ASSESSMENT OF ORTHODONTIC TREATMENT NEED USING A CEPHALOMETRIC INDEX

by

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ABSTRACT

by

Seema Dhingra

A number of cephalometric analyses are used today that describe only a portion of the total variability in the craniofacial complex. Using the Bolton standard subjects, Spillas (1993) demonstrated the feasibility of using factor analysis to identify the smallest number of cephalometric variables that still account for most of the variation in the craniofacial region.

The present study used 150 pretreatment lateral cephalograms from patients treated in the orthodontic clinic at Case Western Reserve University. Factor analysis of this cross-sectional sample verified that fourteen factors account for 83.4% of the variability in the craniofacial complex.

The second step was to develop a cephalometric index using both the orthodontic clinic sample and the "normal" Bolton sample. Nineteen variables were selected from the fourteen factors by five experienced orthodontists for the construction of a cephalometric index. Discriminant analysis was used to classify the two groups based on the nineteen cephalometric measurements. Two methods, forced-entry and stepwise, were used to calculate a cephalometric index score for each subject. Seven variables entered this model (palatal plane, upper lip length, posterior face height, SNB, lower lip to E plane, mandibular prognathism and upper 1

to FH) and correctly classified 96.7% of the subjects in the treatment-needed and non-treatment needed groups. Using the forced entry method, 96.7% of the treatment-needed group and 100% of the non-treatment needed group were correctly classified. The stepwise method for the 6-18 years old group used ten variables (posterior face height, mandibular length, lower 1 to mandibular plane, palatal plane, facial convexity, mandibular prognathism, mandibular plane angle, saddle angle, nasolabial angle and upper lip length) and correctly classified 98.7% of the treatment needed group and 100% of the non-treatment needed group. Using the forced entry method, 99.3% of the treatment needed group and 100% of the non-treatment needed group were correctly classified. These findings indicate that certain cephalometric variables can be used to identify orthodontic treatment need. It is hoped that the cephalometric index score constructed from the cephalometric radiographs will be a useful adjunct to occlusal indices in providing a more accurate and meaningful measure of orthodontic treatment need.

DEDICATED TO

My parents, Krishna and Kanhaiya

My husband, Sunny

and

My son, Azi

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INTRODUCTION

Indices have been used with some success for recording disorders like caries, periodontal and temporomandibular dysfunction. Malocclusion is unique in that it presents as a group of often unrelated traits to which, in social psychological terms, there may be considerable variability of adjustment. Despite this, a number of occlusal indices (Handicapping labio-lingual deviations, Treatment priority index, Handicapping malocclusion assessment record, Index of treatment need) using dental casts have been utilized to assess treatment needs. The validity and reliability of these indices are however questionable because of the lack of an appropriate "gold standard" for comparison. James Carlos (1970) stated that attempts to establish the validity of an index intended for administrative use are often unsuccessful since the reference criterion (e.g., clinical judgement) is difficult to standardize. However, the reliability of such indices may be assessed by standard statistical techniques. While straight teeth are certainly one measure of orthodontic treatment results, most practitioners would agree that there are other parameters that impact on success or failure. Pickering and Vig (1976) points out that a comparison of indices to assess malocclusion may be compared to cephalometric analyses in which each index has its own merits but provides different information to the diagnostician.

Cephalometric variables used individually do not provide a comprehensive method of assessment of treatment need, nor does it allow for easy comparison with other occlusal indices. Therefore, a cephalomertric index is required but one that utilizes a reduced set of variables accounting for all the dimensions in the craniofacial complex.

Cephalometric analyses as used today, describe only a portion of the total variability in the craniofacial complex. An assessment of maximum variation in the craniofacial complex would entail utilizing a number of carefully selected measurements from the several contemporary cephalometric analyses. This can be quite laborious and time consuming. Hence, identification of the least number of variables that can account for the most variation of the craniofacial complex would be beneficial. Multivariate analyses have been applied for this purpose and one such method of describing variables together is through the application of factor analysis. Spillas (1993) used factor analysis to demonstrate the feasibility of this technique. When a statistical attempt is made to group a host of interrelated dimensions into uncorelated factors, verification of the extrapolation is necessary on another sample. The present study reduces the number of cephalometric variables to a few factors, but that which accounts for maximum variation in the craniofacial complex. Secondly, a cephalometric index was derived using the reduced set of variables to provide an easily quantifiable and objective way of assessing treatment need. This index could serve as a valuable adjunct to the already existing occlusal indices of treatment need or priority.

REVIEW OF THE LITERATURE

Cephalometric Studies

History

Cephalometrics is a tool that enables the clinician to accomplish more exacting procedures as well as help solve some of the perplexing problems. Roentgenographic cephalometry was first described by Broadbent in 1931, which led to the creation of the Broadbent-Bolton cephalometer. The technique was first put to clinical use for the analysis of treated cases by Moore in 1938, who developed "teleroentgenography" and was prescribing it for prosthetic planning and for following operative procedures. During the same period of time, Waldo (1936) and Margolis (1940) contributed to the development of cephalometric radiography as a research tool for the study of head growth as well as for orthodontic treatment. Many new applications of cephalometrics have continued to emerge with the most significant of them being in clinical orthodontics. Fifty years after its inception, it still is a standard procedure and an important clinical adjunct for the overwhelming majority of orthodontists.

