Asymmetries of the Dentofacial Complex*

Their Influence on Diagnosis, Prognosis and Treatment

Bercu Fischer, D.D.S.
New York, N.Y.

The important problems confronting the orthodontist in his daily practice may be grouped under the caption "limitations." As is the case with all conditions which prevail in a complex biologic organ, there is a great deal of overlapping and interaction between the various sources of these limitations. This renders practically impossible the investigation of isolated individual factors.

Yet, in discussing limitations, it is convenient to group them according to the manner in which they affect the progress of orthodontic treatment. When grouped in this manner, some orthodontic limitations seem to point to a more or less well defined aggregate of factors as a common origin and they fall into three categories:

1. Limitations inherent in the biologic tissues of the dentofacial complex, such as (a) asymmetries (b) variation of response (c) tissue tolerance and (d) hazards of treatment.
2. Limitations due to inadequacy of our therapeutic methods.
3. Limitations of tooth movement to ensure greater probability of a stable result.

It is obvious that in order to cope fully with the manifold limitations which might be encountered in the treatment of a given case, the orthodontist must rely upon various techniques that will reveal to him before treatment those limitations discoverable through case analysis. This is part of his diagnosis and prognosis. In addition, the orthodontist must also employ such methods of treatment as will enable him to deal with any limitations which may appear as treatment progresses toward the achievable optimum. Finally, after treatment, he must employ additional means to secure the stability of the most important of the corrected relationships.

The clinical material of this paper has been selected to illustrate best those natural limitations caused by imbalances between the component parts of the dentofacial complex. These limitations are inherent in the biologic tissues and interfere with the attainment of the objectives desired by the orthodontist in the treatment of his patients.

The paper will deal with two groups of limitations from this source. The first group of limitations is the result of imbalances the orthodontist can discover during case analysis. Emphasis will be placed upon the need for a three-dimensional system of diagnosis in their detection. It will be shown that because these imbalances vary greatly with each individual, schematizing

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methods, that is, methods using preconceived general plans of case analysis based upon existing classifications of malocclusion or statistical "norms," are not applicable to the individual.

The second group of limitations is the result of various hidden dental imbalances which must be localized during treatment. As will be shown, the need for such localization sharply limits the use of "en masse" movement of teeth in orthodontic treatment. When localized at the end of treatment, these imbalances usually demand compromise of one kind or another for their solution.

Definitions

In order to avoid misunderstanding, it will be necessary to define certain terms used in this paper. As I proceed from one level to the level next above it in the structure of my subject, each term when introduced will be defined and its meaning further made clear by using it in context of illustrative statements and/or by illustrative clinical material indicating the operational elements to which the term applies.

Symmetry and Asymmetry

Since this paper discusses asymmetry, it is important to make its meaning clear.

The term "symmetry" has slightly different usages. The following definition taken from "The American College Dictionary" conveys the meaning of the term as I use it:

> The correspondence, in size, form, and arrangement, of parts on opposite sides of a plane, line or point.

In other words, the term "symmetry" as used in this paper means *balance*. Conversely, the term "asymmetry" means *imbalance*. When thus defined, the various facial and dental malrelationships which come under the orthodontist's observation and correction, may be termed asymmetries. Thus, crowding and spacing of teeth can be viewed as imbalances between tooth substance and size of dental arches or segments thereof. Arch malrelationship may be considered as due to an imbalance in the size or position of the dental arches. Symmetry, balance, and favorable ratios are thus interchangeable, as are asymmetry, imbalance, and unfavorable ratios.

Asymmetries of the Dentofacial Complex

The factors responsible for asymmetries in the dentofacial complex are not confined to the teeth and alveolar process. They may be found in the various component parts of the face and all the structures surrounding the teeth. It is the interplay of these local asymmetries with those originating from the deformation of the skull that is responsible for the infinite variation in the dentofacial complex and forms the basis for its morphologic and functional individuality. (Figs. 8, 9 and 10)

Asymmetry of the component parts of the dentofacial complex may be unilateral or bilateral and may occur in the following directions:

1. Antero-posterior (Fig. 6)
2. Supero-inferior (Figs. 6 and 7)
3. Medio-lateral (Fig. 7)

It is obvious that dentofacial asymmetries must be diagnosed in three planes. It is for this reason that clinical records of my patients are oriented to the Frankfort Horizontal, Preauricular, and Median Planes. They are evaluated from oriented facial photographs and oriented plaster casts.

