A Critique of Orthodontic Dogma*

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Dogma may be defined[1] as a system of principles or tenets; or a doctrine authoritatively laid down; or a settled opinion, belief or principle. Orthodontic dogma based upon truth provides an orderly approach to orthodontic problems; however, that based upon fiction may lead to professional or intellectual chaos.

The authors of our orthodontic dogma have all contributed to the development of the science and art of orthodontics as it is known today. Some of the contributions have been major and have led to rapid progress in orthodontics, while others have had so little basis in fact, that they have stultified or actually set back the orthodontic time clock. Too often it seems that new cults are created by the simple process of someone authoritatively laying down a doctrine or pat formulae.

Examples of recent dogma adopted in some orthodontic circles are light-wire technique and its modifications of both attachments and archform, treatment doctrine based upon the Frankfort mandibular plane angle or the Frankfort mandibular incisal angle, growth prediction formulae, etiologic factors and the treatment of the tongue thrust syndrome, diagnostic formulae for orthodontic extraction procedures, etc. It is not implied that all of the above are bad as there is some merit in any new approach or thought. The problem lies in many of the dogmatists demanding all or none acceptance. Some of the clinical concepts mentioned above have a degree of merit but to say that they are universally applicable would be grossly misleading. Too often an attempt to evaluate, critically, proposed concepts is interpreted as a personal attack upon the integrity of the individual proposer. Unfortunately, critical analysis often creates rifts in the professional relationship of the individuals involved as well as between segments of the profession.

It is time that orthodontics and orthodontists leave behind their blind allegiance to any given system, philosophy or leader. Each of the various schools of thought have something to contribute to the whole, but no one group has a monopoly upon "the best way." The next advance in progress for the science of orthodontics lies in a united profession which, while striving toward a common goal, will engage in an open and objective evaluation of its problems and solutions on a strictly *impersonal* basis.

It is the purpose of this paper to discuss some of the opinions, beliefs and principles that have influenced the development of orthodontic science in recent years. Ground rules for critical evaluation will be presented for consideration.

DIAGNOSIS AND TREATMENT PLANNING

To evolve a concerted approach to orthodontic problems from all of the various approaches that have been proposed in the past demands an open mind and a clear rational evaluation, not cluttered by prejudice, personal allegiances or petty jealousies. Such an evaluation requires exacting criteria based upon scientific knowledge and a keen clinical sense. This each orthodontist must do for himself if he is to

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develop his skills to the utmost. The first step in this self-analysis is to recognize the fact that there is no magic formula and there never will be. The second step requires the use of our powers to think through and to analyze our clinical problems using diagnostic procedures that have been proven scientifically and clinically sound.

It has been stated that diagnosis is an art and not a science. There is a certain amount of truth to this statement yet any artist can tell us that there are basic principles that govern the quality of the art produced. The creation of diagnostic aids in orthodontics is an attempt to define the basic principles underlying the science of orthodontics. Most of these diagnostic criteria are based upon conceptions of the normal. A rigid norm is difficult to utilize and is often ineffective. However, concepts of the normal that allow for the range of variation that exists in man have proven to be most reliable for diagnostic purposes.

It is recognized that for a given diagnostic aid to be clinically useful it must include the concept of variability. Angle[2] quoted Wuerpel as stating, "The tendency of modern civilization seems to be to create a law for each individual, and in the face of complex and constantly changing conditions a fixed type as a basis or standard to govern the molding of the human face cannot be established." In view of Wuerpel's statement, Angle continued, "This may all seem discouraging to the orthodontist, but there is a principle, which if intelligently applied brings us the nearest to an ideal result possible with each given patient—that of balance, of symmetry. We should be able to detect not whether the lines of the face conform to some certain standard, but whether the features of each individual—that is, the forehead, the nose, the chin, the lips, etc.—balance, harmonize or whether they are out of balance, out of harmony, and what concerns us most as orthodontists: whether the mouth is in harmonious relation with the other features, and if not, what is necessary to establish its proper balance." This statement by Angle defines the ultimate goal of orthodontic diagnosis that still is being sought.

In 1907 Angle also presented to dentistry his classification of malocclusion in its final form. He was the first to define normal occlusion and he based his classification of malocclusion upon deviations from this normal. This classification was based upon the relative anteroposterior relationship of the mandibular first permanent molars to the maxillary first permanent molars. The classification assumed the relative stability of the maxillary first molar; however, Angle was aware of the limitation of this assumption. In the seventh edition of *Malocclusion of the Teeth*, 1907, Angle stated, "The fact that the upper first permanent molar varies considerably mesially or distally as to its location in different individuals, which is always noted in anything like an extensive study of the subject, has led superficial students to regard these positions as abnormal, taken by chance, and out of harmony with other principles in the anatomy of individuals, but in reality these variations are to be expected, and are necessary in the creation of different types and different individuals." In another passage he stated, "We know that while all human faces are greatly alike, yet that all differ. Lines and rules for their measurement have been sought by artists, and many have been the plans for determining some basic line or principle from which to detect variation from the normal, but no line, no measurement, admits of anything nearly like universal application." Contrary to opinion in some quarters, Angle apparently was keenly aware of variation and the fallacy of pat diagnostic formulae.