Cephalometric Analyses

For many years dozens of planes, angles, and dimensions on radiographs have been compared by research workers. The lateral or profile radiograph has given us the most useful information regarding what constitutes acceptable balance and harmony of the component parts of the face. Numerous cephalometric analyses have been developed by various people, depending on what diagnostic criteria was of importance to that particular individual.

In 1948, Downs offered a practical method of using cephalometrics in clinical practice, building the foundation for most of the evolution of the later analyses. He undertook a study on twenty living individuals, to determine the range of the facial and dental pattern within which one might expect to find the normal. Models, photographs, and cephalometric and intraoral roentgenograms were taken of these individuals who ranged from twelve to seventeen years of age. All individuals possessed clinically excellent occlusions. This analysis looked at the skeletal and dental pattern of a normal person. The skeletal pattern essentially looked at the profile convexity and the dental pattern at the inclination of the mandibular incisors. All of the measurements were in relation to the Frankfort horizontal plane, and showed an average facial pattern that represented individuals with excellent occlusions.

Vohries and Adams (1951) recorded Down's analytical readings on a graph paper and found that the deviation zig-zagged on both sides of the vertical mean. Those that fall on the left side indicate a Class II facial and denture trend and those on the right a Class III facial and denture trend.

A method of assessment of anterior-posterior dysplasia was developed by Wylie (1947) and was known as the "California Analysis". The objective was to have an anteriorposterior appraisal of the upper face to the lower, more specifically of the maxilla to the body of the mandible. By a cleverly worked out system of cancellation, one arrived at a score indicating whether the lower face was protrusive or retrusive to the upper face.

Tweed (1946, 1954) conceived the diagnostic facial triangle as a basis for diagnosis and treatment planning. The development of this triangle as a valuable adjunct in the analysis and treatment planning of malocclusions was the end result of

the clinical and cephalometric research that was conducted over a period of approximately twenty years. The inclination of the mandibular incisors and the variations found in the Frankfort mandibular plane angles were considered the most important of all measurements. The angles of this triangle consist of FMA, FMIA, and IMPA and in 1954 Tweed shifted his attention more toward the FMIA. Forty-five samples were measured, the majority of whom did not need orthodontic treatment and a minimum requirement of 65^{O} was found to be "normal" for this angle. Bjork (1947) discussed a facial diagram in which the linear and angular configurations determined the amount and distribution of facial prognathism.

Although the "Northwestern Analysis" was worked out by Riedel in 1952, the staff at Northwestern University adopted and reevaluated the work done by him. The material for this analysis consisted of records taken from thirty Seattle Seafair princesses and their queen with an average age of 18 years 10 months. The skeletal pattern of these individuals was very similar to those recorded in a previous study by Downs. The dental pattern showed relatively greater axial inclination of the mandibular incisors but a lesser average inclination of the maxillary incisors. In approximately one-half the cases, the upper lip, lower lip, and chin fell along the same plane. The measurements SNA, SNB and ANB were part of this analysis.

The Steiner analysis, developed and promoted by Cecil Steiner in 1953, can be considered the first of the modern cephalometric analyses. The original ideal measurements were reputedly based on one Hollywood starlet. Surprisingly enough recalculation of the original values based on much larger samples produced only minor changes. Sella to Nasion (SN) was chosen as the reference line. This is essentially due to the fact that both Sella and Nasion are located in hard, nonyielding tissue; are directly and easily visible in a profile x-ray picture; and particularly

because they are located in the midsagittal plane and hence are displaced to a minimum degree by movement of the head. The analysis looks at the relationship of the incisors to their basal bones as well as assesses changes in the position and effective length of the mandible. This is useful in planning treatment, such as extraction versus non-extraction and also in the results of different types of treatment, such as intraoral versus extraoral, stationary versus simple anchorage, and light forces versus heavy ones. The various measurements incorporated in the Steiner analysis from the beginning were represented graphically as "Steiner sticks," a convenient shorthand for presenting the measurements. Elements of this analysis still remain useful today.

Sassouni (1955), used one hundred lateral headplates (fifty-one girls and forty-nine boys), mostly of the Mediterranean White race, on file at the Philadelphia Center for Research in Child Growth. This was the first cephalometric method that emphasized vertical as well as horizontal relationships, and the interaction between vertical and horizontal proportions. The analysis points out that the inclination of the anterior cranial base, Frankfort plane, palatal plane, occlusal plane, and mandibular plane in well proportioned faces tended to converge toward a single point. The inclination of these planes to each other reflects the vertical proportionality of the face. Four facial types were established depending on the relation of the four planes to the common point. An evaluation of the anteroposterior position of the face and the dentition showed that the anterior nasal spine, the maxillary incisor, and the bony chin should be located along the same arc. The total arcial analysis described by Sassouni is no longer used, but the analysis of vertical facial proportions has become an integral part of the overall analysis of a patient.