Asymmetry may occur in all parts of the dentofacial complex (Figs. 4 and 5). Facial asymmetries may exist in individuals with correct occlusion (Fig. 1); dental asymmetries may be present without any appreciable facial asymmetry (Figs. 2 and 3); and both asymmetries may be found concomitantly in the same individual (Figs. 6 and 7).

Let us now consider these various conditions.

Facial Asymmetries

Facial asymmetries are imbalances

that occur between homolgous parts of the face affecting the proportion of these parts to one another with regard to size, form, and position on opposite sides of a plane, line, or point. Facial asymmetry exists in orthodontic as well as in non-orthodontic individuals. Because facial asymmetries are very often present with dental asymmetries, they are of clinical importance in the treatment of malocclusion of the teeth. However, in acknowledging them as diagnostic or prognostic factors, some reservations must be borne in mind.

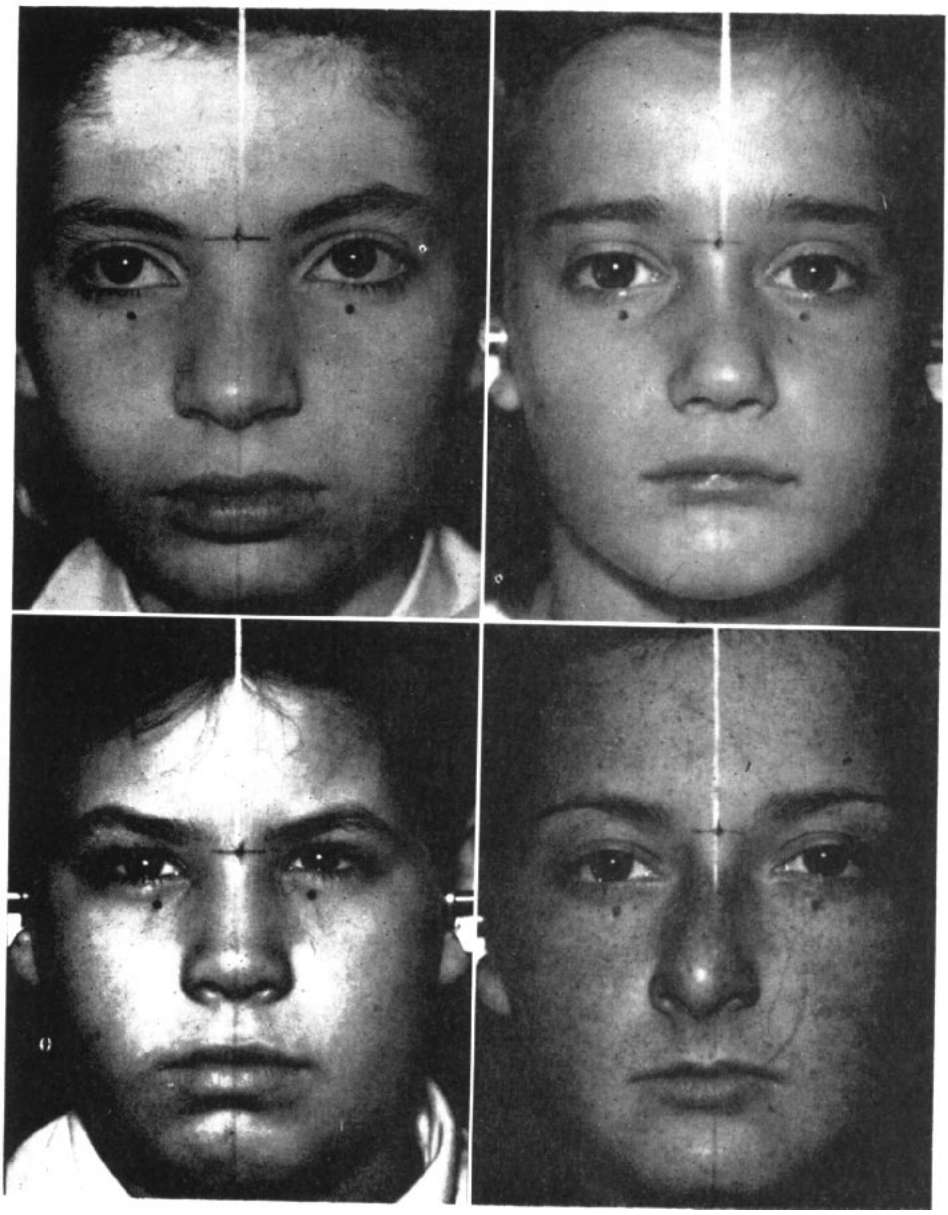

Fig. 1. Natural facial asymmetries in four individuals with correct occlusions.

