Potentials In The Pattern

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The persistence and the potential of the growth pattern of the human head and jaws continue to intrigue me. Therefore, I am constantly on the alert for additional evidence to support or refute my contention that the morphogenetic pattern is unique for each individual and persists over any treatment procedure. The pattern is: (1) spatial, (2) morphogenetic, (3) functional and (4) psychologic.

By pattern I mean a conglomeration (or juxtaposition) of factors which are fixed for the individual. These factors are multidimensional in that not only is the pattern spatial in extent, but also morphogenetic in that heredity puts its permanent stamp on it. It is also functional and psychologic. By psychologic I refer to the patient's behavioral response, namely cooperation. The concept is broad but its emphasis is on limitations. Furthermore, its potential is not known until full growth and development are achieved.

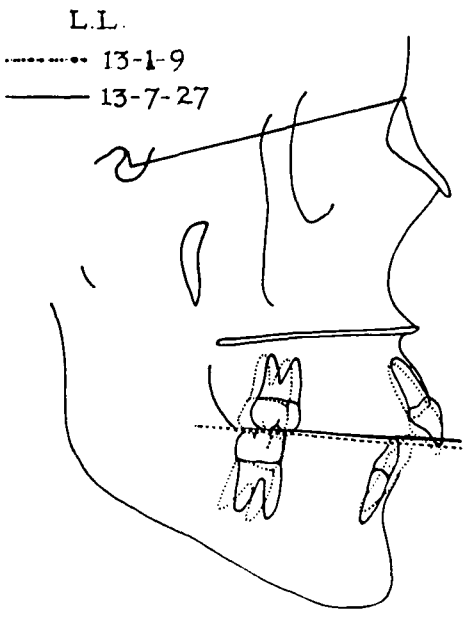
For quite some time a good deal of thought and discussion has been given to the contention that, in order to achieve a successfully treated case, anchorage must first be prepared. This thought seems to be even more prevalent in extraction cases. This preparing of anchorage and its results were assessed cephalometrically in a case which I treated in 1940 and gave to Dr. Brodie to report in his paper on the extraction panel.[1] Subsequently I was fortunate enough to secure additional records some years later which I wish to present here.

Read before the Midwestern Component of the Angle Society, Chicago, Jan. 19, 1959.

Case L.L. was a severe Class II, Division I malocclusion as seen by the tracing taken from a lateral head x-ray (solid line) showing the case before treatment (Fig. 1).

For the first four months the lower teeth were subjected to tip-back bends together with ligature traction and arch expansion. Figure 1 represents a superposed tracing of the original and one made at the end of that phase of treatment. All superpositions have been on the SN plane registered at S. This reveals that, although the lower incisor has been tipped lingually, the molar crown has not gone back, but the root apices have come forward to an appreciable degree. It shows further that the arch has been shortened anteroposteriorly, which shortening could have been gained only by lateral expansion. The Hawley arch form was used as the guide to the shape of the arch.

At this period Class III elastics were applied to complete the distal movement. After one month the clinical evidence of forward movement of the upper was so pronounced that a headcap with occipital force was applied to this arch. Figure 2 shows what was accomplished over the next three and a half months. It will be noted that the maxillary molar has been elevated, the usual response to pull of Class III elastics. The maxillary incisor has been retracted somewhat through a shortening of this arch. The posterior end of the occlusal plane has opened the bite as indicated by the new position (posteriorly) of the mandible. This completed the first phase or anchorage preparation.



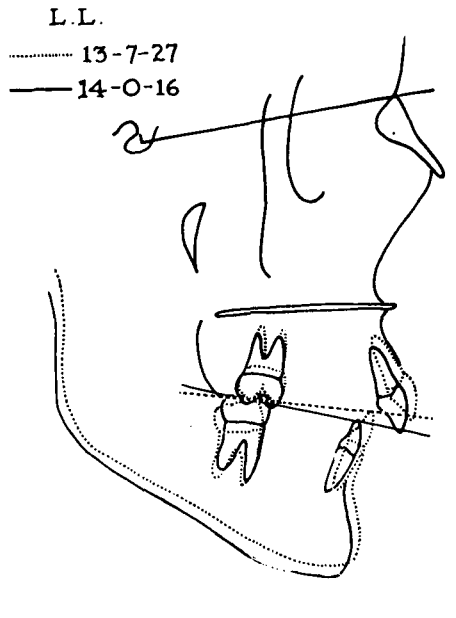


Fig. 1, Left. Fig. 2, Right.