Orthodontic diagnosis may be defined as the process of determining by examination the nature and circumstances of dentofacial imbalance. The decision reached from such an examination will dictate the plan of corrective therapy to be initiated within the possibilities of orthodontic treatment and related clinical sciences. In order to diagnose the nature of dentofacial imbalance for the individual patient, a range for acceptable dentofacial balance must be established. The definition of this acceptable range of variation is the basis for many of the differences of opinion that exist today. It is now generally accepted that individual variation is the rule, but how far this variation may deviate from hypothetical norms is the cause of much disagreement.

An orthodontic diagnosis is futile without the application of successful orthodontic corrective measures. A sound orthodontic diagnosis and the application of corrective therapy presupposes a thorough knowledge of normal and abnormal growth and development of the dentofacial complex, as well as an awareness of the possibilities and limitations of the various therapeutic orthodontic procedures. This knowledge forms a basis for developing sound orthodontic treatment objectives.

Angle proposed the first clear-cut objectives for orthodontic therapy when he defined the line of occlusion and presented a classification of malocclusion based upon the relationship of the first permanent molars. These objectives were immediately adopted by the profession and provided a goal generally applicable for orthodontic therapy. With the subsequent refinement and increased efficiency of orthodontic appliances, and the development of other diagnostic criteria, more sophisticataed objectives were sought by the profession.

Differences of opinion between orthodontists as to their treatment objectives account for variation in the interpretation of the same diagnostic criteria and the acceptance or rejection of other proposed aids. Therefore, before diagnostic aids can be evaluated, agreement must be reached concerning treatment objectives and their relative importance.

The generally held orthodontic treatment objectives may be stated as follows:

1. A maximum dental and facial esthetic improvement in harmony with the individual's facial type. This implies a stable dental occlusion and intermaxillary relationship.
2. Improved masticating efficiency within normal functional range. The position of the teeth should be established in a state of balance to the surrounding musculature and temporomandibular joint.
3. The maintenance of health or improvement in the health of the dentures and their investing tissues.

These are the primary objectives of orthodontic therapy and all orthodontists can subscribe to them without reservation. There will be differences of opinion as to the order in which they are listed in terms of relative importance. These are honest differences of opinion; however, if orthodontics is to continue to be a health science, then all orthodontists will have to subscribe to the primary objective of a stable, healthy denture in balance with its associated structures. All other factors must be secondary.

Disagreement between orthodontists in their concepts of what constitutes facial esthetic improvement accounts for many of the differences of opinion when treated results are evaluated. In some instances what is pleasing esthetically to some is displeasing to others. The recent emphasis on facial esthetics as a factor of prime importance in

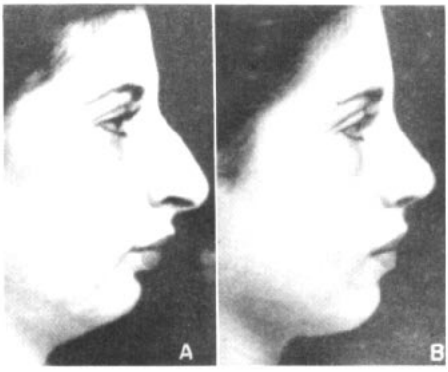

Fig. 1 Before (A) and after (B) rhinoplasty. (Salzmann)

diagnostic procedures is unwarranted. It must be realized and recognized that esthetic values are culturally conditioned, hence subject to change and, therefore, cannot be scientifically measured.

In this phase of the problem the orthodontist is in much the same position as the plastic surgeon whose techniques and results are guided primarily by his own artistic sense and the limitations placed upon him by the material with which he has to work. Agreement on esthetic standards is not possible nor desirable as it tends to stereotype our patients and our thinking, thus nullifying future progress.

Too little is known about the effects of the position of the dentures upon overall facial esthetics. This is graphically illustrated in a photograph taken from Salzmann[3] (Figure 1). This illustration shows the profile photograph of a patient before and after rhinoplasty. The patient is reported not to have received any orthodontic treatment, and the intermaxillary position and occlusion of her teeth remained unchanged. The marked improvement in the lip relationship to the denture was attributed to reorientation of the mimetic musculature and not to a change in tooth relationship. On the basis of this evidence it might be well for the orthodontist, who is seeking maximum improvement in facial esthetics, to work closely with his professional colleague, the plastic surgeon.

There are exceptions to the tenets just propounded which are related to the mental health of the patient. Occasionally a patient and his parents are unfavorably conscious of a marked protrusion of the dentures and their effect upon the facial profile. In such instances reduction of the dental protrusion for facial esthetic reasons alone is justified for the resultant improvement in the mental outlook of the patient.

The following is an attempt to discuss criteria for evaluating existing diagnostic procedures from the point of view of their scientific soundness and their clinical applicability.

Most orthodontic diagnostic procedures are based upon a comparison of the patient to a proposed standard. Such procedures and standards that have been established are derived from a study of one or more individuals considered normal, or upon a mental image of the normal contained in the mind of the originator. These procedures and their standards may be rigid or may allow for a range of acceptable variation from the norm established.