Fig. 2. Facial values are substantially symmetrical although the casts (Fig. 3) show marked imbalance of tooth relationships.

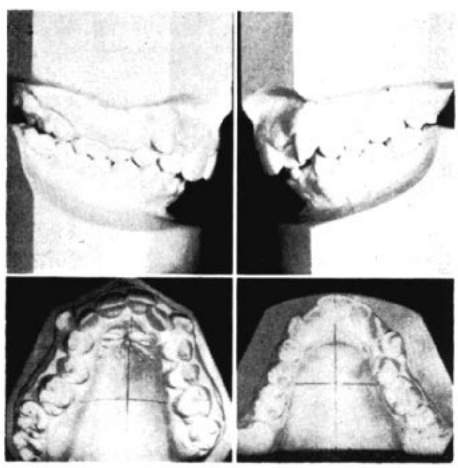

Fig. 3. Dental asymmetry of individual seen in Fig. 2; contrast with the facial symmetry.

(1) Facial asymmetry is a natural phenomenon and there is nothing abnormal about it.

(2) Most of the structural facial asymmetries can be detected only by comparing homologous parts of the same face.

(3) Barring distorted patterns of growth due to injury, disease, and so forth, which may result in extreme asymmetry, natural asymmetry of the face does not necessarily interfere with the attainment of a correct occlusion.

(4) The only clinical significance of structural facial asymmetries lies in the fact that they are not amenable to change by orthodontic means and therefore they place certain limitations on orthodontic tooth movement in treatment.

Dental Asymmetries

Since the orthodontist is limited to dental manipulation, he is mainly interested in dental asymmetries. In the following discussion of dental asymme-

tries, the terms Class I, Class II, and Class III of Angle's terminology have been retained because of their widespread usage. However, these terms take on a general meaning and are used to describe the antero-posterior relationship of the dental arches regardless of the antero-posterior relationship of opposing teeth. Conversely, each buccal tooth in the maxillary dental arch, beginning with the canine, may present an antero-posterior relationship with its opposing tooth in the mandibular dental arch which may be described as a Class I, Class II, or Class III relationship, as the case may be, regardless of the arch relationship.

Some of the dental asymmetries are:

1. Imbalance between tooth substance and dental arches.
2. Imbalance between the tooth substance of opposing segments of the maxillary and the mandibular dental arches.
3. Imbalance between maxillary and mandibular dental arches in their entirety or in their segments.

All these imbalances may occur in various combinations in the same individual in position, in size, or in both.

While some classifications such as Angle's, utilize tooth relationships as the basic criterion (Fig. 8), other schematizing methods employ dental and/or facial criteria for establishing their diagnosis and prognosis. Such criteria may be angular relationships between some of the component parts of the dentofacial complex, linear measurements, or facial landmarks. Criteria of the individual patient are assessed by comparison with corresponding criteria of standards derived as composites or generalizations from samples of so-called normal individuals or statistical norms.

The following records (Figs. 9, 10, 11, 12 and 13) question the validity of these methods.

After seeing these records, I am sure you feel as I do that such evidence stresses the individuality of each ortho-