The next and final phase of treatment called for the setting back of the maxillary arch. This was accomplished with second order bends and Class II intermaxillary elastics with a headcap worn against the upper at night to support the elastics. This required approximately six months and is represented by the findings at age 14-5-27. Although the mesiodistal correction had been accomplished, another three to four months were used in settling and finishing the case.

Figure 3 represents a comparison between the first tracing and one made at the end of active treatment. It reveals that both molars are slightly forward of their original positions, the lower more than the upper. The upper incisors have been carried downward and lingually. The occlusal plane has been tipped down in front, and the mandible has been forced inferiorly and posteriorly.

The lower molar, on the other hand, has gone upward one-third of its crown height and forward one-third of its mesiodistal width. The arch has been shortened by expansion and the molar now occupies a more unfavorable position than it did originally. Thus, at the end of a long period of treatment,

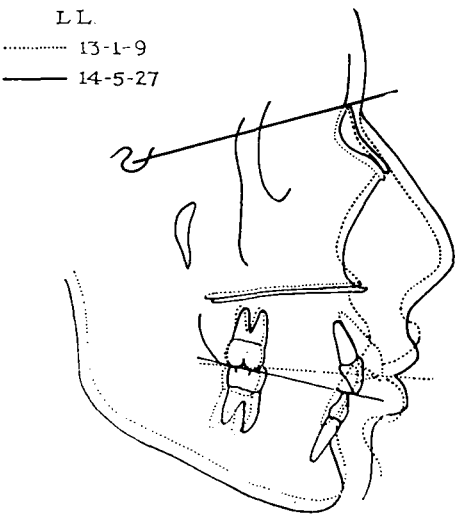


Fig. 3.

with considerable disturbance of axial inclinations, we find the case in a more unstable condition than it would have been had it been treated in an orthodox manner.

Figure 4 is a composite of two tracings showing the case two years later at the end of the retention period. We see here a downward and forward growth of the mandible of considerable extent. There is a downward and forward position of the lower incisor which has maintained practically its same axis.

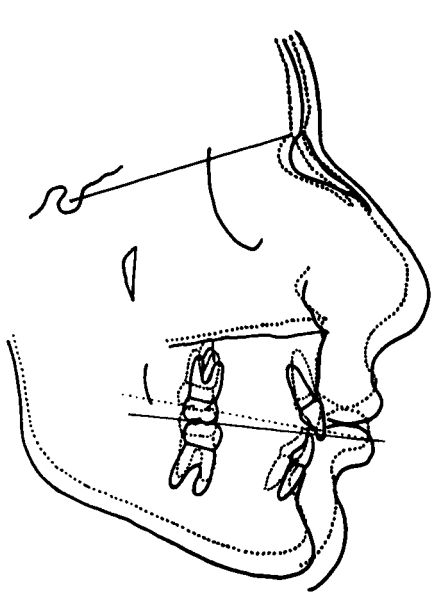
The lower molar which at the end of active treatment was apparently tipped distally, is now beginning to assume a more upright position as it moves downward and forward under the growth influence.

There is a distinct change of the axis of the upper incisor, with the crown down and forward and the root apex pointing lingually again. The upper molar shows a similar change of its axis with the crown down and forward. Notice the recovery of the occlusal plane, the result of the improved axes of the teeth.

We note also a tremendous surge in overall growth with parallel downward and forward growth of the nasal floor and a forward position of nasion with an accompanying increase in the size of nasal bone and the nose.

Figure 5 is a comparison between the tracing of 16 years, 6 months and one taken at 23 years, 6 months, and shows a continuation of the overall growth picture which is a male characteristic. The occlusal plane has remained nearly parallel, as have the axes of the incisors and molars. Notice the combined forward growth of nasion with a tremendous increase in the size of the nasal bone and the nose, and observe how the nasal floor has maintained a parallel position.

Figure 6 represents cephalometric tracings of the mandibles of Case L.L. superimposed on the symphyses. The result of active treatment (upper left) shows that the occlusal plane has been elevated; the molar has gone forward



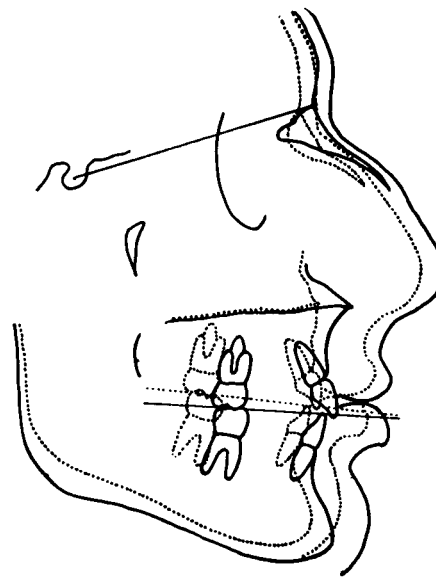


Fig. 4, Left. Fig. 5, Right.