Burstone (1958), recognized that relatively few investigations of the soft tissue profile were to be found reported in the orthodontic literature, probably because orthodontic treatment was primarily concerned with hard-tissue manipulations. There was also this implication that if the teeth are arranged according to a given standard, soft tissue will automatically drape in a maximally harmonious manner. Since the soft-tissue may vary in thickness, length, and postural tone in different persons, it is necessary to study the integumental contour of the face in considering facial beauty and harmony. Burstone developed a method of integumental/soft tissue profile measurements consistent with anthropometric standards. The readings were made from oriented lateral headplates exposed to both soft and hard tissue detail. Burstone used a group of forty acceptable faces as chosen by a group of three artists at the Heron Institute of Art in Indianapolis. The hypothesis that average inclination, contour and proportion is related to profile excellence was proven to be true. This analysis proved to be an important adjunct to treatment planning.

J.D. Subtelny (1961), also studied and researched the integumental characteristics of the profile on thirty subjects from the Bolton-Brush Growth Study Center. The results indicated that all parts of the soft tissue profile did not directly follow the underlying skeletal profile. The bony facial profile tended to become less convex with age, whereas, the total soft tissue profile (including the external nose) was found to increase in convexity with progression in growth. The soft-tissue profile, excluding the nose shows a tendency to remain relatively stable in its degree of convexity. The soft tissue nose continued to grow in a downward and forward direction from one to eighteen years of age. With growth the skeletal and integumental chins assumed a more forward relationship to the cranium. Both lips

were found to be closely related to the teeth and alveolar processes in a vertical and anteroposterior relationship.

In 1960, Ricketts felt the need for restatement of the objectives of cephalometric analysis. One thousand consecutive cases were studied and a system of five measurements were initially developed from x-ray tracings which proved to be the indicators of facial depth, facial height, and profile contour. In 1981 a revised version of the descriptive analysis both in lateral and frontal orientation were presented. The Ricketts analysis is an eleven-factor summary analysis that employs specific measurements to locate the chin in space, the maxilla through the convexity of the face, the denture in the face, and evaluate the profile. Six of the eleven measurements are aimed at locating the chin in space. The major reference lines are the true Frankfort horizontal, the nasion-basion, and the pterygoid vertical and the analysis includes not only tabulated normal data for the recommended factors but also the amount of change to be expected during normal growth (growth prediction) and the treatment effects to be seen in a Visual Treatment Objective (VTO). The normative data for many of the measurements are based on unspecified samples and hence the analysis should be interpreted with caution, particularly when measurements are significantly different from the norm.

After many years of clinical use, Ricketts brought the work on the E (Esthetic) plane to its culmination with the formulation of a "law" which was called "the law of lip relationship". The lip convexity decreases consistently from the deciduous dentition to the age of the full adult dentition. In 1968 Ricketts considered the chin, point B, and the lower incisor as a unit, and called it the keystone triad. A knowledge of this is important in treatment planning.

Merrifield (1966) studied 120 lateral cephalometric roentgenograms and analyzed soft-tissue profiles with a line tangent to soft-tissue pogonion and the most procumbent lip extending superiorly to intercept the Frankfort horizontal plane. The inferoposterior angle formed by the intersection of this profile line and the Frankfort horizontal was called the "Z angle". This value gave some indication of the sagittal position of the lips and the chin.

Begg (1956) found it desirable to place the incisal edge of the lower incisor at or close to the A point-pogonion line. It was considered important in achieving a stable dentition and favorable lip balance.

Jarabak and Fizzell (1972) adopted variables from different analyses in order to develop the skeletodental analysis that takes into account the skeletal aspects of growth, as desired by Bjork. This could be used in clinical assessment of growth and also in the designing of treatment in anticipation of these growth events. The main focus was on the relationship between the cranium and the mandible, and the anterior and the posterior cranial bases, which, comprise to a large degree the hafting zone between the face and the cranium. He felt these areas did not receive sufficient investigation in the literature and hence were explored. The influence of growth on these relationships was studied during and after orthodontic treatment.

In 1974, Harvold used data from the Burlington growth study and developed standards for the "unit length" of the maxilla and the mandible. The difference between these numbers provides an indication of the size discrepancy between the jaws. The position of the teeth has no influence on the Harvold figures.

The Wits analysis (Jacobson, 1976) was conceived primarily to overcome the limitations of ANB angle as an indicator of jaw discrepancy. This analysis entails drawing perpendiculars from point A and point B on the maxilla and the mandible

respectively, onto the occlusal plane. In a sample of twenty-one male and twenty-five female adults studied by Jacobson (1975), it was found that in females, points AO and BO coincided and in males point BO was located 1mm ahead of the point AO. The "Wits" appraisal was intended not as a single diagnostic criterion, but, as an additional measurement which may be included in existing cephalometric analyses to aid in the assessment of the degree of anteroposterior jaw disharmony. This analysis is influenced by the teeth both horizontally and vertically. The magnitude of the discrepancy in the Class II direction can be estimated by how many millimeters the point A projection was in front of the point B projection, and vice versa for Class III relationship.