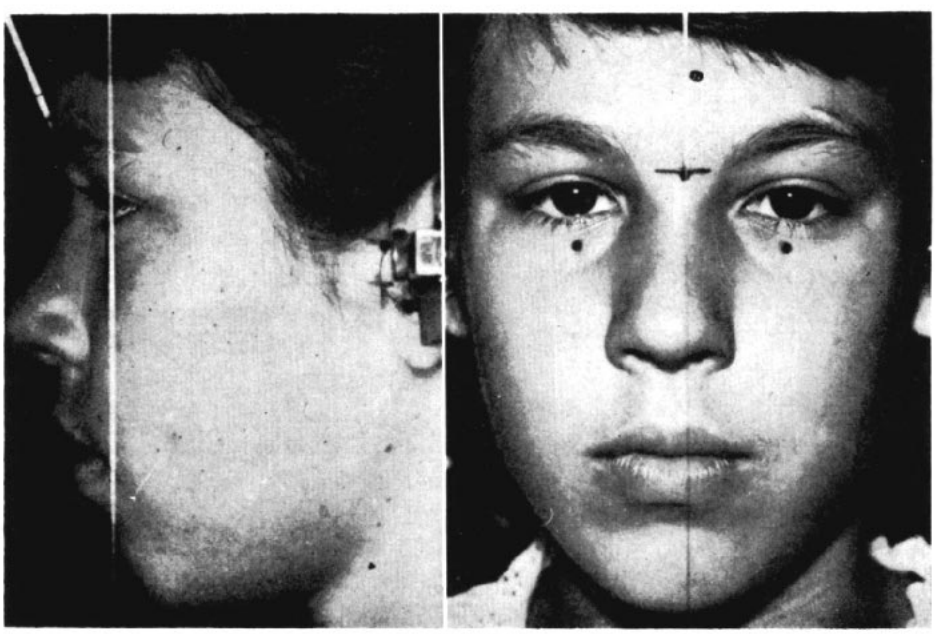

Fig. 4. Facial asymmetry combined with dental asymmetry shown in Fig. 5.

dontic case and invalidates orthodontic concepts based upon classification or statistical norms. I have replaced these by operational concepts based upon my own clinical practice.

A brief discussion of one of these operational concepts, the "Trait Concept of Malocclusion," and its corollary, "Sectional Treatment," should clarify the difference between schematizing and operational concepts.

The trait concept of malocclusion is based upon the clinical fact that only those elements of the dentofacial complex which we come to know and become familiar with through actual work on patients, appear as concrete manifestations.

The other elements remain vague and vanish with every attempt to isolate them. To date, the stock of concrete orthodontic elements is made up of units of malocclusion, such malrelationships as overjets, overbites, crowding, spacing, malrelationships of single teeth, groups of teeth, alveolar arches, jaws, etc. In the final analysis, all malocclusions seem to consist of various combinations of these undesirable traits. Since these traits show great variation and are independent of each other, we are confronted by an endless variety of combinations and each individual patient presents a new situation. This I designate as the "Trait Concept of Malocclusion."

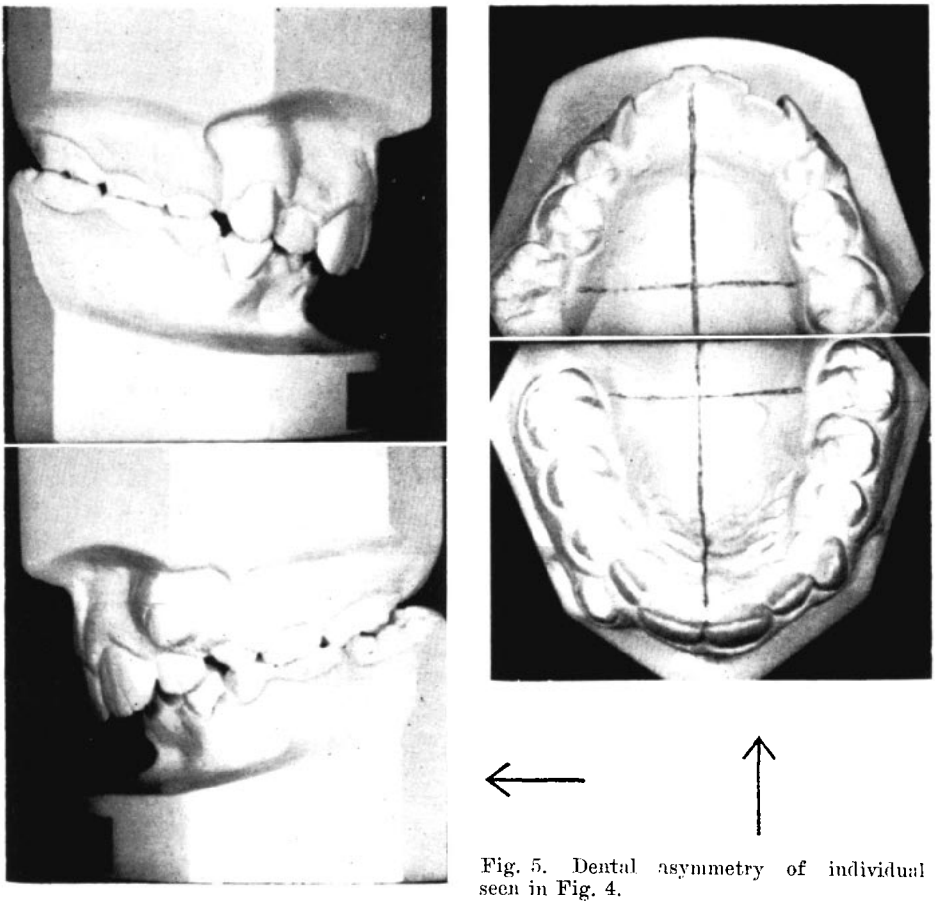

Fig. 5. Dental asymmetry of individual seen in Fig. 4.

