larentis<sup>1</sup> 

Received: 18 September 2018 / Accepted: 16 November 2018 / Published online: 23 November 2018  
© Springer-Verlag Italia S.r.l., part of Springer Nature 2018

Facial expressions are considered the vehicle by which we convey our emotions. Among them, fear, called the “primary emotion,” played an important role in our evolution. During the second half of the nineteenth century, Angelo Mosso (1846–1910 Turin, Italy) (Fig. 1) studied and classified fear and pain expressions. But he did more than that: he theorized that every expression of suffering corresponded to a peculiar kind of pain. This connection was the basis for the diagnosis method that he developed.

Angelo Mosso was an eclectic figure in the history of medicine, with interests ranging from natural science to pharmacology and neurology. He devoted a large part of his life to the study of human physiology. His studies as a physiologist started in 1871 in Florence under the tutelage of Moritz Schiff (1823 Frankfurt am Main, Germany–1896 Geneva, Switzerland). Starting from 1873, he visited Lipsia and Paris, where he worked with Carl Ludwig (1816 Witzhausen, Germany–1895 Leipzig, Germany), Ernst Wilhelm von Brücke (1819 Berlin, Germany–1892 Vienna, Austria), Emil Du Bois-Reymond (1818–1896 Berlin, Germany), Claude Bernard (1813 Saint-Julien, France–1878 Paris, France), and Étienne-Jules Marey (1830 Beaune, France–1904 Paris, France). Finally, he returned to Italy, where in 1879, at the age of 33, he became a lecturer in physiology at the Physiology Institute of Turin.

The Institute became the international point of reference for experimental physiology research. As a child, Mosso worked in his father's carpenter workshop, acquiring technical knowledge on the construction of devices. This allowed him to devise machinery and equipment to help him correlate the emotions to a human's brain functional organization and to

changes in blood circulation [1]. A positivistic and innovative approach marked his research. Indeed, Mosso was a dogged supporter of the graphic method in order to obtain quantitative evaluations of facial expressions suitable for an objective comparison between individuals.

Mosso's work originated from the observations of Leonardo da Vinci (1452 Anchio, Italy–1519 Amboise, France) who, with his drawings, was harbinger of the school of thought on physiognomy, flourishing in Italy during the fifteenth and sixteenth century [2]. Tied to this tradition, with a pragmatic rather than idealistic approach, he expressed the need to sketch faces to demonstrate their attitude, revealing a connection between emotions and facial expressions. During the nineteenth century, Charles Darwin (1809 Shrewsbury, UK–1882 Downe, UK) analyzed in his treatise “The

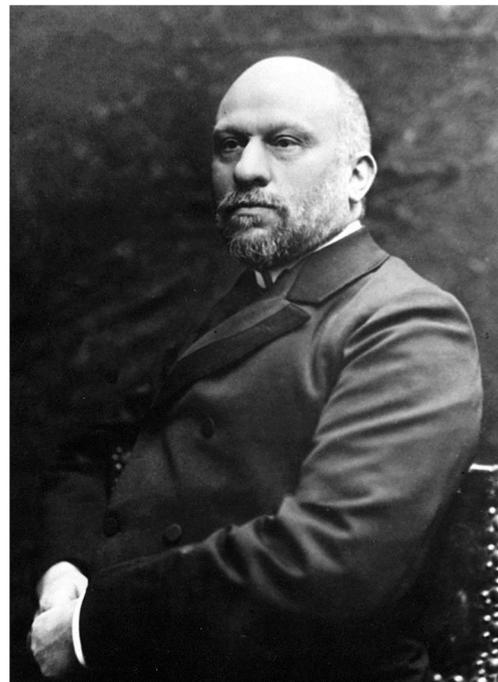


Fig. 1 Angelo Mosso (1846–1910 Turin, Italy)

✉ Omar Larentis  
omar.larentis@gmail.com

<sup>1</sup> Centre of Research of Osteoarchaeology and Paleopathology, Department of Biotechnology and Life Sciences, University of Insubria, v. O. Rossi, 9, 21100 Varese, Italy

expression of the Emotions in Man and Animals” (1872), with a comparative physiological approach, animal and human expressions in order to classify them and to identify their correlations. Darwin’s innovative approach laid the foundation on which Mosso and his mentors investigated the causes, the dynamics, and the origin of physiologic manifestations and human emotions.

