



## The Historical Flaws of Angle's Classification

Xavier Riaud\*

Department of Dental Surgery, National Academy of Dental Surgery, France

### Edward Hartley Angle (1855-1930)

Edward Hartley Angle was born in 1855 in Herrick, Bradford County, Pennsylvania (Figure 1). He graduated with a Doctorate in Dental Surgery in 1877. He became Professor of Orthodontics at the University of Minnesota in 1885 [1].

Angle distinguished orthodontics from general dentistry, not only in its teaching but also in its practice. He consistently tried to standardize orthodontic devices in order to produce them industrially. Therefore, the orthodontist stopped laboratory works. His book was edited seven times from 1887 to 1907. Each outlined the progress of his technique. In 1897, Angle graduated with a Doctorate in Medicine. In 1899, he classified malocclusions meticulously.

On the eve of the 20<sup>th</sup> century, he opposed extractions which, according to him, could harm the completeness of the occlusions. In 1900, Edward opened a school in Saint Louis. His preserving precept was explained in his main work, the 7<sup>th</sup> edition of his book entitled Treatment of malocclusion of teeth which was published in 1907 and which consisted of 628 pages and 641 illustrations. Thus, Angle's system with his expansion arch spread worldwide. However, Angle was not satisfied with his system because it only caused new versions of it. He was looking for a device able to control the position of the roots. He succeeded in 1925 when he introduced the edgewise to the world. The latter was published in 1928 and 1929. It is still used and taught today. Each tooth wears a bracket split by a rectangular throat by a rectangular throat to which is inserted an arch of a corresponding section, and which thereby controls the position and orientation of the tooth. Angle died in 1930, in Pasadena (Philippe, 2003) [1].

### Angle's Classification (1899)

This classification is a real brainteaser for all the students who start studying orthodontics. However, today it is still an essential tool for the preparation of a treatment.

It lists and classifies all the diagnoses concerning malocclusions in three categories, divisions and subdivisions in order to help choose the appropriate treatment for the patient (I, II1, II2, III).

I: 1<sup>st</sup> bottom molar showing a deviation of ½ cusps in comparison with the lower one (likewise for the canine).

II1: The middle upper incisors move forward.

II2: Disocclusion of the lower molar.

III: Mesioocclusion of the lower molar. A reverse occlusion may occur.

In 1907, the author never generalized his study to the whole population but only to the patients who consulted him. "The classes are based on the mesiodistal relations of the teeth, of the dental and maxillary arcs which, depend on the mesiodistal position of the first molars during their eruption and on the arcade. Hence, in the diagnosis of malocclusion cases, we should firstly pay attention to the mesiodental relation between the dental and maxillary arcs as indicated by the relation between the first lower molar and the upper one (keys of occlusion) and secondly, on the positions of each tooth carefully observing their relations with the occlusion line" [2].

On the few thousands of examined cases of malocclusions, the proportion in thousands occupying each class (Table 1).

In the USA, from 1898 to 1902, this classification was definitely ahead of its time due to its static conscious and voluntary juxtaposition of plaster models from Angle's patients, the latter only having at his disposal some maxillary models that he would mesh with one another.

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#### \*Correspondence:

Xavier Riaud, Doctor in Dental Surgery, Doctor in Epistemology, History of Sciences and Techniques, Winner of the National Academy of Dental Surgery, France, E-mail: xavier.riaud@wanadoo.fr

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**Table 1:** Angle, 1907.

Class I		692
Class II	Division 1	90
	Subdivision	34
	Division 2	42
	Subdivision	100
Class III	Division	34
	Subdivision	8
		1.000

## Angle's Goals

A therapeutic protocol was born out of this classification. It aims at choosing a type of treatment resulting in a faultless line of occlusion, and harmonizing the lines of the face with this ideal occlusion and at correcting growth deficiencies.

However, Angle never specified the length of contact between the two arcades [3]. He always saw them closed. This protocol primarily focused on the meshing of the first four molars, the others being fixed by the goodwill of Mother Nature. According to him, this connection defined the distance between the jawbones and determined the harmonious aspect of the face which distinguished an individual from another, a human being from a primate. He never dwelt on the opening and closing of the jaws, neither on the lingual function he often quoted. In his defense, neurophysiologic and molecular mechanisms of the Manducatrice function, notably with its characteristics of dento-dental reflexes or with the position of physiological postural rest, were known much later [2].

To sum up, the determination of Angle's classification emerged from the examination of intimate dento-dental connections and from a transversal angle, or from a horizontal angle when dental arcades are in voluntary occlusion, upper teeth against lower teeth.