Burstone et al., (1978) thought that a number of cephalometric assessments were available primarily for orthodontic case analysis. Hence a cephalometric analysis especially designed for the patient who requires maxillofacial surgery was developed at the University of Connecticut and was called the Cephalometrics for Orthognathic Surgery (COGS). This appraisal was based on a system of analysis that was developed at the Indiana University, with the addition of clinically significant new measurements. Dental, skeletal, and soft-tissue variations are described by this analysis. COGS has the characteristics which make it particularly adaptable for the evaluation of surgical orthodontic problems. The landmarks can be altered by various surgical procedures and the rectilinear measurements can be readily transferred to acetate overlays and study casts for detailed planning of treatment and postsurgical evaluation.

In 1983, Holdaway developed a soft-tissue cephalometric analysis that looked at eleven different characteristics. The materials and methods used to develop this technique came from years of observation and description of patients in the office.

The H line (Harmony line) was also conceived which is drawn tangent to the soft tissue chin and the upper lip. Lip objectives were considered to be achieved when this line extended to a point near the center of the nares. Also ideally the H line should fall 3-7mm anterior to soft-tissue point A, or the superior labial sulcus, and that the lower lip should fall approximately 0.5mm anterior to this plane. It was felt that it was practical as a treatment planning procedure to approach the proposed orthodontic changes from a soft-tissue analysis perspective, making changes only to the point where the best soft-tissue profile is established. and then compute the tooth movement necessary to develop ideal profile relationships. The VTO was chosen to accomplish this objective. The Holdaway ratio was also developed which stated that the measurement pogonion to NB and lower incisor to NB should be equal in order to achieve optimum balance of the lower face.

Spradley et al., (1981) assessed normal means, standard deviation, and ranges for the anteroposterior positions of five soft-tissue profile landmarks inferior to the nose in young adults exhibiting pleasing profiles and normal sagittal and vertical relationships. Linear measurements from four different vertical reference planes were used and the subnasale vertical perpendicular to the true horizontal was shown to have the smallest standard deviation. One hundred and forty individuals who ranged in age from 19-32 years were used. Cephalograms were taken in natural head position, thus establishing a true extracranial horizontal reference plane.

In 1984, J.A. McNamara found the necessity for the development of a method of cephalometric analysis that would be sensitive not only to the position of the teeth within a given bone but also to the relationship of the jaw elements and cranial base structures to each other. The analysis is derived in part from the principles of the cephalometric analysis of Ricketts and of Harvold, although the constitution of the

nasion perpendicular and the point A vertical, are presumed to be original. In this method, both the anatomic Frankfort plane and the basion-nasion line are used as reference planes. The anteroposterior position of the maxilla is evaluated relative to the nasion perpendicular. The second step is a comparison of maxillary and mandibular length, using Harvold's approach. Relationship of the upper and lower incisor to their basal bones are also evaluated. The normative standards of this analysis were determined by arbitrarily combining comparable average values of the Burlington, Bolton, and Ann Arbor samples.

It is evident that cephalometric radiology has been an essential aid to assess craniofacial morphology of the dentofacial complex. There are a number of cephalometric analyses available today with the most widely used been cited above. Majority of them describe only a portion of the total variability in the craniofacial complex. The description of a particular feature was probably based on what the author considered as being of utmost importance. Differences in treatment philosophy, inadequate or unsatisfactory information were a few reasons why some dimensions were considered more valuable than others. Also, a number of these analyses were derived from a rather small sample size which can introduce bias and hence the validity of the results. To get a full appreciation of craniofacial growth and morphology, it is more beneficial to the clinician to study the craniofacial complex as a whole rather than in incomplete parts (as is the case in most of the conventional cephalometric analyses). Thus an assessment of maximum variation in the craniofacial complex would entail utilizing a number of carefully selected measurements from among the several contemporary analyses used today. This is not feasible since it can be very time consuming. To our knowledge there is no

cephalometric index available today. This is due to the inavailability of one single system that gives a full appreciation of the craniofacial complex.

Indices

Indices have been used with some success to record other dental disorders like caries and periodontal disease. Malocclusion is unique in that it often presents as a group of unrelated traits. Despite this problem, several indices of malocclusion using dental casts have been developed and have been used for diagnostic classification, epidemiological data collection, recording of treatment need and assessment of treatment success.

Several indices have been developed with the intention of categorizing malocclusion into various groups, according to the urgency and need for treatment. Draker (1960) developed the HLD or the "Handicapping Labiolingual Deviations" index which could be applied to both patients and models without need for special equipment. Deviations from a fictitious norm rather than the state of "occlusion" were of epidemiological importance in establishing prevalence rates for such orthodontic problems. This index is simple, reproducible, and tests for validity shoed 80% correlation. Unweighted measurements were used and the index yielded a cut-off point.