Diagnostic aids may be classified into two categories. The first type includes those methods that are specific and permit only total acceptance or rejection of the premise upon which they are based. The methods cannot be adapted to individual variation by the dentist. An example of this type of aid is the use of Pont's Index for determining ideal arch width upon the basis of the width of the maxillary incisors. The recent resurgence of the Crozat appliance relies upon the Pont's Index for its basic diagnostic criterion. Today, many dentists are being led down the primrose path that was tread and abandoned many years ago by those who

were enticed by its simplicity and found the way blocked by orthodontic relapse. Another example is the construction and use of the Bonwill-Hawley graph for determining the ideal archform for a given patient.

The second type of diagnostic methods may be considered general in nature in that the methods proposed are subject to variable adaptation by the individual dentist and allow for individual variation of the patient. Such methods may be used by any orthodontist either by modifying the proposed standards or accepting them as proposed. Examples of these types of diagnostic aids are the various methods that have been proposed for analyzing cephalometric headfilms. The methods can be used with the standards adjusted to the thinking of the individual orthodontist. The adjustment is made in light of his clinical experience and treatment objectives.

Criteria proposed for the evaluation of diagnostic aids should meet the following standards:

1. Any standard proposed must include a range of variation in order for it to be applicable to all individuals.
2. It must correlate or be compatible with other methods of assessment.
3. Standards should be based upon scientific knowledge and not upon personal opinion, likes, or dislikes.
4. To be useful clinically, the proposed standard must point to a therapeutic solution that is attainable through orthodontic therapy.
5. It must be readily understandable and applicable by the clinician.
6. Standards to be useful universally must allow for variability between clinical operators and the treatment methods employed.

These tests are suggested to form a framework in which diagnostic aids or methods may be evaluated; the closer a given diagnostic aid adheres to them, the more objective it is. It must be remembered, however, that a clinical science is based upon subjective as well as objective observations. All diagnostic aids cannot be measured by objective standards. It is recognized that there is no substitute for successful clinical experience in producing the able clinician. Subjective criteria based upon successful clinical experience are not to be criticized or discarded just because they cannot be immediately, or possibly ever, measured in objective terms. However, a proper balance between subjective and objective criteria is essential if the clinician is to provide the ultimate in service for his patients.

Evaluation of Clinical Procedures

What may we learn from the written record of experienced orthodontic clinicians? An attempt to review the literature to ferret out those clinical investigations that were scientifically sound proved most frustrating. Few clinical studies were planned prior to the institution of treatment so that invariably the crucial record or necessary technic of recording was lacking and the results were inconclusive. Rather than review the many articles extolling the virtues of orthodontic therapy, it was decided to make an attempt to set up the ground rules that should apply to studies that are presented to substantiate the claims made for the effects of orthodontic treatment.

Too frequently a clinical study is evolved from observing a phenomenon and then attempting to explain it upon the basis of the available records that are inadequate for the purpose. Or, as sometimes happens, an appliance is designed to produce a given effect and then adequate records are not gathered to evaluate the claims made for its effect. A great deal of confusion results from such so-called studies and time has been wasted by both the author and

his readers. Mr. Charles B. Bolton[4] made a pertinent point when he charged the first cephalometric workshop as follows: "May I interject a patient's point of view? We can renew our supply of money from time to time. We can renew the type of instruments that we use. We can use new films, new diaphragms, new equipment. There is one thing that we cannot spend twice, and that is time. We spend it once, and it is gone. It seems to me it is a waste—a real waste—of an essential if we do not spend it as nearly perfect the first time as is possible."

A great deal of time is wasted in attempting to produce answers to our problems from material that is inadequate for the purpose. This does not mean that we should cease studying our treated results for it is by this means that we may make observations that give impetus for planned research. It is now time that clinical research follows the pattern set by other sciences; this demands that the experiment should be predesigned to evaluate objectively the questions asked.

In growing and developing individuals it is extremely difficult to relate biological reaction to orthodontic mechanical procedures. The main problem is the infinite variety of dentofacial patterns that exist and the variation between them in each of their particular modes of development. When orthodontic reactions are superimposed upon such variables, the problem of assessing their specific influences on dentofacial development becomes compounded.

The human head may be considered as a biological entity or system in which various biological processes are causing it to increase in size and change in proportion from infancy to adulthood. Harvold[5] has classified the most important of these biological processes as being: 1) The growth of the jaws and of the facial skeleton, 2) The neuromuscular activity determining jaw relationship and jaw function, and 3) development of the teeth and their eruption pattern. This classification forms a logical framework in which to discuss the influence of orthodontic treatment upon the concomitant development of the dental-facial pattern.

Growth of the Jaws and the Facial Skeleton

There should be no doubt, after the numerous studies that have been reported during the past thirty years, that facial growth plays an important role in the success or failure of orthodontic treatment procedures. Hellman[6] stated over thirty years ago that, "growth of the face is not dependent upon the success of orthodontic treatment, but the success of orthodontic treatment may be dependent upon the effects of growth."

Growth of the face may be considered from two points of view: 1) the relative change in interrelationship of the growth sites to each other and, 2) the growth patterns of the individual bones themselves.

