The norm concept - its use and abuse

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Among the concepts which the orthodontist employs in order to clarify problems relating to diagnosis and treatment, the Norm-concept occupies a prominent place. It serves as a standard for the diagnostician, who, casting his panoramic gaze over the orthodontic landscape, sees in its infinite variation some recognizable order. To the clinician it is a guidepost toward which his corrective efforts are directed. It is, in addition, highly useful to the research investigator, who, concerned with the underlying causes of malocclusion, seeks to find the path whereby the organism grows to maturity. Ever searching for standardization, he charts growth trends and patterns as he seeks to delineate what he calls "the normal".

While on cursory examination the norm concept seems a perfectly well behaved, clearly defined term, further scrutiny indicates that it exhibits a vagueness which merits further investigation.

The importance of this matter and its direct bearing on treatment procedures are clearly seen in the following example: About 15 years ago in the heart of the great southwest, where the Arizona desert blends into the city of Tucson, an orthodontist dreamed a dream. He envisioned an ideal, a pattern which would serve as a guide, a standard to be used in positioning teeth. To achieve this ideal, he devised a technique based on revolutionary principles — a technique which is now called by his name — the Tweed method.

Dr. Tweed's technique found wide acceptance, and orthodontists throughout the land busied themselves in problems such as anchorage preparation, toehold, co - ordinated second - order bends and so forth. Not only had these men changed their treatment procedures; they had also modified their concept of the normal. They spoke now of the notion of uprighting teeth over basal bone, a term which they found difficult to define operationally.

It was the impetus of this concept, the concept of the normal, that was the direct, actualizing influence in the development of the Tweed school. The efforts of this school to bring to reality the preconceived notion of the ideal in the finished case provided a singular demonstration of Kurt Lewin's statement that: "There is nothing so practical as a good theory."

In a similar way, one remembers Angle's notion of the constancy of maxillary first molar position and Simon's Law of the Canine as concepts which exerted tremendous influence on the thinking, and consequently on the orthodontic practices of their day.

In the recent past there has been some criticism of the norm concept as regards its efficacy or suitability when used in diagnostic procedures. It behooves us, therefore, to examine some of our thinking along these lines. Shall we abandon this concept so useful in the past or shall we retain it in a modified form? The result of a re-examination of this problem has a direct bearing on treatment and in fact on many orthodontic procedures. With this idea in mind we propose to examine the

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concept of the norm, trace its history, touch on some attempts at definition, and coming down to the present day, trace in broad outlines the contentions of the opposing schools of thought. Finally we shall turn our attention to the patient and show how these principles can have a direct bearing on diagnosis and treatment.

Attempts at definition have been many and varied. Wilton Krogman stated that an orthodontic result must have two aspects: it must look right and it must work right. Further, to apply these tests we have to find a standard of rightness and this standard of rightness he termed the normal. In a sense it is the usual; the term implies the idea of rightness, of harmony, of symmetry. Krogman did not state how to find this standard of rightness.

Paul Simon saw the shadowy character of the norm concept and was skeptical of ever finding the normal. "All we ever find," he said, "are variations, endless variations; an exact ideal normal does not exist, cannot exist. And this is our enigma: in theory we will never find the normal, in practice we forever feel its need and apply it constantly."

Simon analyzed in detail five definitions of the normal from the esthetic, the etiologic, the functional, the anatomic and the biometric point of view. He rejected all but the last or biometric method. He determined the biometric norm by selecting individuals with correct and healthy dentures and from measurements of these dentures determining a set of averages which were then used as norms to assess cases requiring diagnosis.

Dr. Angle, on the other hand, thought of the normal from the anatomic viewpoint—if the teeth occluded according to a certain plan involving a certain molar relation, a certain overbite, a certain muscle relation, then the normal had been achieved. Function was the agency which would bring adequate development of the parts if occlusion were established.

Experience has not justified this view. It was just this failure to achieve Dr. Angle's objectives which led Tweed to seek a different concept — one he could realize in treatment and end result. Dr. Tweed stated his position thusly:

"Some of you might say that the normal, as I envisage it, has a mandible that is slightly anterior to the true position in relation to the skull, and that the individual teeth in the mandible are a little too upright or vertical. It is true, the lower incisors and cuspids are so vertical that when ready for retention they might even give the impression of retruding slightly. There is no protrusion of the alveolar process in the lower incisor region, and the mandible is firm and prominent. Though differences of type should, of course, be considered, my vision of the normal allows of no variations; it seems a piece of precision machinery."

But Tweed's vision of the normal had to be modified. Later, due no doubt to difficulties in retention, he introduced modifications based on the size of the FM angle, and increased the range of mandibular incisor uprightness to plus five and minus five of vertical. Rigidity of concept was seen to be incompatible with the variations found in individuals.

Milo Hellman employed the biometric normal in his craniometric work on growth.

When, in 1931, cephalometric radiography was introduced, many believed that this precise research tool would, through quantitative methods of studying facial morphology establish a basis upon which a scientific definition of the normal could be erected.