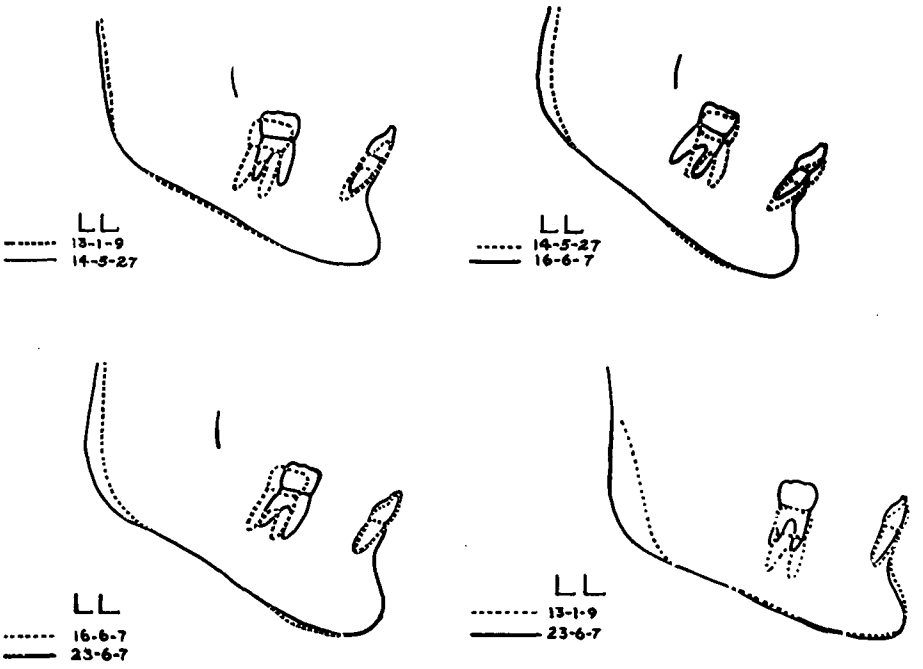


Fig. 6. Mandibular superpositions.

and rotated on its axis. Note that, although the incisor is elevated, the axial inclination is practically unchanged. The anchorage preparation which was supposed to tip back the incisor appears to have succeeded only in displacing the molar.

What looks like anchorage preparation may be a distal positioning or tipping of the mandible, giving an upright flat appearance to the incisor area.

During retention (upper right) we see a definite return of the molar to its former axial position. The incisor axis has been practically maintained. The occlusal plane has returned to a more level position and has elevated.

In the lower left composite is depicted the changes from 16 years, 6 months to 23 years, 6 months. There is some growth at the posterior border. The lower molar is forward slightly while the occlusal plane moved up-

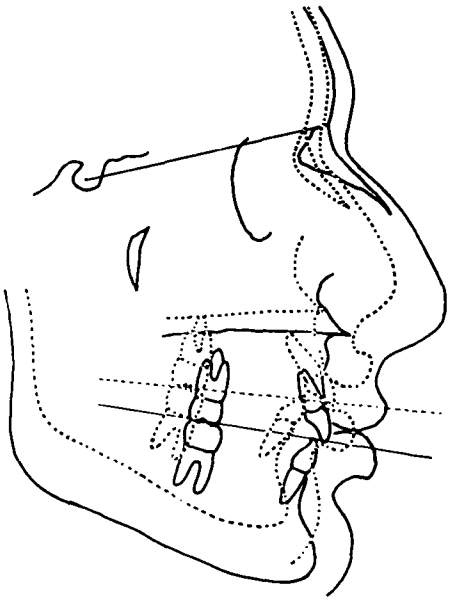


Fig. 7. Dotted, before treatment; solid, ten years later.