All of the growth sites within the maxilla and mandible grow by surface appositional bone formation with the exception of the mandibular condyle. The condyle grows primarily through the proliferation and conversion of cartilage into bone. This is a rapid type of bone development, and the need for it becomes apparent when it is recognized that growth at this area contributes to both the height and the depth of the face.

One concept of facial growth that has been widely quoted but rarely understood in the orthodontic literature is that of the "constancy of the pattern." This concept developed out of the studies of Broadbent[7] and Brodie.[8] The general interpretation of this concept has been that facial growth is always an even and orderly process. Such an

interpretation of this concept is completely erroneous and does nothing but lead to confusion when one tries to understand any given person's growth pattern. Such a strict interpretation applies to the population *only* and seldom, if ever, to an individual. The directional behavior of the peripheral points on the skeletal profile of the face, when related to the cranium during growth, varies according to the rate and amount of growth at the various facial growth sites. It must be remembered that all bones do not grow at the same time nor at the same rate.

The facial growth sites may be divided into those that contribute to the vertical plane and those that contribute to the horizontal plane of space when the head is viewed in normal lateralis.

Vertical	*Horizontal*
Frontal process, maxilla	Maxillary tuberosity
Maxillary eruption	Anteroposterior position of pterygoid plates
Mandibular eruption	
Mandibular condyle	Mandibular condyle
Position	Position
Vertical growth	Horizontal growth

With this number of growth sites being responsible for the enlargement of facial complex, it becomes apparent that the relative location of the various sites to each other and the rates and amounts of their growth will determine the final facial pattern to be developed.

The foregoing discussion was undertaken to point out some of the variables that might alter or enter into the development of the cranial-facial complex. In view of these variables the impossibility of prediction should be readily apparent. Others have pointed this out, yet within the last few years at least two new methods of prediction have been published.[9,10] These methods, as well as others previously published, are based upon the concept of the constancy of the pattern, or as Harvold[4] put it, "Them that has, gets." The truth of the matter is that "them that has, don't necessarily get." It is a population concept and is not applicable to the individual.

Attempts at prediction of facial growth upon the part of the orthodontist can prove disastrous if he predicates his treatment plan and therapy upon such a prediction. How often have you treated what appeared to be a case with a relatively simple treatment problem based upon your previous experience, and found that, to your dismay, the treatment time was double what you originally anticipated and the result was not all that you had hoped for? Conversely, the treatment of an apparently severe malocclusion judged upon previous experience progresses to a very excellent result in half the time that you expected. The difference between the two treatment reactions is that the concomitant facial growth occurred in an orthodontically favorable direction in the latter case (Figure 2) and in an unfavorable direction in the former example (Figure 3).

The bones that make up the facial complex must also be considered in terms of the factors that are related to their individual development. A study by Kraus, Wise, and Frei[11] failed to show a morphologic duplication of the facial patterns of monozygotic twins. However, when these same individuals were studied, by breaking down the various profile outlines of the individual bones of the face and comparing them, marked similarities were noted. This would support the contention that the morphologic traits of the individual bones may be genetically determined. The differences in the facial patterns between the monozygotic twins were concluded to be due to the variation in the way the various similar bones were oriented to one another. It may be deduced from this observation that even though there may be identical genetic patterns for the individual bones themselves, their subsequent development and orientation to one another

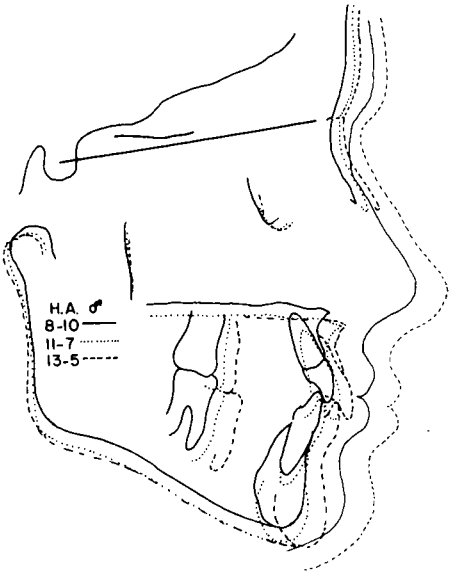

Fig. 2 Example of Orthodontically Favorable Growth Pattern.

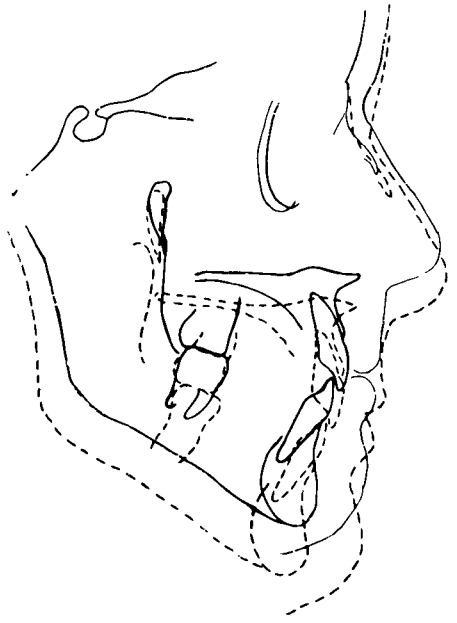

Fig. 3 Example of Orthodontically Unfavorable Growth Pattern. This case had a marked deficient maxillary arch length problem in which little or no growth occurred in the maxillary anteroposterior dimension thus resulting in a prolonged period of treatment and subsequent compromise in the initial treatment plan.