The TPI or "Treatment Priority Index" was originally developed by Grainger (1967) in connection with the Burlington orthodontic research project at the University of Toronto. The effects of preventive orthodontic treatment on the prevalence and severity of malocclusion in children. were assessed. Scores on the TPI range from 0, indicating ideal occlusion, to scores of 10 or more which reflect extreme malocclusion. The total score comprises of five component scores. Weights

are assigned to different components of this index which relate to the degree of malalignment.

The HMAR or "Handicapping Malocclusion Assessment Record" was developed by Salzmann in 1968 in response to a 1966 recommendation by the ADA's Council on Dental Health. The purpose of this index was to identify any occlusal conditions that might interfere with the oral health or the general well-being of the individual. The teeth in malocclusion are assessed according to the criteria and the weights or point values assigned to them. The relative point values are based on clinical orthodontic experience from the standpoint of the usual contributory effects of various types of malocclusion on dental health, function and esthetics. The assessment was not designed to ascertain the presence of specific occlusal deviations.

The "Occlusal Index" was developed by Summers in 1971. Nine characteristics were scored and the index appeared to correlate highly with the clinical standard indicating high validity. This index incorporates seperate weighting mechanisms for deciduous dentition, mixed dentition and permanent dentition stage. Each examination item is simply scored (observation score) and then the weighted score (code) is placed. The sum of the weights is then determined. The occlusal index appears to correlate highly with the clinical standard, indicating high validity.

Brooke and Shaw (1989) developed the "Index of Orthodontic treatment Need." This index incorporates the dental health and the aesthetic component. The dental health component comprised of three main categories representing "no need", "borderline need", and "need" for orthodontic treatment. The aesthetic component is a visual scale. A rating is allocated for general attractiveness rather than specific morphological similarity to the photograph. All the above mentioned occlusal indices used regression analysis to yield a cut-off point.

Thus, while straight teeth are certainly one measure of orthodontic treatment need, most practitioners would agree that there are other parameters that impact this decision, lateral cephalograms being one of them. Since they are used as a routine diagnostic aid by an overwhelming number of orthodontists the development of a cephalometric index would serve as a valuable adjunct to the occlusal indices in assessing treatment need. The application of multivariate analyses to cephalometric radiography would help to process a large number of variables involved in craniofacial growth. Such analyses commonly utilized by researchers include factor analysis (Brown et al., 1965; Solow, 1969), dicriminant analysis (Lawley and Maxwell, 1971), and principal component analysis (Anderson, 1958).

Harris (1963), Johnston (1968), Walker (1972) and others applied multivariate analyses to study dentofacial growth. Howells (1957) did an extensive factor analysis of the cranial vault. Landauer (1962) performed a study to search for factors of variation in measurements of the facial skeleton, to complement factors of the cranial vault found in the previous study.

The applications and aims of factor analysis in cephalometric research and craniometric data were studied by Brown, Barrett, and Darroch in 1965. Selected body measurements of Central Australian Aborigines as part of the material for a longitudinal growth study was used. It was shown that there can be a mathematical description of the relationship between the variables. These are termed factors which are computed from coefficients of correlation between the variables. There are two types of factors, common factors affecting more than one variable of a set and unique factors affecting single variables. Solow (1966) obtained eight factors which were considered to be representative of the craniofacial region. A correlation

between two or more variables may only demonstrate a "biological coordination", and does not necessarily provide direct evidence of cause-effect relationship.

In a Master of Science thesis, based on the research done by Cleall et al., (1976), Adeli-Nadjafi (1977) tried to ascertain if growth of the various facial types was distinct and unique. This was not found to be true, but, the component scores for each facial type did change with age. These changes in component scores and the lack of constancy in classification signified that changes in facial proportions occured with growth. Adeli-Nadjafi felt that if a larger number of pure facial types were studied, unique patterns of growth could be exhibited.

A problem in the presentation and interpretation of the results of factor analysis is deciding the level at which a loading achieves significance. In several previous studies (Solow, 1966; Brown, 1964) a level of 0.20 was taken as the level at which a loading reached significance. Benfer (1975), in an analysis of co-ordinate data, took a level as high as 0.70. Buranarysa (1981) considered a loading of 0.50 as significant. Hence there appears to be no firm criteria for deciding the appropriate level.

Most studies in the past utilizing factor analysis in cephalometric research have not fully explained what the underlying dimensions that thoroughly characterize the variation in the craniofacial region are or have utilized a relatively fewer number of variables to explain craniofacial variation. In order to have complete description of craniofacial growth and morphology, all the individual interrelated measurements across the many contemporary cephalometric analyses were incorporated into a system by Spillas (1993). One hundred thirty four cephalometric measurements representing linear and angular assessments of the craniofacial complex were obtained from each of the 150 lateral cephalometric radiographs. The sample

consisted of fifteen males and fifteen females (Caucasians), who had serial cephalometric radiographs taken at ages six, nine, twelve, fifteen and eighteen years of age. They were collected from the Bolton Brush Growth Study Center, Case Western Reserve University, Cleveland, Ohio. Factor analysis was performed on these measurements and fourteen factors were extracted which accounted for 83.4% of the total variance in the craniofacial complex. Thus factor analysis has been used to reduce a large number of correlated variables into smaller sets. In essence it provides the simplest description of the observed data.

