Photography an Aid in Orthodontics*

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Photography is a recognized aid in orthodontic diagnosis. It offers to orthodontics one of the most accurate, easy and satisfying methods of recording existing conditions of facial form. A knowledge of photography is one of the required attributes of an orthodontist. Dr. B. W. Weinberger[1] says, "Today modern orthodontia requires not only a knowledge of dentistry, but of art, anatomy (both human and comparative), anthropology, biology, embryology, endocrinology, pediatrics, physical diagnosis, psychology, photography, roentgenology, nutrition and many other branches of medicine and allied sciences."

Photographic facial reproductions are placed next in importance to the written record by Dr. B. E. Lischer[2] in his review of the requirements of orthodontic diagnosis. Photographs of the face made to scale are placed next in importance to denture reproductions by Dr. Samuel J. Lewis[3] in his summary of the physical equipment for orthodontic diagnosis. Today photography is limited as an aid in orthodontics by the varying degrees of inaccuracies in photostatic technique.

In a review of the quality of the illustrations of articles in medical journals, Ralph P. Creer[4] reported that only 42 per cent of the illustrations were good or excellent. Editors of our dental journals request better illustrations and occasionally ask for the original negatives so that better prints can be made. A review of the orthodontic illustrations in our orthodontic and dental journals revealed that they too have not only a low percentage of good photographic illustrations but an amazingly small percentage of standardized photographic facial reproductions of orthodontic patients. One need only study the before-and-after photographs used as illustrations in our textbooks and journals to realize the need of more standardization.

A more universal knowledge of dentofacial deformities as portrayed by photographic facial reproductions is being retarded by a lack of standardization of equipment and technique and in making the finished photographic results. Our specialty will be the greater when we learn to recognize the benefits to be derived from coordinating plaster denture and photographic facial reproductions with well established craniometric and cephalometric

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points and planes of mensuration. These points and planes have been beautifully illustrated and presented by Harris H. Wilder,[5] Rudolph Martin,[6] and other authors of texts of anthropology and anthropometry.

Pleas for more standardization have been made for many years. Two decades ago, Dr. Frank A. Delabarre[7] advocated, " . . . standardization of equipment, methods of posing, lighting, focussing to scale, printing, study of symmetry and growth and acceptance of definite anatomic landmarks as guides to various steps." Dr. B. E. Lischer[8] likewise for many years with many different cameras and lenses improved his technique in making photographic facial reproductions, until life-size photographs charted on graph paper were the recognized ultimate in standardization. When gnathostatics was introduced by Dr. Paul W. Simon,[9] many of our leaders in orthodontics recognized photostatics as a definite step forward in accurately recording and diagnosing dentofacial deformities. Today Simon's photostatics is fairly well accepted as the standard technique for photographing the most acceptable view of the growing part of the patient's face. Cameras made in our own country are improvements over the original photostatic camera. They are modern in appearance and become welcome as well as necessary additions to the orthodontist's office equipment.

Photography is the avocation of many orthodontists. The adaptation of the "old reliable box" to orthodontic photographic requirements is a most natural procedure because one would like to have a camera for his use in the office for candid shots and for use afield. Such adaptation of cameras to orthodontic uses has given us many types of photostatic equipments. Most of these equipments provide an outlet for the orthodontist's desire to create something useful. However when he realizes that some necessary standardized requirement has been modified too grossly or eliminated entirely, the orthodontist creates a new photostatic camera. Different size of image, different lighting of the subject and different finishing of the photographic facial reproductions made by successive photostatic cameras prove satisfactory to the orthodontist while he is showing facial deformities to the parents of patients. But the results of these different photostatic equipments are not as a rule sufficiently accurate to be used from year to year as measurements of a patient's facial growth.

Modern lenses have a depth of focus which permits the movement of the camera several millimeters closer or farther from the patient without there being a perceptible difference in sharpness of image on the ground glass. Even with a magnifying glass it is difficult to obtain the sharpest focus on a plane of measurement. Some photographers focus on the hair while others focus on the eyelashes. After having made photographic facial reproductions with the average hand camera, refocussing each time for sharp-

ness of image, it is most discouraging to measure follow-up photographs and find that the patient has become smaller instead of larger.

The popularity and adaptability of the miniature camera to all types of photography has permitted its use to extend into the field of orthodontics. Many articles on the adaptability of the miniature camera have appeared in our journals, photographic magazines, manuals and in pamphlets distributed by photographic dealers. The Leica Manual's chapter, "Photography in Dentistry," by Dr. Laurence Dunn,[10] shows clearly the adaptability of these miniature instruments of precision to our specialty. Miniature cameras meet the many requirements of the orthodontist. But there is a tendency among many users of converted camera equipments to disregard the laws of photographic geometric perspective.