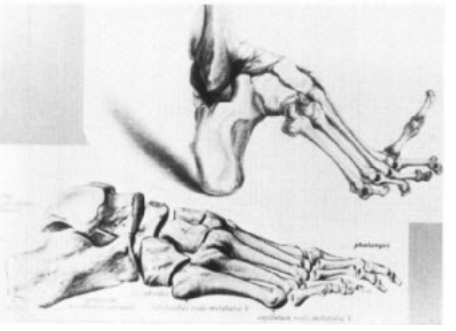

Fig. 4 Morphologic arrangement of the bones of a foot bound at an early age during its most active period of growth compared with the articular arrangement of a normal foot.

may be influenced by their environment.

The concept that the genetic pattern plays a dominant role in the morphologic developmental patterns of individual bones is further substantiated by observations made upon the form and shape of the feet of Chinese women who were subjected to foot-binding at an early age (Figure 4). It is obvious that the normal morphology of the total foot has been altered. However, a comparison of the morphology of the individual bones which make up the deformed foot with a normal foot fails to demonstrate growth changes in the morphogenetic patterns of the individual bones. Environmental forces have markedly altered the interrelationship between the various bones, but the morphologic growth patterns of the individual bones themselves apparently have not been disturbed.

Only through the study of the effects of growth upon the developmental morphology of the individual bones of the face can we ever hope to fully appreciate the significance of their interrelationship to each other in creating a given facial pattern. Differential growth rates of the various bones of the face account for variation in the direction the face develops away from the cranial base. Thus, the difference between favorable and unfavorable growth from

an orthodontic point of view may perhaps best be explained in terms of individual bone morphology, interbone relationship, and differential growth rate. These three phenomena are interdependent in establishing the growth pattern of an individual face.

In view of the foregoing, what effect does orthodontic force have upon the developing cranial-facial complex? All of the evidence that has been produced to date has failed to demonstrate that the morphogenetic growth pattern of an individual bone can be altered by environmental forces. There is also no evidence to support the contention that the rates of growth of individual bone can be either increased or decreased by environmental forces. The only other possible effect that orthodontic forces might have on the developing face is that such forces may alter the relationship between the various bones making up the craniofacial complex.

Such an effect has been cephalometrically documented by Wieslander,[12] and more recently by Haas,[13] in a study of orthodontically treated children who were compared with a nonorthodontic group of children who were growing over the same interval of time. The alteration produced in the facial growth pattern of the orthodontically treated children was not dramatic but was of sufficient magnitude to aid in correcting the Class II molar relationship that existed in these children to a Class I. From this study it may be concluded that orthodontic forces may favorably affect the interrelationships of the various bones of the face when a group of treated children is compared with a control group on a statistical basis. However, this statement should be qualified when it is applied to the individual patient. For the individual patient, orthodontic therapy will have a favorable influence upon the interrelationship of the various bones of the face provided the genetic potential for harmonious development is present. In other words, we cannot make a "silk purse out of a sow's ear unless, perhaps, the sow has been eating silk worms."

Neuromuscular Activity Determining Jaw Relationship and Jaw Function

For the purposes of this paper only one aspect of the neuromuscular activity which determines jaw relationship will be discussed. This aspect necessarily relates to a concept which Thompson[14] introduced to the orthodontic profession some eighteen years ago. I am referring to mandibular displacement. I would like to modify the generally held interpretation of Thompson's concept that dental occlusion can force the mandible into a more posterior or anterior position than the suspensory musculature intended it to be held. Proponents of this concept believe that by removing the occlusal interference the mandible will resume its rightful or more normal relationship to the upper face. Many of us who originally adopted this concept became disenchanted when we found after removing the occlusal interference often the mandibular position did not shift.

Let us consider the concept of mandibular displacement from another point of view adding time and growth to our analysis. First, let us select a case for illustrative purposes. The case is an individual with a severe Class II, Division 1 malocclusion, characterized by all the mandibular arch being contained within, in complete crossbite, the entire maxillary arch (Figures 5, 6, 7, 8). There is no question that this malocclusion is not self-correcting and will not alter its basic characteristics without orthodontic intervention. If the malocclusion is first observed at eight years of age, it will still have, at age eighteen, the same basic morphological characteristics. We know, however, that a great deal of facial growth is going to take place during the intervening