In conclusion, a variety of cephalometric analyses are available today that describe only a particular dimension of the craniofacial complex. The normal patterns of craniofacial morphology as described by most of them are based either on small samples from rather special populations, or purely subjective judgements about what constitutes a balanced face and normal development. Due to this, some variables are repeated and redundancy is encountered. Spillas (1993) attempted to compile about ten of the most commonly used analyses and identify the least number of variables that could account for the maximum amount of variation in the craniofacial complex. Once this statistical deduction is verified on another sample, a cephalometric index can be constructed with the reduced number of variables. To our knowledge, no cephalometric index is available at the present time. Since lateral cephalograms are used by the majority of the orthodontists, development of a cephalometric index may provide an easy, quick and objective way of classifying subjects who need orthodontic treatment from those who do not. It can also be used in combination with occlusal indices to provide a more accurate and meaningful measure of treatment need. It could also be used as a research tool to evaluate treatment outcome or success based on cephalometrics.

STATEMENT OF THESIS

The long-term objective of this project is to develop a valid and reliable cephalometric index that can be used by practitioners to assess the treatment need or priority in individuals. Such an index could also be used as a screening tool for large scale epidemiologic surveys evaluating the need for treatment. In order to achieve this objective, the project has to proceed in phases. The specific aims of the present study are as follows:

1. Reduce, via a statistical approach, the number of cephalometric variables that are required to describe the craniofacial structure. This will yield unique dimensions of the craniofacial complex called factors. Each factor will comprise of a subset of cephalometric variables that correlates with that particular dimension of the face. Verify to see if these factors account for the same or similar amount of variation of the craniofacial complex as that accounted for by Spillas (1993).

2. Select a reduced set of variables from each of the factors to be accomplished by a panel of five experienced orthodontists.

3. Construct a cephalometric index with this reduced set of variables that would establish a separating boundary, to classify those needing orthodontic treatment from those who do not. The derived cephalometric index will be tested in the future to evaluate the validity of the index.

MATERIALS AND METHODS

Study Population

The study population for the first aim consisted of pretreatment lateral cephalograms of 150 Caucasian subjects that were randomly chosen from the orthodontic clinic sample at Case Western Reserve University. The radiographs belonged to five different age groups (See Table 1 for a summary display of the specific age groups selected for the study).

Table 1.--A summary display of the specific age groups selected for the study.

Age in Years	No. of males	No. of females	TOTAL
6.0-08.6	15	15	30
8.7-11.0	15	15	30
11.1-13.6	15	15	30
13.7-16.0	15	15	30
16.1-18.6	15	15	30
Total	75	75	150

This selection criteria was necessary to be in accordance with the previous study by Spillas (1993). The sample selected for the present study were presumed to have either received orthodontic treatment or were undergoing treatment purely based on information received from their lateral cephalometric radiographs.

The second aim of the study did not require a sample of subjecs. The third aim required two groups of samples.

cephalogram is termed the midline-lateral film distance (ML). The ML distances of the cephalograms were not recorded in each and every case, but the average range of ML used with this cephalometer was from 110-130 ML; the average being 120 ML. The cephalograms were taken in a manner that the Frankfort horizontal plane was parallel with the floor. Majority of them were recorded with a relaxed lip posture and all of them were taken in maximum intercuspation.

Lateral radiographs were traced on 0.03 inch matte acetete paper with 0.5 mm H lead pencil. By means of an X-Y coordinate digitizer, a standardized series of 152 recognized cephalometric landmarks (see Figure 1 for a graphical display of the "CWRU Cephalometric Regimen") were located and digitized by the same investigator for each of the 150 radiographs. Their coordinates were used to generate 134 dissimilar linear and angular variables relating to both hard and soft tissue structures (Appendix B for a description of the measurements). An IBM computer was used to digitize all the landmarks in this study, while the computer software utilized was Dentofacial Planner^{TM} (Dentofacial Software Incorporated, P.O.Box 950, Staton A, Toronto, Canada, M5W IG5)

Errors made in landmark identification and for digitizing method were estimated by retracing and redigitizing 10% of the cephalometric radiographs (N = 15 radiographs). Selection of radiographs was randomly done. All of the 152 landmarks were redigitized by the same investigator and the 134 measurements were then compared to that of the first tracing. Intra-class correlation coefficient was computed for reliability.