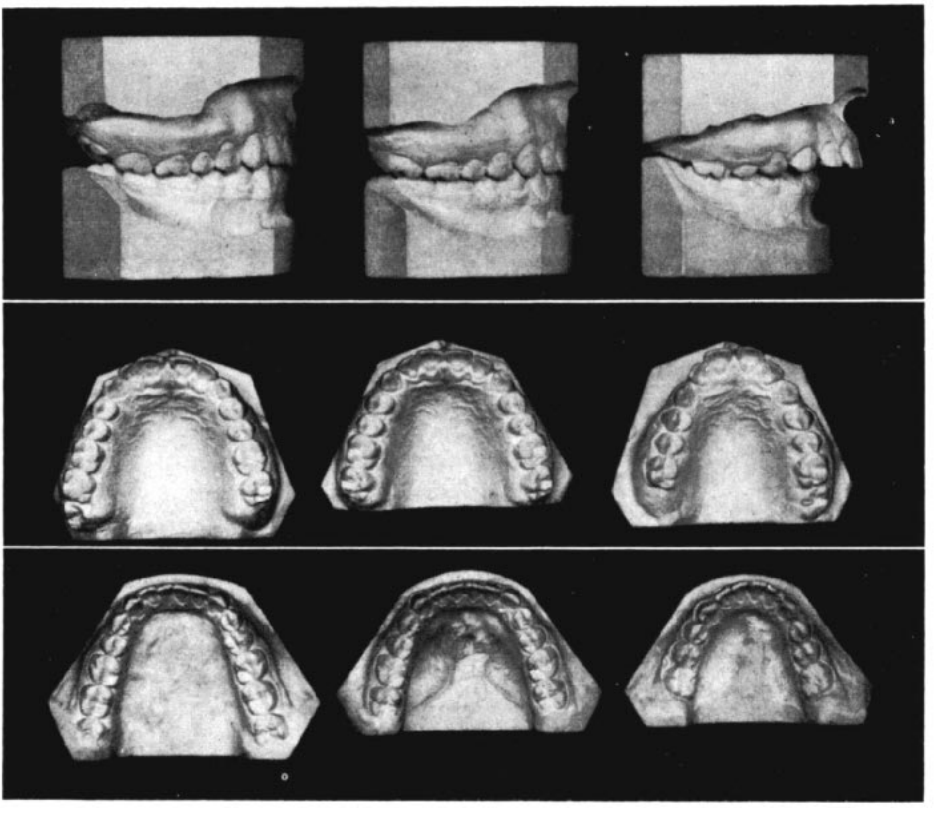


Fig. 8. Right to left, models before treatment, at completion of retention, and seven years after treatment.

ward chiefly in the molar area.

We now go one step farther and examine the original case at age thirteen before treatment and at age twenty-three. Figure 7 represents a composite of the tracings of those years and reveals the following:

(a) An enormous overall growth, especially in the mandible; a downward and forward growth of the entire face along the Y axis.

(b) Extreme forward position of nasion, together with marked increase in nasal bone.

(c) Downward movement of the nasal floor in a distinctly parallel manner.

(d) The occlusal plane has returned almost to the original. In fact it has opened slightly in the anterior region.

(e) The axes of the molars and incisors are nearly identical; in fact, the incisor at the end of this ten year interval is slightly more upright than it was at the beginning of treatment.

Figure 8 represents original models, those at the end of retention, and those taken 7 years later at age 23 years 6 months; they illustrate how the case has maintained itself. In fact, the models taken at age sixteen years can be transposed on those taken at age twenty-three years. Figure 9 shows photos originally, at end of active treatment and at end of retention. Figure 10 is a profile photograph at 23 years — the frontal photograph was not available. The balanced face speaks for itself.