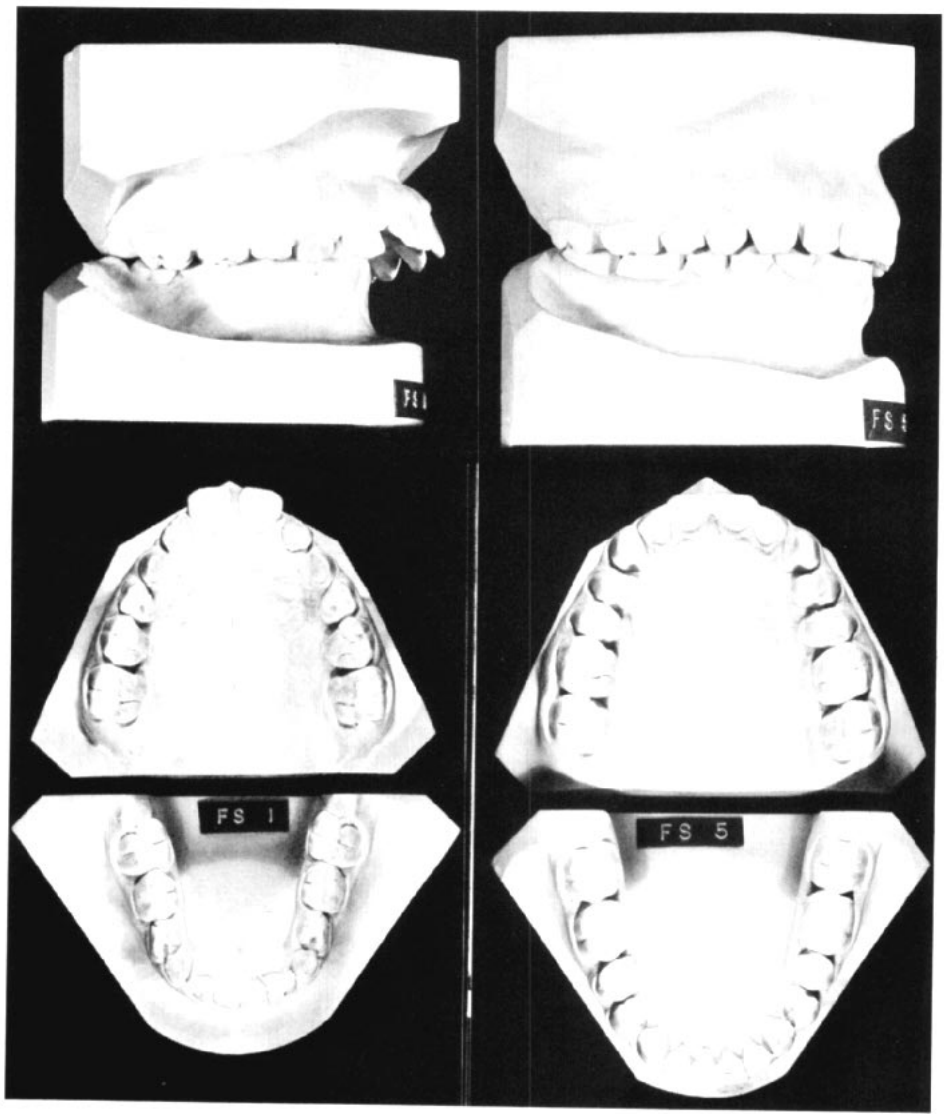

Fig. 5 Class II, Division 1 malocclusion: Initial record, age 8 and three years out of orthodontic retention, age 18.

span of time. In this example the relationship between the jaws is being determined and maintained by the malocclusion. The jaws, however, will increase in size according to their morphogenetic growth pattern and the resultant direction of their growth will be partially determined by their interrelationship which is related to the dental occlusion. The mandibular denture will be carried downward and forward through growth away from the cranium but, at the same time, through its occlusal relationship with the maxillary denture and growth of the maxilla, it will in effect be guiding the direction of maxillary development. If during this growth period the occlusal interference is removed through orthodontic therapy and correct force application,

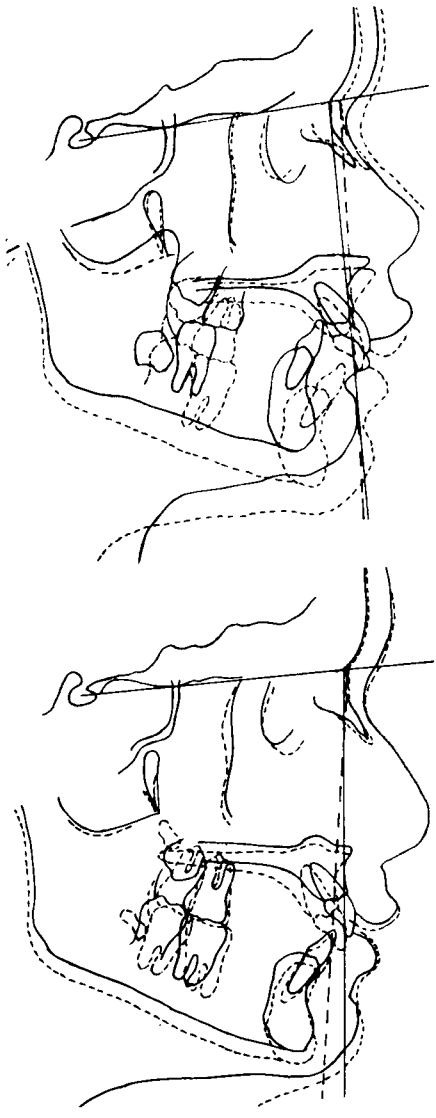

Fig. 6 Cephalometric tracings of patient FS, 8 to 12 years of age, above, and from 12 to 14, below.