This method of classification, taken by this practitioner from plant life and that of the 19<sup>th</sup> century's animal kingdom, gave no scientific contribution on the tridimensional dento-dental relation, neither on the vertical dimension of physiological occlusion or of its rest, nor on the lingual function and the infantile salivary swallowing [2].

## The Occlusion According to "Mother Nature"

In 1899, the occlusion of two jawbones was only guided by "Mother Nature" and Angle's classification did not take the manducator muscles into account, neither their functions, nor the reflexes they control and the physiological rest of the fibers which they are made up of. In 1900, Angle specified the goal of this classification, which was to help to clarify the diagnosis of a natural dento-dental malocclusion (which should now be called "the voluntary dento-dental occlusion of the patient", under "the patient's order" of the dentist, the orthodontist or of the radiotherapist (with regards to lateral teloradiographs)) [4]. Its main goal was the perfect harmony of the outlines of the face. His personal reference was Adonis's face [5]. "All the lines [of the face] are entirely incompatible with mutilations or malocclusions".

Angle never required his orthodontic treatments to be included in class I for the latter was described as an unequivocal malocclusion which concerned 69.2% of the patients consulting him.

Yet, his treatments were put into question by the recurrences

**Figure 1:** Edward Hartley Angle (1855-1930).

for the former never took the lingual or maxillary dysfunctions into account. Besides, the American orthodontist offered 50% of his salary to those who agreed with continuing dental care after the end of his treatments [2].

## Physiology or Medicine Nobel Prize

The awarding of the Nobel Prize in Physiology or Medicine showed that Angle neither knew in 1899 the physiology of muscles, nor that of neurons [6].

1901: 1<sup>st</sup> Nobel Prize in Physiology or Medicine awarded to Edmil Adolf von Behring (1854-1917) for the use of a serum against diphtheria. Angle was 46 at that time.

1904: Ivan Petrovitch Pavlov (1849-1936) for his work on the physiology of digestion, and notably his discovery of the induced salivation reflex.

1906: Camillo Golgi (1843-1926) and Santiago Ramón y Cajal (1852-1934) for their discovery of the components of the nervous system.

1922: Archibald Vivian Hill (1886-1977) and Fritz Meyerhof (1884-1951) for their discovery of energizing mechanisms within the muscles.

1932: Sir Charles Scott Sherrington (1857-1952) and Edgar Douglas Adrian (1889-1977) for their discovery of the neuromuscular reflex.

Sherrington notably studied the manducator reflexes on a decerebrated cat in 1917 [7].

1953: Hans Adolf Krebs (1900-1981) for his discovery of the cycle of the citric acid which today bears his name [6]. It was the starting point for the comprehension of the intracellular mechanism of muscular cramps (lactic acid).

## Discussion about Angle's Personality

Angle had an anatomistic, almost mechanistic vision about dental occlusion. According to him, the occlusion of the first molar pair was the center of the morphogenesis of the face. Angle lived in the USA whereas Sherrington (1932 Nobel Prize winner) and Krebs (1953 Nobel Prize winner) were in England. Communication means were not the same as they are today. If the Nobel Prize spread the

results of the discoveries to the international scientific world and if Angle had died in 1930, he may not have heard about all the English medical discoveries. According to his titles, “Former Professor of Histology, Orthodontia, and Comparative Anatomy of the Teeth (...) Former Surgeon for Treatment of Fractures of the Maxillae (...)” and the chapter “Part II. Fractures of the maxillae” of the 6<sup>th</sup> edition of his book published in 1900 (p.285-305) and the insertion of unitary dental splints of retention in the same edition, Angle EH, dentist and even surgeon sometimes, was above all trained in oral anatomy [4,8].

We must remember that at the beginning of the 20<sup>th</sup> century, Léon Frédéricq (1851-1935), a physiologist from Liège, tasted toads’ spittle to determine the saltiness of saliva from different species. Therefore, during Angle’s time, physiology and biochemistry, such as we know them today, did not exist [8,9].

## Conclusion

Epistemology is the study of science in its cultural and historical context. If the former allows us to appreciate the worth of Angle’s classification, it also allows us to measure its flaws. It is undisputable that a historical approach to the odontological subjects would allow many to better understand the content and limits, and if that approach would be performed in its historical context, it would allow a better understanding of its importance and its strength. Auguste Comte (1798-1857), a positivist philosopher considered as the father of sociology in France was not mistaken when he claimed: “We do not know a science completely as long as we do not know its history.”

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