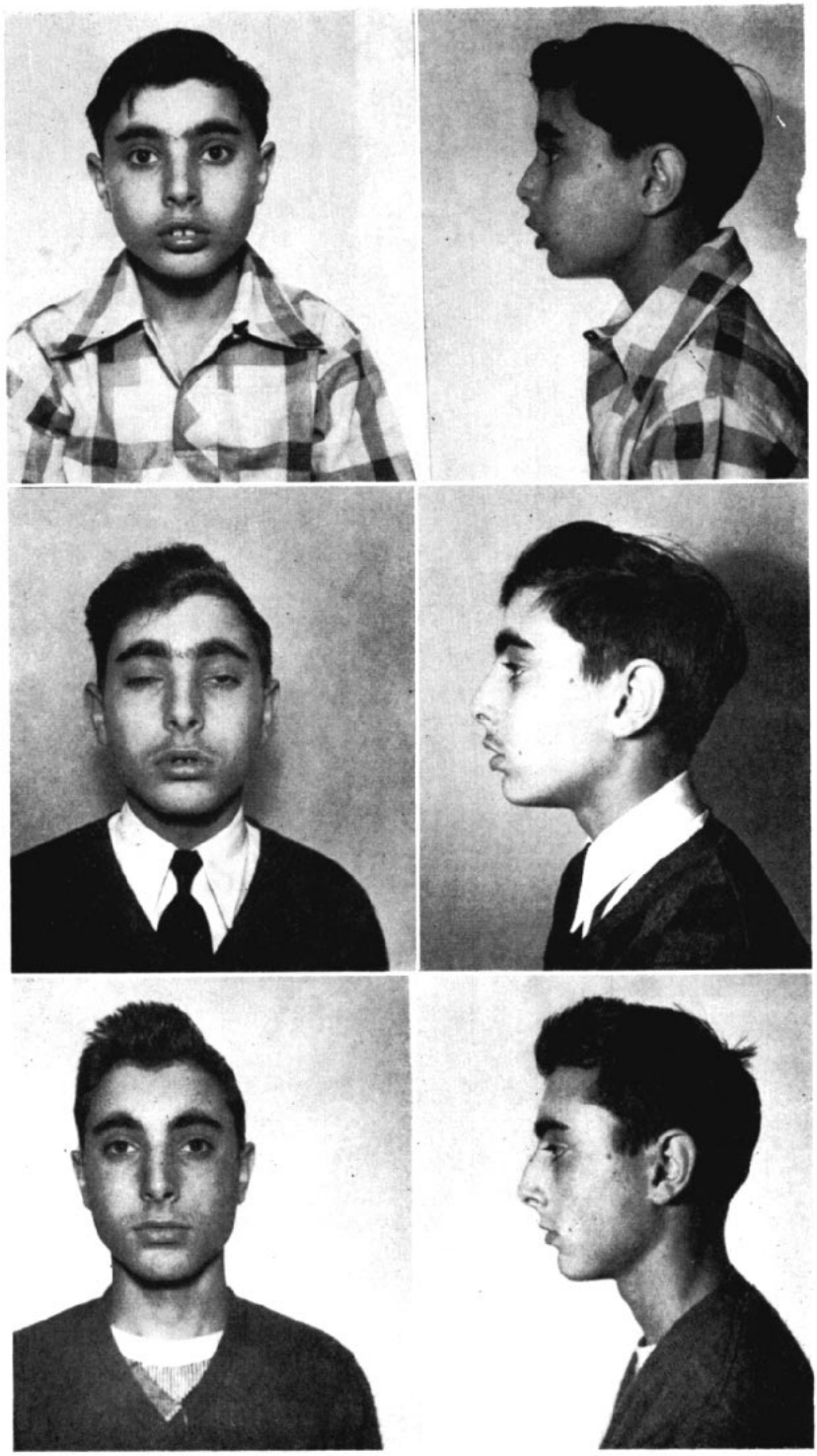


Fig. 9. Above, original photographs; middle, at end of active treatment; bottom, at the end of retention.

Fig. 10. Seven years after retention.

The findings in this case bear out almost completely the findings reported in the first cephalometric appraisal of treated cases by the staff at Illinois, published in 1938, namely:

1. Tipping is the predominant movement.
2. In all cases in which elastics were worn there was a disturbance of the occlusal plane.
3. There is a tendency for the occlusal plane to return following treatment.
4. Axial inclination of teeth, disturbed by orthodontic management, tends to correct itself following treatment.
5. There seems to be a definite correlation between success in treatment and growth.

The second case (M.R.) is also a male, age 13-6-3, at the onset of treatment. The case is classified as a Class II, Div. 1 Sub. The left side is in a full Class II relation, while the right side is somewhat forward of a Class I. The upper incisors are in severe overjet with an increased overbite. The lower incisors are in supraocclusion. Facial musculature is hypertonic. Case presents a somewhat protrusive type dentition.

Figure 11 is a tracing of the lateral head x-ray, at beginning of treatment; the facial photographs are in Figure 12, and in Figure 13 are the models at the beginning of active treatment.

The case was treated with a complete edgewise mechanism with all the teeth banded including the second molars. Treatment in this case was carried out in a more or less orthodox manner. Anchorage was not prepared. However, approximately from four to six months were used in establishing a good lower arch which consisted of leveling the occlusal plane and correcting nearly all rotations. Slight tip back bends to reverse the curve of Spee were used in the lower arch and the arch was tied back. In achieving the above some expansion was resorted to.

Fig. 11.

Fig. 12.