In “The Fear,” his first book, published in 1884, Mosso analyzed fear’s corporal expressions through observation, description and hypothesis on their physiologic manifestations. The book starts with the study of involuntary movements and continues with a dissertation on the role of the brain and blood flow during emotional expressions which were correlated to fear-related phenomena like pallor, redness, tachycardia, and breathing, focusing the least on facial expressions. It is worth noting that fear-induced physiological changes in blood circulation had been discovered long before the Victorian age and the Renaissance. Indeed, more than 4000 years ago, a description of a fight-or-flight response appeared in an Egyptian novel [3].

The last part of his work focused on pain physiognomy, highlighting the innovative and original method of Mosso’s research. He went beyond Darwin’s descriptive approach by digging deeper in the study of expressions, measuring the response from dog’s facial muscles and nerves during direct electric solicitation. This allowed him to demonstrate the physical origin of expressions.

Later, he focused his efforts on the study of human facial alterations during suffering. Mosso himself and his colleagues were the first to undergo to his experiments: they squeezed their finger into a wooden vice, taking pictures of their faces at different levels of pain. Mosso considered photography the only technology able to represent pain and human expressions, better than any painter or sculptor of the past. Nevertheless, Mosso required more data and he studied the patients from Turin’s hospitals who were secretly photographed during surgical operations.

He noticed that pain expressions could not be controlled at will, although it can be modified and muffled depending on

**Fig. 2** Expression of pain of the patient



age and personal strength of character. Moreover, he also theorized that every pathology could be diagnosed solely by the expression of pain of the patient (Fig. 2) because “every disease has a pain expression of its own” [4]. This physiognomic interpretation of pain predated several lines of research in scientific and predictive physiognomy that, in Italy, found the leading figures in Cesare Lombroso and his contemporaries [5].

Mosso was an eminent Italian scientist, mainly remembered for his studies on brain activity and blood pressure through the creation of plethysmograph, sphygmomanometer, ergograph, and his balance. Nevertheless, he was a precursor of a physiologic understanding of the human body by a rigorous scientific method. This approach, led by his eclecticism, framed his research into a physiognomic context, predating a line of research that in Italy would be very successful. His proposal to connect a particular disease to a peculiar suffering expression, although today rejected by the scientific community, was the first scientific attempt to understand brain activity and its manifestations.

## References

1. Sandrone S, Bacigaluppi M, Marco R et al (2014) Weighing brain activity with the balance: Angelo Mosso's original manuscripts come to light. *Brain* 137:621–633. <https://doi.org/10.1093/brain/awt091>
2. Britton DG (2002) The signs of faces: Leonardo on physiognomic science and the ‘four universal states of man’. *Renaiss Stud* 16(2): 143–162
3. Galassi FM, Böni T, Rühli FJ, Habicht ME (2016) Fight-or-flight response in the ancient Egyptian novel “Sinuhe” (c. 1800 BCE). *Auton Neurosci* 195:27–28
4. Iorio S, Larentis O, Licata M (2018) Show me the shape of your face and I will tell you what crime you committed. *Am J Forensic Med Pathol*. <https://doi.org/10.1097/PAF.0000000000000398>
5. Borgo M, Martini M, Bragazzi NL et al (2017) Corpus loquens: the speaking body and Abele De Blasio (1858-1945). *Acta Med Mediterr* 33:95–100. [https://doi.org/10.19193/0393-6384\\_2017\\_1\\_015](https://doi.org/10.19193/0393-6384_2017_1_015)