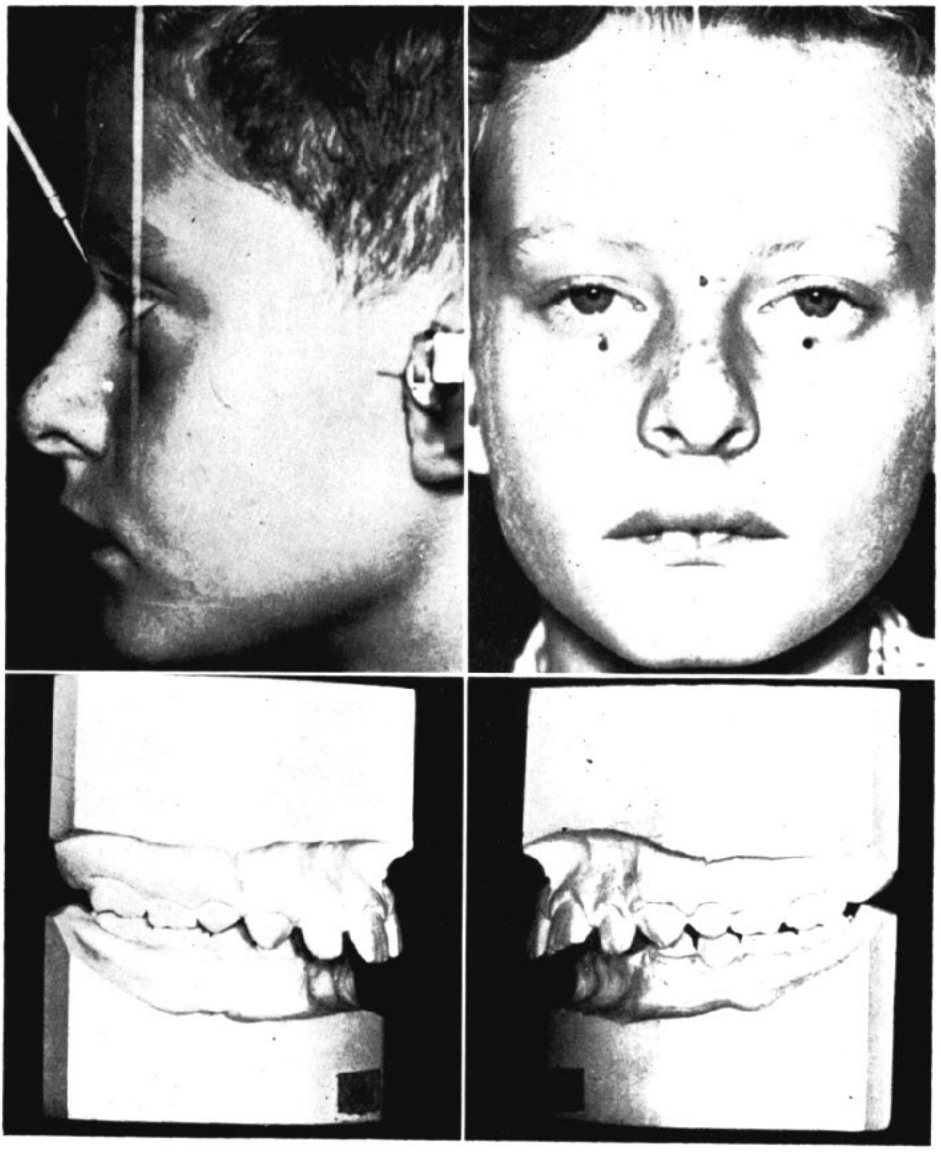

Fig. 6. Concomitant dental and facial asymmetries: in the vertical and antero-posterior planes.

Schematizing methods of diagnosis are analagous to *general* building plans which cannot possibly be used for the building of one *particular* house. Such methods can only lead to confusion and failure. The method indicated is one designed for building orthodontic houses, so to speak, individually, brick by brick, and within the limitations of the materials and conditions presented by each patient.

With such an approach to the orthodontic problem, schematizing methods of diagnosis must be replaced by case analysis applicable to the individual patient. A change must also be made in

the methods of treatment. En masse movement of teeth in orthodontic treatment, a logical result of schematizing methods of diagnosis, is completely out of line with the trait concept of malocclusion. It must be replaced by sectional treatment which employs forces capable of producing independent selective tooth movement basically directed toward the attainment of a correct occlusion and effected through various steps, the number, sequence, and duration of which are influenced by individual factors and are therefore seldom alike in every respect.