In the meantime, bracket control and some rotations were taken care of in the upper arch.

The next phase consisted of correcting the mesiodistal relationship. This was accomplished as follows: The upper archwire was cut on each side mesial to the canines. Hooks for intermaxillary elastics were soldered to rest against the mesial side of the canine brackets. Distal second order bends were placed in the buccal arch segments which were then tied in the usual manner and Class II elastics started.

Fig. 13.

The anterior arch segment was left in place for lip protection.

I have employed this procedure in Class II cases or wherever the mesiodistal relationship requires correction for the past twenty years. The thinking behind this is as follows:

1. Class II intermaxillary elastics are not employed continuously.
2. Second order bends are placed and elastics worn in the buccal segments for two or three appointments of three to four weekly intervals.
3. The buccal arch segments are then removed, elastics discontinued, and the case allowed to settle, or relapse, for one or two appointments.
4. This reveals several things:
   (a) Anchorage is not strained and has a chance to recover dur-

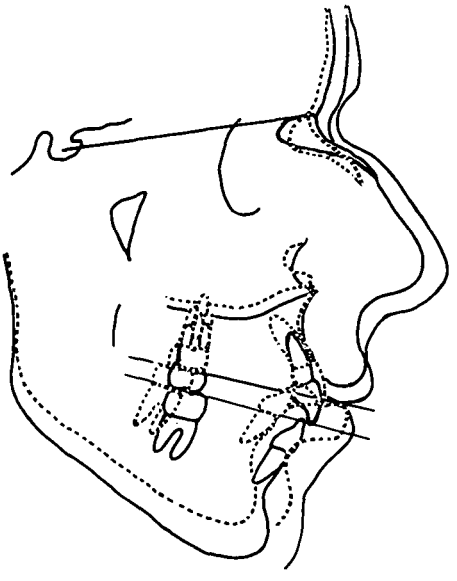


Fig. 14. Before treatment and at the end of active treatment.

ing this brief rest period.

(b) Adverse distal tipping of the upper teeth is prevented.

(c) The relations of inclined planes of the upper and lower teeth change to each other; often this change occurring during a growth period acts to jump the bite. This saves much tooth movement.

5. After the rest period the arch segments are then replaced, second order bends checked, and intermaxillary elastics worn.

6. This procedure also serves as an excellent check on whether the patient is wearing elastics as instructed. If elastics are worn correctly, a space nearly always opens, distal to the upper laterals.

7. This process is repeated several times until the buccal segments are locked in correct mesiodistal relation. The upper incisors are then retracted and placed in their correct positions. Figure 14 shows tracings of the case at the beginning and the completion of active treatment and reveals the following:

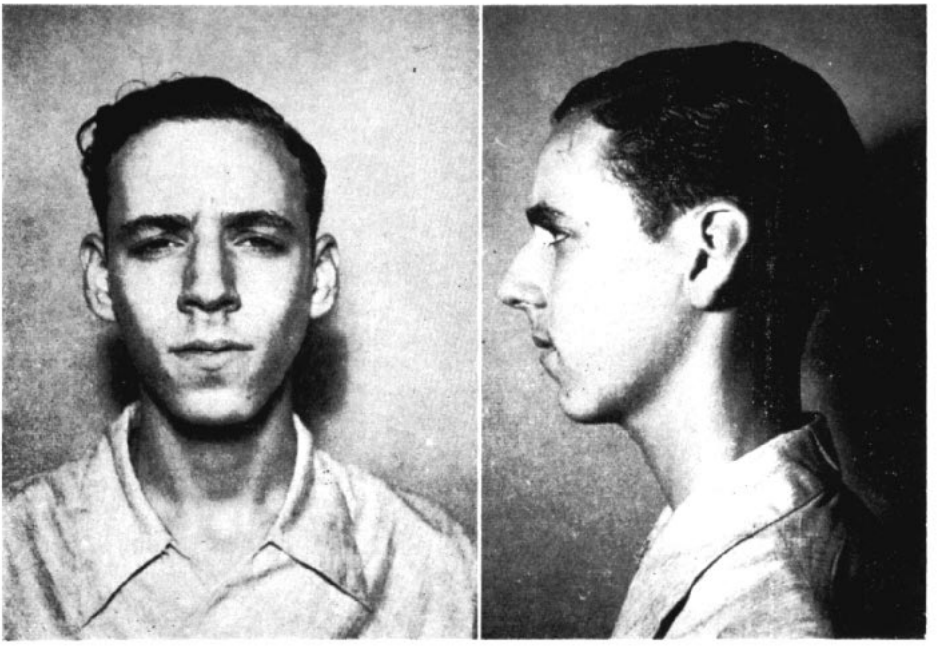


Fig. 15.