Data Analysis

The data analysis proceeded in three stages, each corresponding to the three aims of the study. The first stage employed factor analysis. The general goal of factor

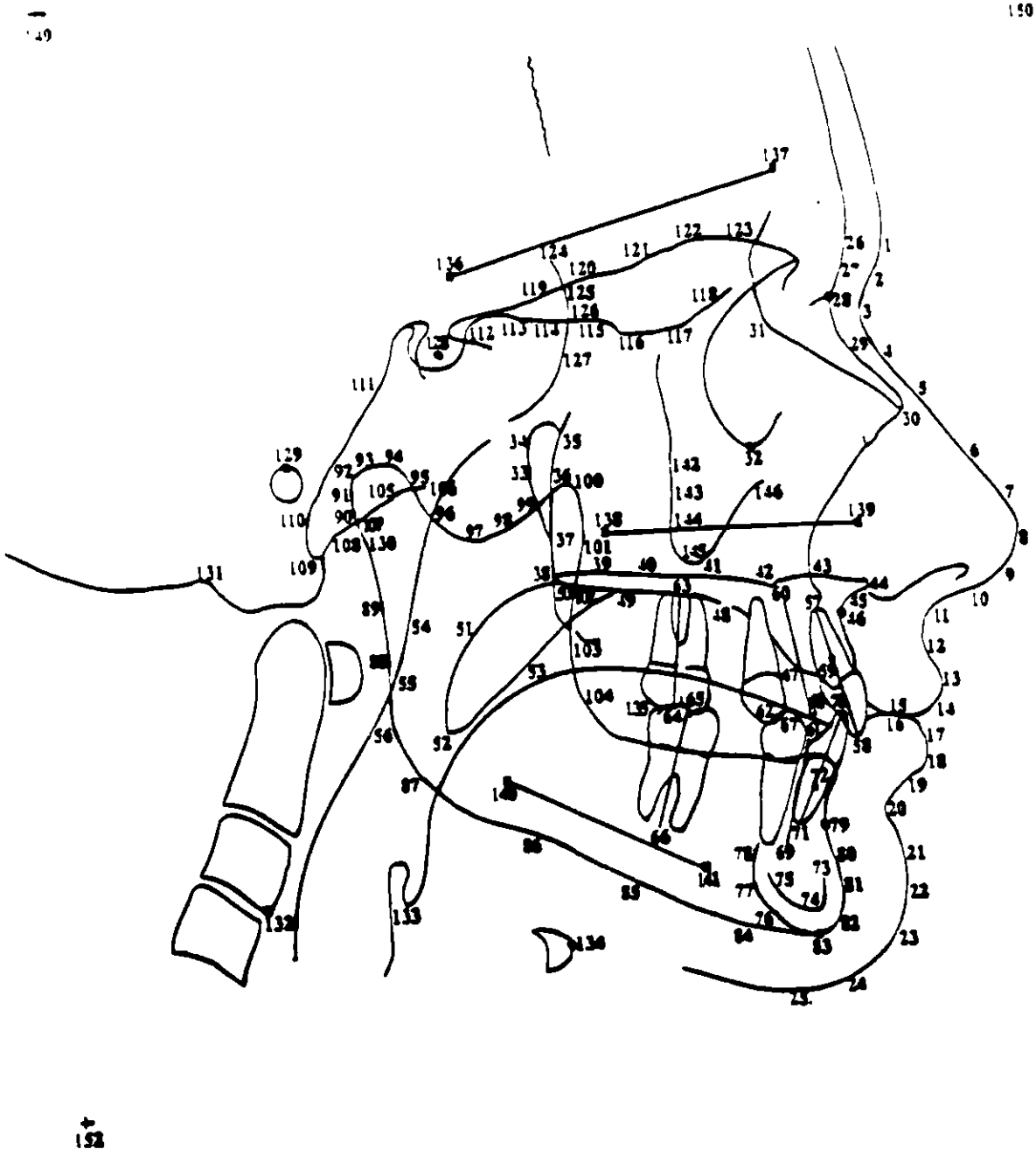


Figure 1. CWRU Cephalometric Regimen. See appendix B for list of corresponding landmarks.

analysis was to reduce the total number of variables to the smallest possible number of sets. This created a group of completely seperate measures called factors. Thus the main justification for the application of factor analysis in the study of craniofacial variables seemed to be the analysis of the associations between different sources of variability represented in the correlation matrix, for example, between the length of the cranial base and the length of the mandible. While the number of factors and their relative importance may be influenced by the investigator in the choice of variables, the relationship between the factors expresses properties in the data that cannot be influenced by the investigator. According to Solow (1971), the most rewarding use of factor analysis in cephalometry seemed to be its application to the analysis of the relationship between different sources of variability.