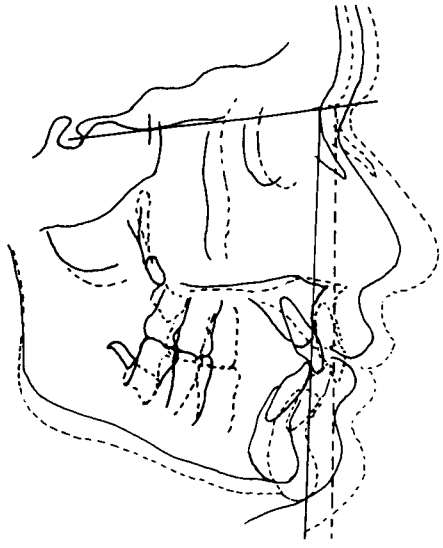

Fig. 7 Cephalometric tracings of patient FS, 14 years to 18 years of age.

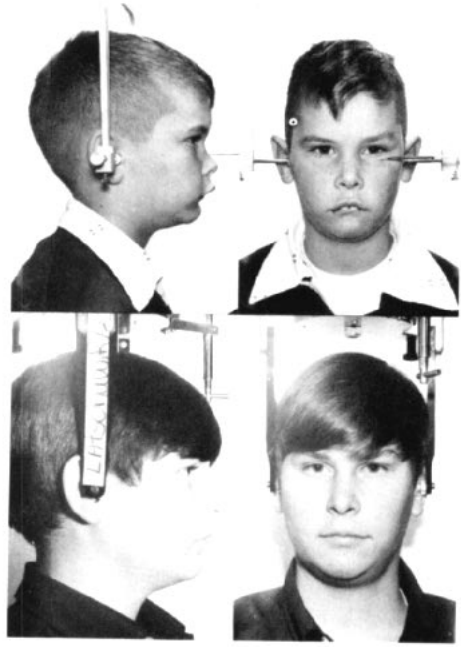

Fig. 8 Initial photographs of patient FS, age 8 and at 18.

the mandibular denture will no longer exert its directional influence on maxillary development and the resultant growth direction of the two jaws will then have been altered favorably from an orthodontic point of view. There would not be an alteration in the growth patterns of the individual bones, but an alteration in their spatial relationship as a result of their growth and the orthodontic therapy. It may not be a matter of correcting a distal mandibular displacement, but rather one of

orthodontics aiding the reorientation of the bones to each other through the process of *altering the effects* of their individual growth patterns. This explanation could apply to any interlocking malocclusion where a discrepancy exists in the anteroposterior jaw relationship such as the Class II, Division 2 malocclusion, or the example illustrated. Hence, we must add the dimensions of time and growth to our functional analysis of occlusion.

Tooth Eruption Pattern

A third biological process which should be considered in the development of the dental-facial complex is the eruption pattern of the teeth. Numerous cephalometric studies have been carried out concerning the eruption pattern of the various teeth of both the maxilla and mandible. Briefly stated, the general findings show that when the maxillary teeth are related to the palatal plane and pterygomaxillary fissure, their paths of eruption are generally downward and forward from these structures[15] (Figure 9a). The mandibular denture, when related to the cross-section of the symphysis and the mandibular plane, generally erupts in an upward or upward and backward direction[16] (Figure 10). The effective resultant of these directions is determined by the relative amounts of vertical versus horizontal growth that is occurring at the same time. Up until the present time orthodontics has demonstrated little influence upon the eruption pattern of the mandibular teeth. Significant alteration of the eruption pattern of the maxillary teeth however has been demonstrated as a result of orthodontic forces.[17,18] Utilizing a posterior force upon the maxillary molars concomitant with maxillary growth has been shown to alter the eruption direction of unerupted premolars and canines (Figure 9b). They erupt in either a downward or downward and backward direction

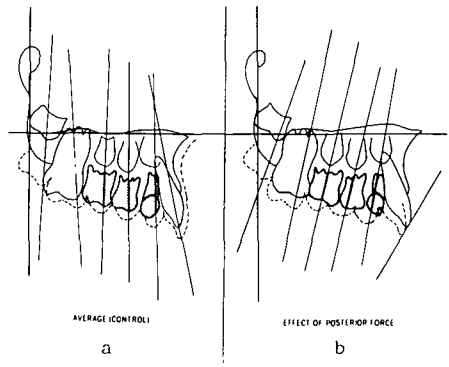

Fig. 9 Eruption direction of maxillary teeth related to the palatal plane with the anteroposterior position of the pterygomaxillary fissure registered.
a. Average pattern without orthodontic force over a two-year growth period.
b. Average effect on eruption pattern produced by a posterior orthodontic force to the maxillary denture over a two-year growth period.

relative to the pterygomaxillary fissure and palatal plane.

Another aspect of orthodontic influence over the eruption pattern of the teeth has been amply demonstrated in both the maxillary and mandibular arches through serial extraction procedures that have become part of the orthodontist's armamentarium.

It may be concluded then that the biological process of tooth development and eruption in the development of the dental facial complex can be altered by orthodontic therapy.