The "trait concept" of malocclusion and "sectional treatment" can best be illustrated by using a familiar analogy such as the chess game which is played with thirty-two chessmen and a chessboard with sixty-four squares. The positional combinations and permutations these chessmen can present are innumerable. While certain positional patterns

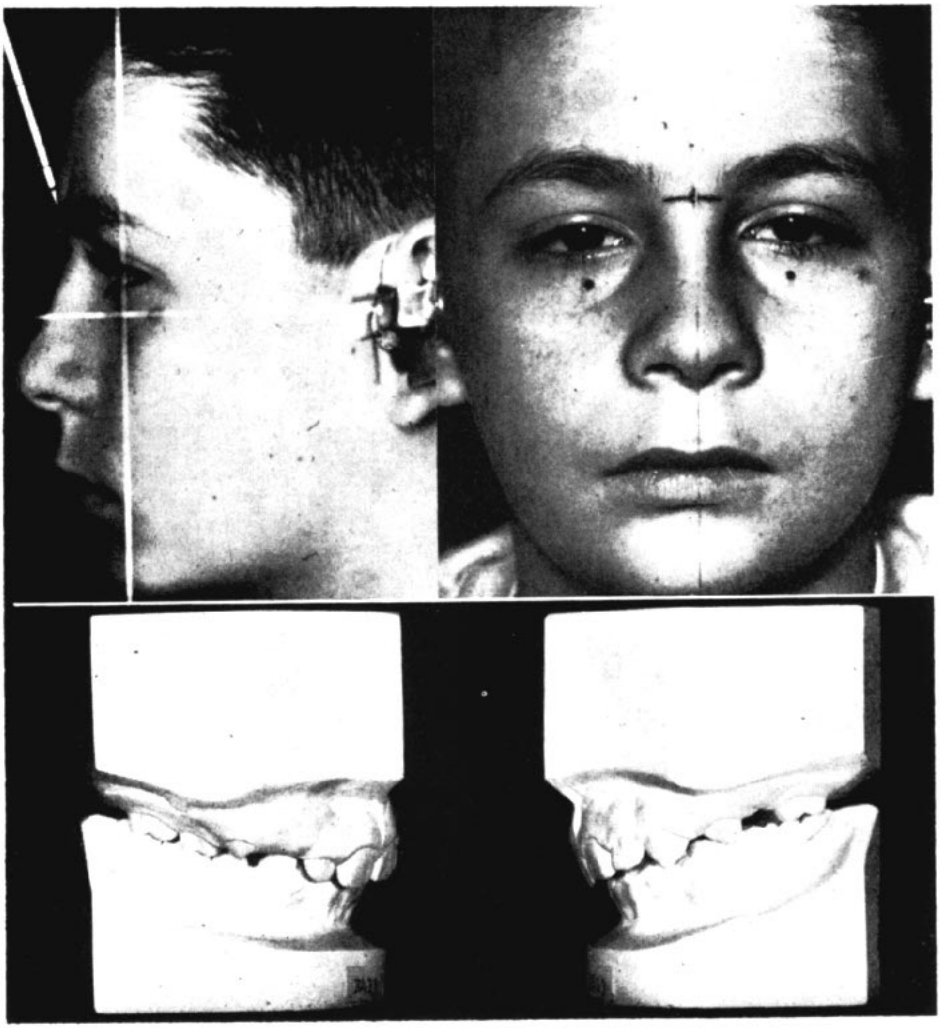

Fig. 7. Concomitant dental and facial asymmetries: in the vertical and medio-lateral planes

Fig. 8. Profiles of patients with dentitions in the so-called Class II, Div. I malocclusion. (from "Orthodontics", courtesy W. B. Saunders Co.)

repeat themselves, no one can foresee or predict all the positional combinations the chessboard may present during a given play. A player, therefore, learns first the rules of the game which have to do with the allowed movements and behavior of each chessman. Through practice and experience, however, the player memorizes not only single moves but basic patterns which frequently repeat themselves. The expert player remembers a large number of these patterns. Whenever it is his move, he registers the situation facing him, matches it with one in his memory, and immediately plays what he remembers as the best move. Where such knowledge ends, begins the reasoning process a player must use to cope with new and unfamiliar situations which may present themselves.