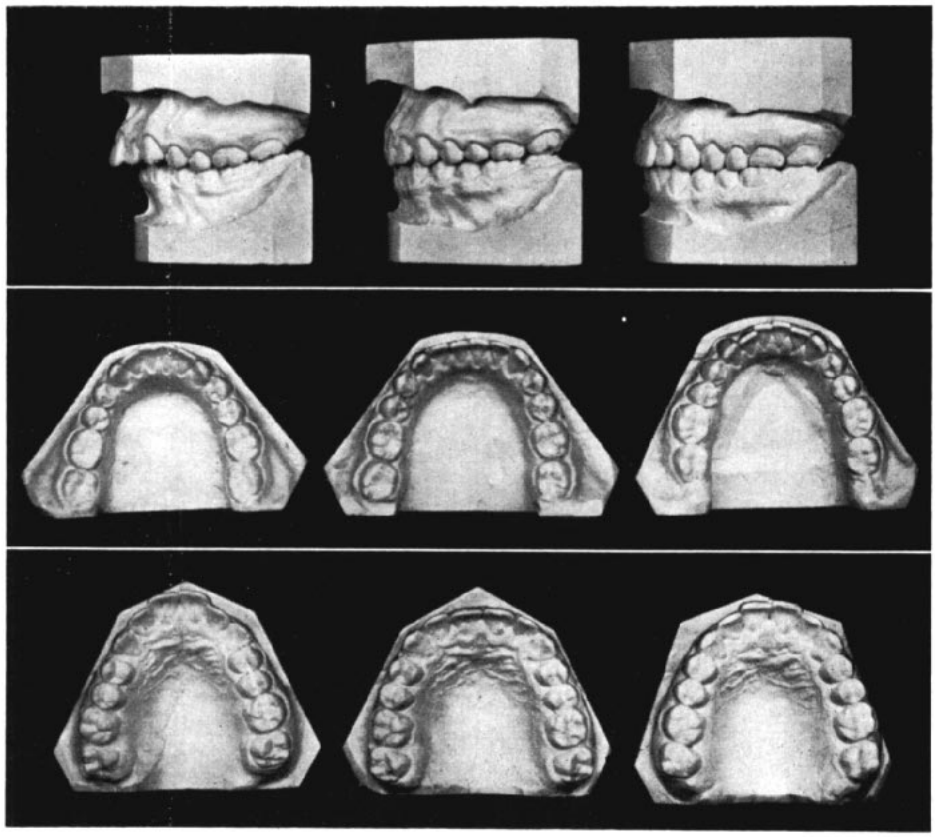


Fig. 16. Left to right, original models, end of active treatment, and sixteen years after completion of treatment.

1. Correction of the mesiodistal relationship.

2. Considerable overall growth with maxillary and mandibular growth in a downward and forward direction.

3. The lower incisor has improved its axial inclination from 100.5° to lower border in the original, to 92° at end of active treatment.

4. The lower molar has a more upright position. Any existing tipping is due to reducing the curve of Spee.

5. The occlusal plane has not been tipped. Note the nearly parallel relationship.

6. Nasion has moved forward while the nasal floor has descended in a parallel manner.

7. The upper molar has moved downward while maintaining the same relative axial inclination. This may be ascribed to the influence of the inclined planes. The incisor is relatively more upright.

Photographs at end of active treatment are seen in Figure 15.

Figure 16 shows models of the case sixteen years after the completion of treatment and approximately fourteen years after removal of retention. The four third molars were removed two years prior to making these models.

Figures 17 and 18 represent composites of tracings made before starting treatment and sixteen years after the completion of active treatment, a

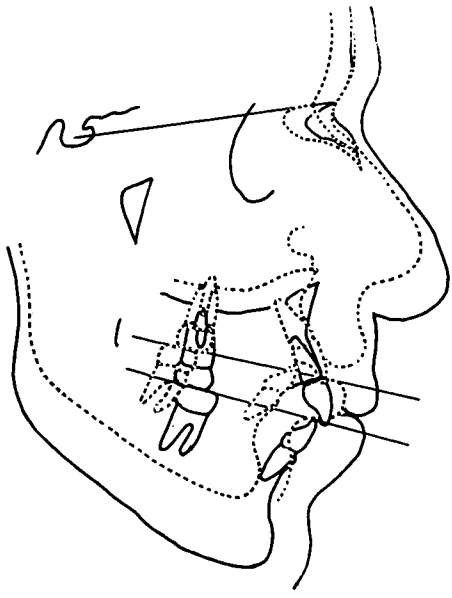


Fig. 17. Tracings before treatment and eighteen years later.