Downs set out to determine the range of facial and dental pattern with which one might expect to find the normal. To do this he selected 25 individuals possesing what he judged to be normally occluding teeth and then proceeded to subject these individuals to cephalometric analysis. Note that he did not seek to determine the nature of the normal. This was assumed in his selection of cases. His analytical methods were used on cases judged by him to be normal. The standards derived from his analysis then, showed merely the variations in a sample of selected cases. At no time, were they intended as a standard for the evaluation and assessment of all cases. They have, however, come into widespread use in the methods of cephalometric diagnosis where they have become the criterion, the standard by which all cases are judged. Practitioners found in these standards a convenient, satisfying yardstick—one made a tracing or perhaps filled a wiggle and the deviations from the "normal" were clearly shown.

But soon the cold winds of disagreement with this restrictive notion of normality began to felt: Brodie and Wylie and more recently Bercu Fisher began to question the findings of the statisticians. What did they say and what is the present status of their position?

Brodie took as his theme the words of Angle: "All human faces are greatly alike — yet all differ." In a skeptical and frankly critical mood, he decried the use of quantitative methods to set up infallible guides. Statistical indices tell things about groups. They are not meant to be guides to measure individuals. Brodie wrote:

"My entire plea is for the abandonment of the norm concept. We should stop comparing individuals with some pattern that has been arrived at by either an inner sense of proportion or by a careful compilation and averaging of large series of measurements of different individuals.

"We should stop comparing every face that we see with some mental image that is pleasing to us or to one that has been set up by the compilation of a group of averages. This can only lead to disappointment because it has been shown that we cannot alter the basic pattern that presents itself for treatment.

"But if we abandon this criteria, what have we left to guide us? Answer: the individual whom we are treating. He carries the answer to his own treatment."

Bercu Fisher stated the position of the dissidents in this quote:

"Any standard that is formulated either ideally or upon the basis of a statistical norm casts all individuals into a preconceived anatomic, functional, or esthetic mold and ignores the individuality of the dentofacial complex." We see, then, that our search for the normal has ended, strangely enough, in the individual patient. This patient possesses a remarkably stable morphogenetic pattern — a dentofacial complex which we should not ignore.

The stability of this pattern has been amply demonstrated. All of us have had difficulties with retention due to the tendency of the teeth to return to the original configuraion of the malocclusion. Recently Dr. James Burrell showed a series of cases 10 to 30 years out of treatment and the tendency of the cases to return to the original pattern of the malocclusion was as convincing as it was depressing. Exactly similar findings were demonstrated by Dr. Edward Mitchell at a meeting of this society.

The thesis of this paper is that the configuration of the malocclusion

represents a state of equilibrium between the various forces which play on the denture. The pressure of the tongue and lips, the action of the inclined planes of the teeth, the forces of growth and development — all these move the denture elements until a point of equilibrium is reached. Any attempt to change this configuration disturbs the equilibrium and with the removal of force, the system tends to return to its original position.

There is a small range of movement within which stability can be maintained. Correction of mechanical displacements and the assistance of active growth during the treatment period enable marked changes to be achieved. But any change in the basic morphogenetic pattern holds only so long as retainers are worn.

The implications of this point of view for treatment are as follows:

First. Treatment arches are now bent to conform to the malocclusion. It was found that expansion could not be maintained when the limitations of the pattern had been exceeded. Moreover, in many cases, since expansion and increasing of arch length failed, extraction had to be accepted. Naturally extraction modified the basic dental pattern and allowed positioning of teeth in positions not otherwise possible. But even here, if, for example the axial inlination of mandibular incisors exceeded the allowable limit they tended to return to their original inclination.

Second: Overbites tend to return to their original dimensions. This would not include mandibular displacements. Here mechanical considerations are paramount.

Third: In certain severe class two cases, attempts to establish a stable mesio-distal relation frequently fail since the restrictions of the pattern are violated. In these cases two upper bicuspids are removed rather than four bicuspids. The difficulty of positioning the arches in an acceptable relation in these cases has been confirmed by others.

Of course muscle pressures due to habits which exert pressures on the denture should be eliminated if stability of end result is to be maintained.

We have traced the development of the norm concept and have shown that failure to achieve the ideal norm has forced investigators to recognize limitations in treatment imposed by the resistance of the individual dentofacial or morphogenetic pattern to extensive change.

His dream of omnipotence gone, the wary orthodontist now tempers his efforts with a wholesome respect for the dominance of the morphogenetic pattern. He feels that although his cases may fall short of the ideal, they will have greater stability, with less root resorption due to shorter treatment time, and treated with mechanics designed to produce an acceptable occlusion within the structural pattern of the individual.

In conclusion, those of us who, like your essayist, have believed in the indispensability of the norm concept should well remember the words of Bertrand Russell:

"Most of the evils that Man has inflicted on Man have come through people feeling quite certain about something which in fact was quite false."

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