Let us now turn from the chess game to the field of the orthodontist. The positional relationship of the human teeth shows great variation in three planes: the antero-posterior, the mediolateral and the vertical. The combinations and permutations of their positional patterns are innumerable. With such endless variation, it seems inconceivable that all the possible positional patterns can be imagined, foreseen, and described. Some of these, while not identical, repeat themselves often

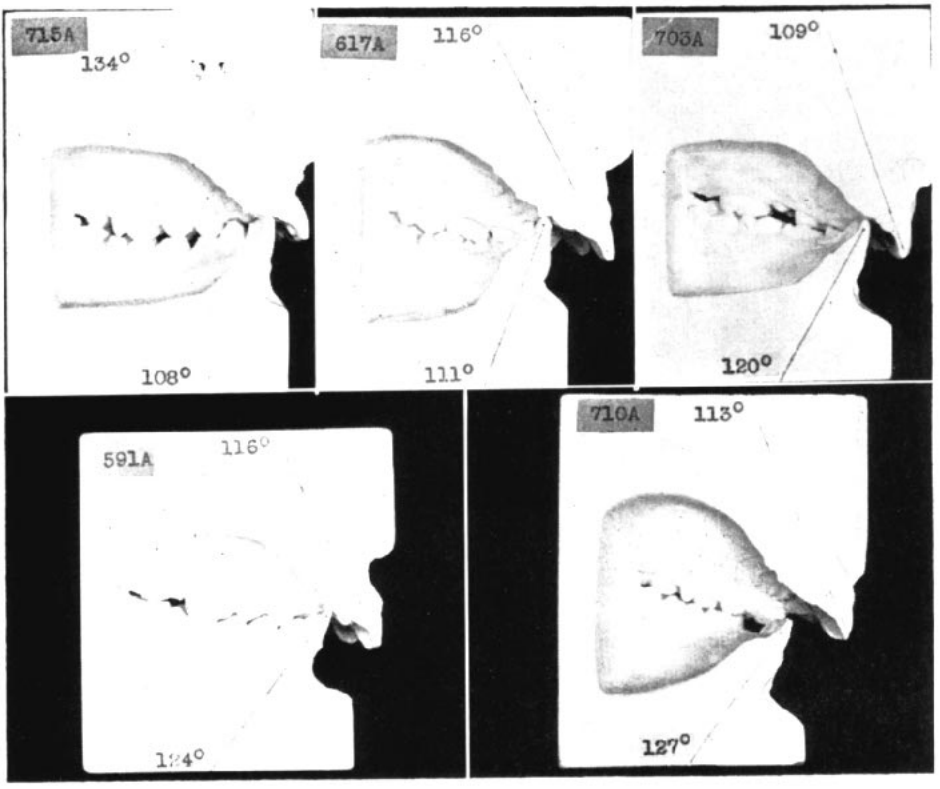

Fig. 9. Variation in angular relationships, overjet and overbite as seen in sectioned casts. (courtesy W. B. Saunders Co.)

Fig. 10. Angular relationships alone are not valid diagnostic criteria: the incisor mandibular plane angles differ by only two degrees in these two patients although their facial values are dissimilar. (from "Orthodontics": courtesy W. B. Saunders Co.)

Fig. 11. Facial photographs before (top row) and after (lower row) seven months of extra-oral anchorage applied to the maxillary dental arch only. See additional case records in Figs. 12 and 13.

enough for the orthodontist to become familiar with them. Somewhat like the chess player, the orthodontist using sectional orthodontic treatment learns by experience not only the movement of single teeth but the patterns of tooth position as teeth are being moved singly or in groups towards the attainment of the objectives of treatment. It is these intermediate patterns of the denture during its transition to the finished result that must guide the clinician in his treatment.

While there are sufficient points of similarity between the "trait concept" of malocclusion and "sectional treatment" on the one hand, and the chess game on the other hand, to make an apt analogy, I do not mean to establish a true parallel between them. A line must be drawn between the operational concepts derived from immutable parts of inanimate and static objects and the operational concepts derived from the changing dynamic biologic parts of the human body.