Summary and Conclusions

We have discussed orthodontic dogma from several points of view and have proposed criteria for the evaluation of diagnostic procedures based upon their scientific soundness and clinical applicability. It was pointed out that recognition of individual variability is a must in all orthodontic procedures. Angle stressed this over fifty years ago, yet, many still have not learned the lesson.

In conclusion, even though we can-

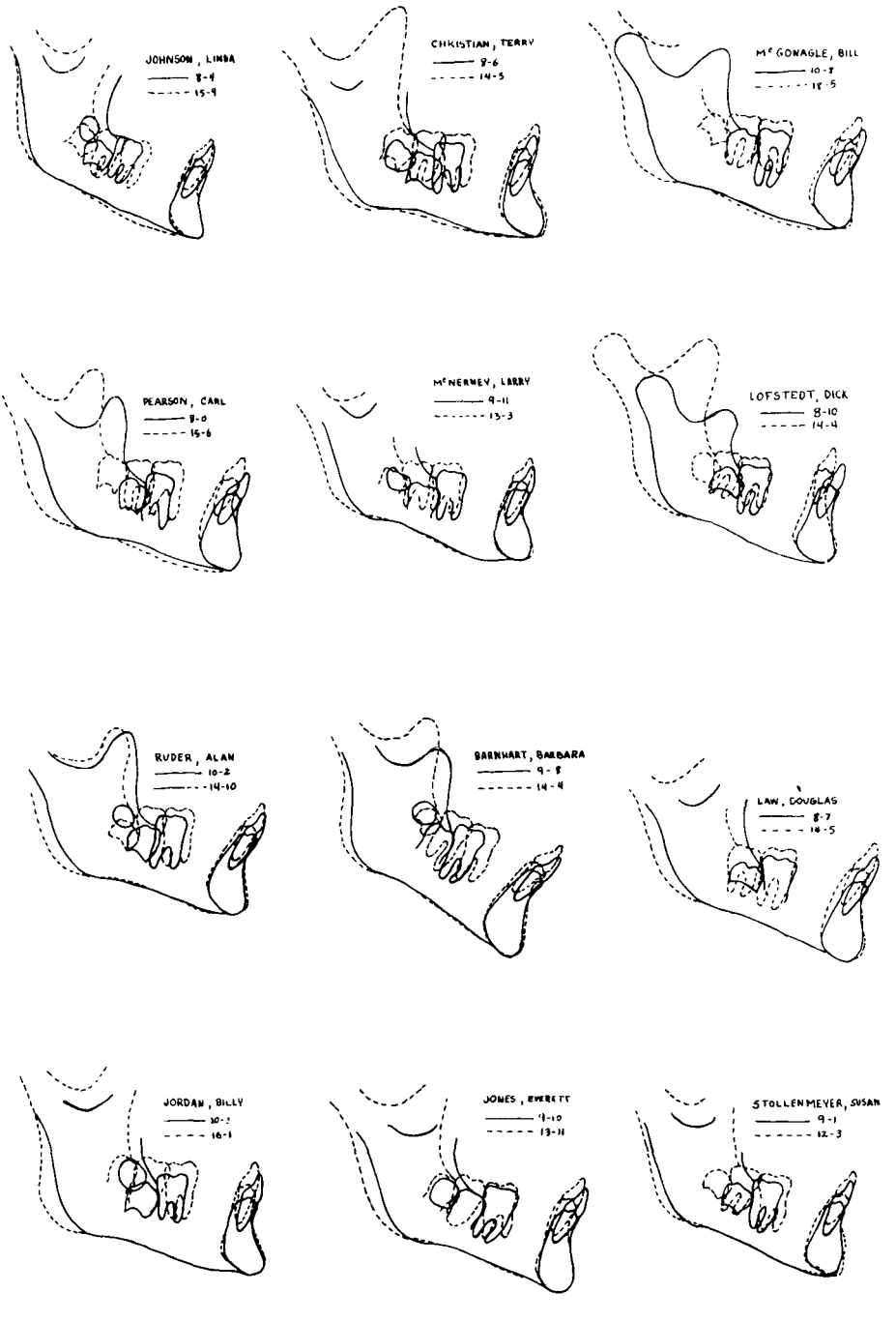

Fig. 10 Eruption direction of mandibular teeth related to the cross section of the symphysis and the mandibular plane in twelve individuals without orthodontic forces being applied to the mandibular denture.

not predict the amount, rate, time and direction of growth, let us list those things that are predictable and upon which we can design our treatment plan and therapeutic procedures.

1. We can orthodontically eliminate occlusal interference as a possible factor in determining the interrelationship and future developmental direction of maxillary and mandibular growth.
2. Interferences within the individual dental arches can be removed through selective extractions to enable the remaining teeth to assume a more normal relationship.
3. The eruption pattern of the maxillary teeth can be altered in the buccal segments through applying a distal force upon the maxillary first permanent molars.
4. We can through orthodontic therapy favorably influence the interrelationship of the various bones of the face provided the genetic potential for harmonious development is present.
5. Treatment can be planned to avoid using mechanics that might increase the severity of the dental malrelationship that exists as a result of skeletal disharmony.

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