In the last two years several articles on portrait photography with the miniature camera have appeared in photographic magazines. Most of the writers on the subject have cautioned the photographer about not getting too close to the sitter and quote the old law, "Never less than six feet, better, more than ten," if seemingly correct relative sizes of ears, eyes and nose are desired. Dr. V. A. Gage[11] writing on "Portraits with Short Focus Lenses," says: "The eye seeing a face three feet away will not notice geometrical perspective, but upon viewing the photograph made with the lens three feet from the face, the mind will perceive that geometrical perspective is false, although the perspective is true but unpleasing."

William Mortensen[12] tersely says, "It is when an amateur seeking to get a larger image, recklessly and inexpertly moves up on his subject that unpleasant perspectives are obtained with short focal lengths. Only by inexpert handling, or by malice aforethought, is it possible to obtain such monstrosities as we all have seen exhibited . . . ."

Violation of photographic geometrical perspective can be readily understood by comparing the photographs in Figure 1, one made with the camera close up, the other with the camera five feet from the orbital plane of the patient.

The use of a measuring beam and a fixed focus camera has introduced accuracy into our photographic technique. But there are certain uncontrollable factors accompanying the use of a standardized photostatic camera which prevent our saying, "This photographic facial reproduction shows that the patient has grown so many millimeters." Assuming that the median plane is selected upon which the fixed focus camera is focused, the question arises, shall the orbital plane or a plane parallel to the tragium plane be placed in the lens axis? The writer had only to make photographic facial reproductions of both left and right profiles to realize that the orbital plane is not always at right angles to the true profile. The amount of variance

in the lines and angles of mensuration of left and right profile photographs is in direct proportion to the amount of asymmetry existing in the patient's face. Measurements made to determine whether the orbital plane was parallel to the tragium plane showed that only 2 per cent of the patients measured

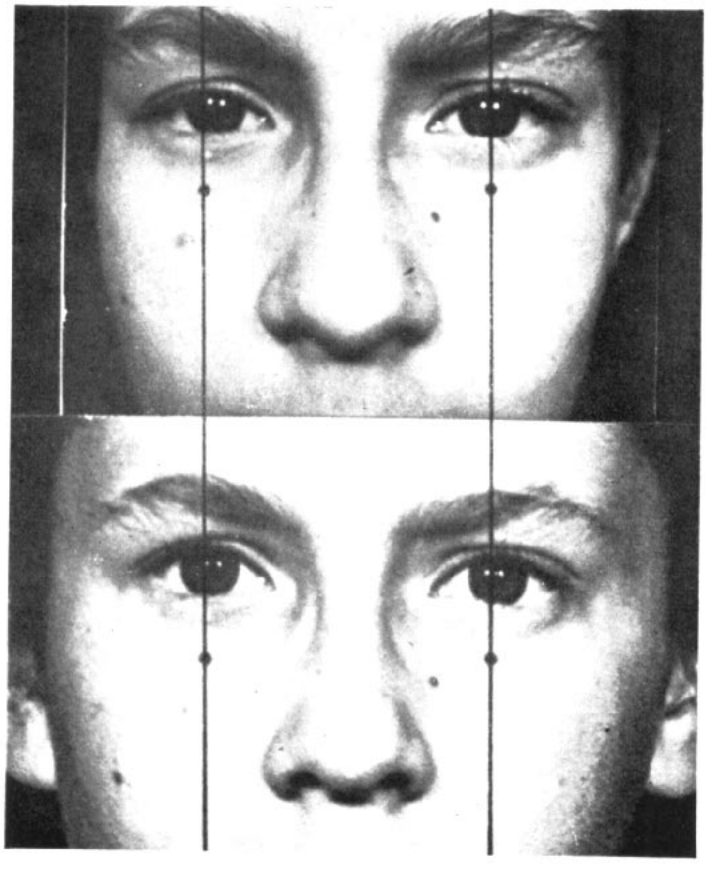


Fig. 1

had the two planes parallel.[13] Therefore it may be assumed that when photographing profiles with the orbital plane in the lens axis, 98 per cent of the left and right profiles cannot coincide.

If the distance between a patient's left tragia and orbitale is greater than that distance on the right, the patient's face will be turned slightly toward the camera when the orbital plane is placed in the lens axis. The orbital plane marked on the finished left photographed profile will therefore