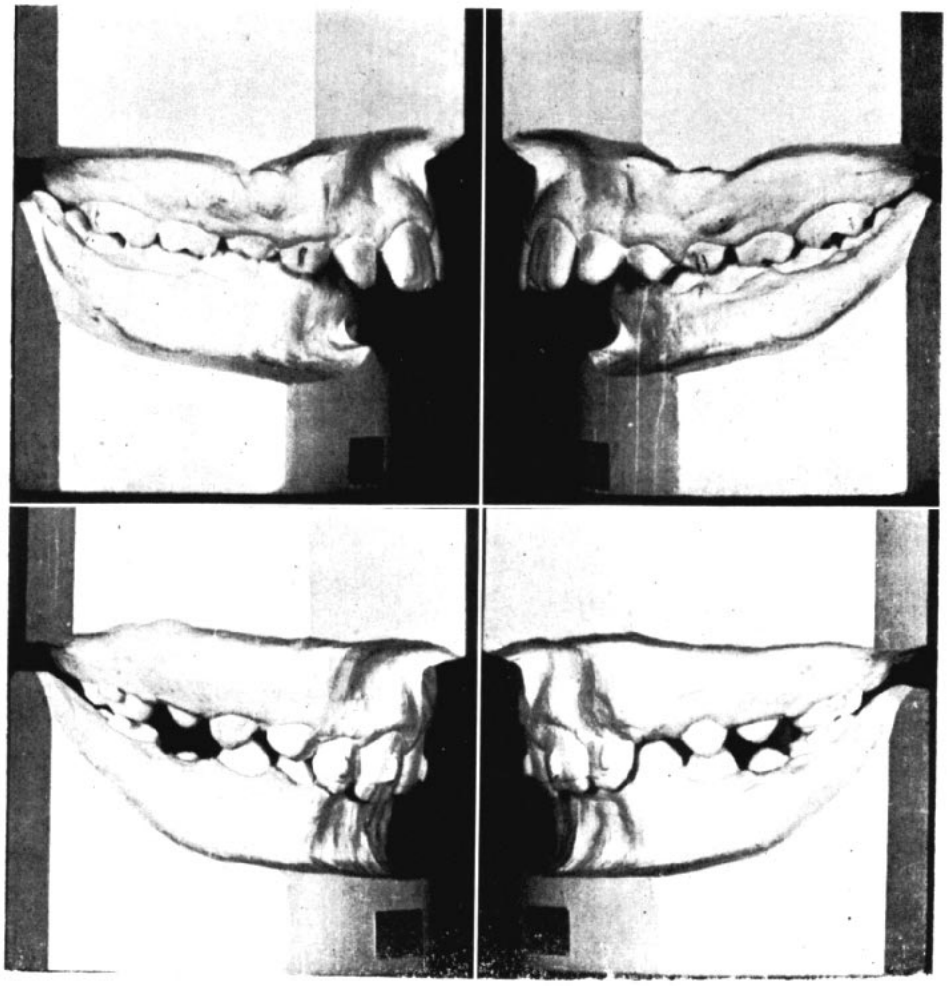

Fig. 12. Plaster casts before (top row) and after (lower row) treatment of patient seen in Fig. 11.

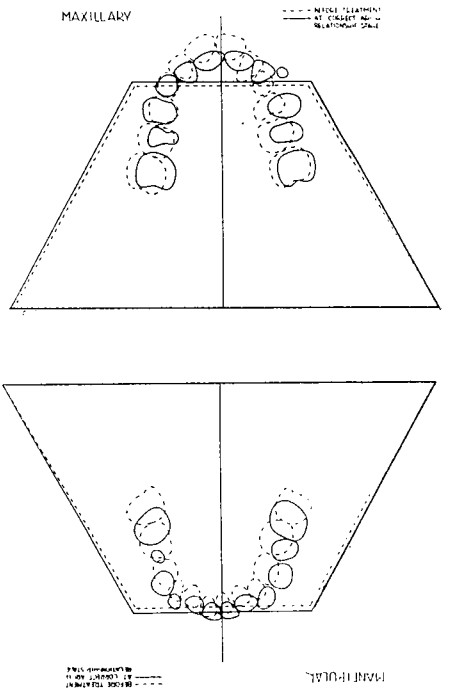

Fig. 13 Superposed diagrams of case shown in Figs. 11 and 12, indicating a repositioning of the mandible during treatment and no distal movement of the maxillary buccal teeth. (Figs. 11, 12 & 13 from "Orthodontics": courtesy W. B. Saunders Co.)

One attribute of living tissue contributing to this difference in concepts is the natural variation found in organs of individuals even of the same species. As will be shown, this characteristic contributes greatly to the limitations encountered by the orthodontist and strongly affects orthodontic methodology.

The paper has dealt with the general aspect of asymmetries of some of the components of the dentofacial complex and points to the trait concept of malocclusion as a more realistic approach to orthodontic diagnosis.

2 East 54th Street