span of eighteen years, and reveals the following:

1. The excellent overall growth.
2. Practically parallel occlusal planes.
3. The close paralleling of the axes of the incisors and molars.
4. The upper incisor is tipped lingually.
5. Note the forward movement of nasion as well as the parallel descent of the nasal floor.

Final photographs are illustrated in Figure 19.

Summary

The analyses of these two cases show striking similarities: both show excellent growth changes during the active treatment period and evidence of continued excellent growth long after treatment; both were treated without extraction.

The first case, L.L., had its dentition subjected to severe turmoil in the process of setting up anchorage. The second case, M.R., was not subjected to the process of setting up anchorage.

In the final assessment the results

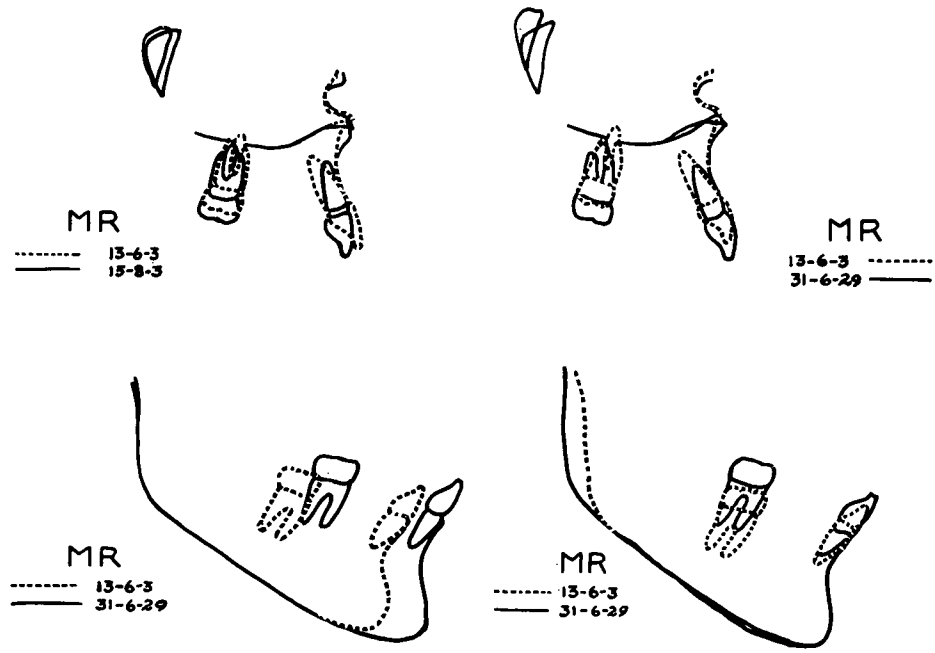


Fig. 18. Above, maxillary superposition and below, mandibular superpositions.

Fig. 19.

were strikingly similar. The occlusal plane in the first one was completely upset and ultimately returned to a position practically parallel to the original case before treatment.

The occlusal plane in the second case was maintained nearly parallel throughout treatment and was found parallel, or nearly so, to the original case many years after treatment.

In the second case, after sixteen years without appliance support, the only evidences of relapse are broken contacts at the lower left central and upper right central, and a slight buccal movement of the lower left first molar. There does not appear to be any root resorption evident in the second case on intraoral x-rays taken sixteen years after treatment. The first case showed some slight resorption about the roots of the upper and lower incisors.

It would appear, therefore, that our greatest ally is the angel on our shoulder, growth. It also appears that setting up anchorage does not appear to offer enough advantages to justify its use.

These findings are the answer to my reluctance to give full credence to the cephalometric findings in angular measurements at the beginning of treatment, especially between the ages of nine and twelve years.

The basic angles may remain the same or nearly the same, but the potential of the pattern in a spatial relationship is not known for many years. It behooves us to explore this potential to its utmost.

I am fully aware that one case proves little in orthodontics. However, were we to explore more adequately the potentials in the pattern, keep adequate treatment and follow-up records, it is not unreasonable to suppose that we may find many cases exhibiting the same or similar response to like treatments.

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