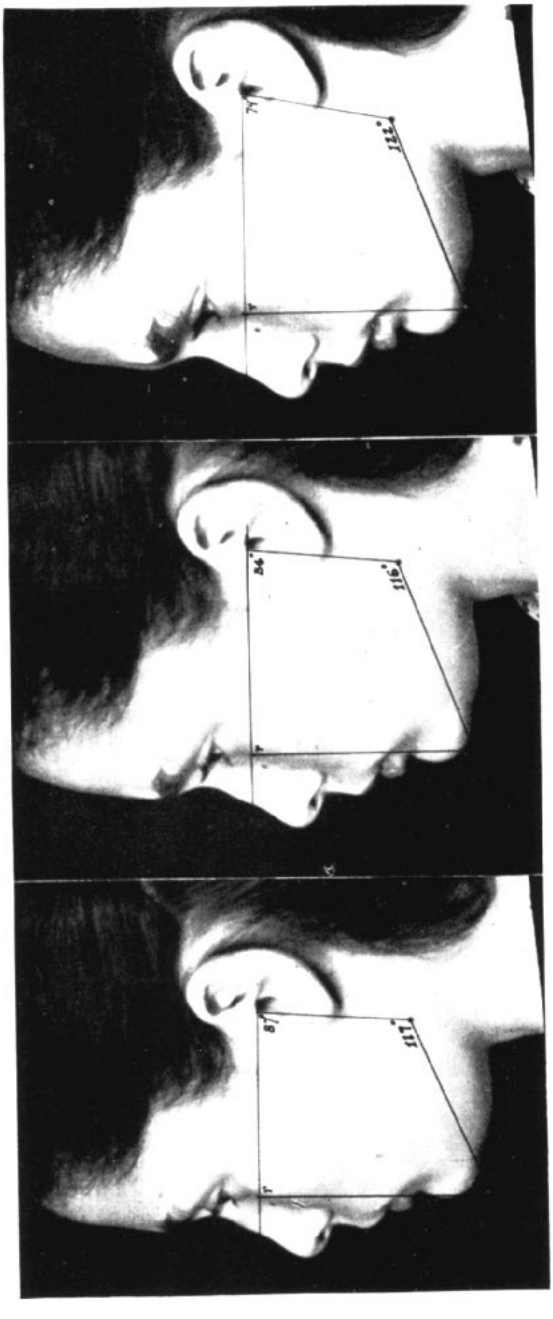
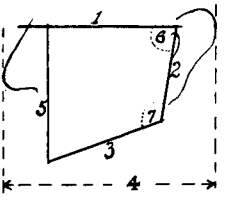
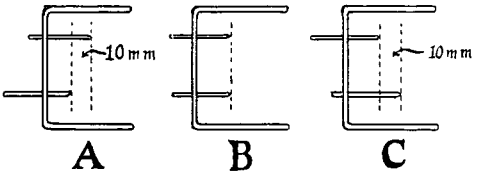


Fig. 2

fall farther to the distal than our eye told us it should. The orbital plane marked on the finished right photographic profile will fall farther to the mesial. Thus it is possible to have a profile's orbital plane, on the finished photographic facial reproduction, fall mesial or distal to the gnathion by simply making exposures with the patient's head turned toward or away from the camera.





	1	2	3	4	5	6	7
A	75	62	68	126	90	87°	117°
B	83	62	77	143	89	84°	116°
C	89	62	82	156	89	79°	122°

Fig. 3

Measurements of the lines and angles on three left photographic profiles made with the patient's head turned right 10 mm. in profile and turned to the left 10 mm., show perceptible variances. In each profile view, Figure 2, the patient's left orbitale was the same distance from the camera. The distance between tragia and orbitale, (1), in profile view A, in life-size is 75 mm. The measurement between the same points in profile view C is 89 mm., a difference of 14 mm. Measurement (4) shows a difference of 30 mm. between profile views A and C.

Rotation of the patient's true profile away from or toward the camera while being photographed is not the only cause of inaccuracies encountered while making photographed facial reproductions for measurements of growth.

If the median plane is used, a measured distance from the camera each time the patient is photographed in profile, growth of the patient's face in width will cause the points of mensuration to become progressively closer to the camera. This growth toward the camera will produce a proportionately larger facial reproduction. If the orbitale is used a measured distance from the camera each time the patient is photographed in profile, the planes of mensuration will likewise, but in a lesser degree, be recorded proportionately longer than actually exists. The profile line will be farther from the camera as the patient's face grows in width, thereby causing measurements of the profile line on the finished photographic reproduction to be proportionately smaller than that of the patient's face, compensating to a small degree the growth of the profile line.

Compared to the great benefits photographic facial reproductions contribute to orthodontics, these variances and inaccuracies in technique are inappreciable. Photography in orthodontics readily portrays the existence of facial asymmetries and repeatedly calls to our minds the fact that children's faces do not grow symmetrically.

When the urge comes to revamp a photostatic equipment, let us first review the literature on the subject of standardization and then, with a standardized equipment, we can record more accurately asymmetries of facial form. Let us make differential diagnoses and photographic facial reproductions of both left and right profiles of our patient's faces as well as front views and as many more as is necessary to adequately record existing conditions. The more accurate we become in our photographic technique, the more observing will we be of our patients' dentofacial deformities.

Medico-Dental Building

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