The mathematical model for factor analysis appears somewhat similar to a multiple regression equation. Each variable is expressed as a linear combination of factors which are not actually observed. The general expression for the estimate of the jth factor F_j is:

$$F_j = W_{j1}X_1+W_{j2}X_2+.....+W_{jp}X_p$$

The W's are the factor coefficients and X's are the values of the cephalometric variables. The 134 measurements were subjected to factor analysis on each of the 150 subjects. Two criteria were used for the extraction of the factors, namely, an eigenvalue > 2.0 and the inclusion of a minimum of three variables per factor. The total variance explained by each factor is called the eigenvalue. The eigenvalue is a mathematical property of a co-variance matrix and is used in relation to the decomposition of such a matrix. It is utilized both as a criterion of determining the number of factors to extract and as a measure of variance accounted for by a given dimension. Each factor was assessed to determine and explain the underlying

dimensions being measured based on what the associated variables were actually measuring and how they were related to each other. The factors so extracted were compared to the previous study (Spillas, 1993) and so was the percentage of the variation in the craniofacial complex accounted for by these factors.

Each factor (explaining a particular dimension of the craniofacial complex) had a large number of variables that were essentially explaining the same dimension. The rationale was that repetitive measurements could be eliminated to achieve a reduced set of variables that explained the maximum variation in the craniofacial complex. To achieve this reduced set, experienced orthodontists had to be consulted in order to arrive at a consensus which entailed involvement of five experienced orthodontists practicing in the Cleveland area. Each orthodontist was given a list of variables that loaded onto each factor and were asked to choose the most important variables for treatment diagnosis (see Appendix A for a list of the variables). These results were consolidated choosing the most common variables selected by all five orthodontists. This procedure would warrant the use of fourteen to twenty measurements for development of the cephalometric index.

In order to differentiate subjects who need orthodontic treatment from the ones who do not (based on cephalometric analysis only), linear discriminant analysis (multivariate statistical procedure) was utilized. Discriminant analysis is a statistical procedure concerned with the problem of distinguishing two or more populations on the basis of observation of several variables. This statistical method attempts to establish a rule, or discriminant function that can be used to classify each individual.

For the discriminant model, two main methods of variable selection were compared. First, all of the final chosen variables were forced to enter the linear discriminant model. Due to the potential for interdependencies among the

independent variables, a step-wise procedure, was later used to find a subset of the given variables which best performed this assignment. This procedure was useful to determine if some variables were more important than the others in discriminating between the two groups (those needing treatment from those who do not). Variable selection criteria for the step-wise discriminant procedure in the present study was to minimize the Wilks' Lambda.

Wilks' Lambda is the ratio of the within group sum of squares to the total sum of squares. The small value of the lambda indicates that within group variability is small compared to the total variability which means most of the total variability is attributable to differences between the means of the two groups. At each step-wise session, variables that result in the smallest Wilks' Lambda for the discriminant function were selected for entry. The equation used for the discriminant function calculation was as follows:

$$D = B_0+B_1X_1+B_2X_2+.....B_jX_j$$

where the X's are the values for the cephalometric variables, and the B's are coefficients estimated from the data. Unstandardized coefficients were used for calculation of the function score.

The equation given above was calculated for the two groups (treatment not needed and treatment needed) using the group mean and the coefficients. The cephalometric index that was used for classification is described below:

Cephalometric index = 1/2 (mean score for treatment needed + treatment not needed)

The effectiveness of the discriminant function was also computed. Relative variability of the actual discriminant scores within and between groups was interpreted as the eigenvalue. The eigenvalue is a ratio of the between-group to

within groups sum of squares. A large eigenvalue (between groups variability is high compared to within group variability) is characteristic of a good discriminant function. Canonical correlation, another indicator of effectiveness, was also calculated. The canonical correlation measures the degree of association between the discriminant scores and the groups. The correlation is equivalent to the square root of the ratio of the between groups sum of squares to the total sum of squares and represents the proportion of the total variance attributable to differences between the groups. A large correlation value is associated with a good discriminant function. The cephalometric index was first computed for the twelve year old subjects, and also the entire sample of 6-18 year old subjects.

In future any individual with a score greater than the index score will need treatment and less than the index score will not need treatment. This procedure has to be validated using a seperate sample of subjects.

RESULTS

Study Population

The study population consisted of pretreatment lateral cephalograms of 150 caucasian subjects taken from the orthodontic clinic sample at Case Western Reserve University, Cleveland, Ohio. The radiographs belonged to five different age groups, essentially, 6-8.6 y, 8.7-11.0 y, 11.1-13.6 y, 13.7-16.0 y and 16.1-18.6 y and included an equal amount of males and females in each group (fifteen males, fifteen females). The sample selected for the present study were presumed to have either received orthodontic treatment or were undergoing treatment due to the fact that records were obtained on them in the orthodontic clinic.

Cephalometric Measurement

One hundred thirty-four dissimilar measurements were used and was in accordance with the previous study (Spillas, 1993). See Appendix B and C for a list and a description of these measurements.

Objective One

Factor Analysis

The 134 measurements that were selected for the present study were subjected to varimax-orthogonal rotated factor analysis (See Appendix E) on the 150 individuals. Two criteria were used to define whether a factor was significant or not i.e., eigenvalue $\geqslant 2$, as determined by the scree plot and atleast three variables had to load ($\geqslant 0 \geqslant 52$) onto a given factor (see Figure 2) for a graphical display of the scree plot utilized and Table 2 for a display of the different eigenvalues for each of

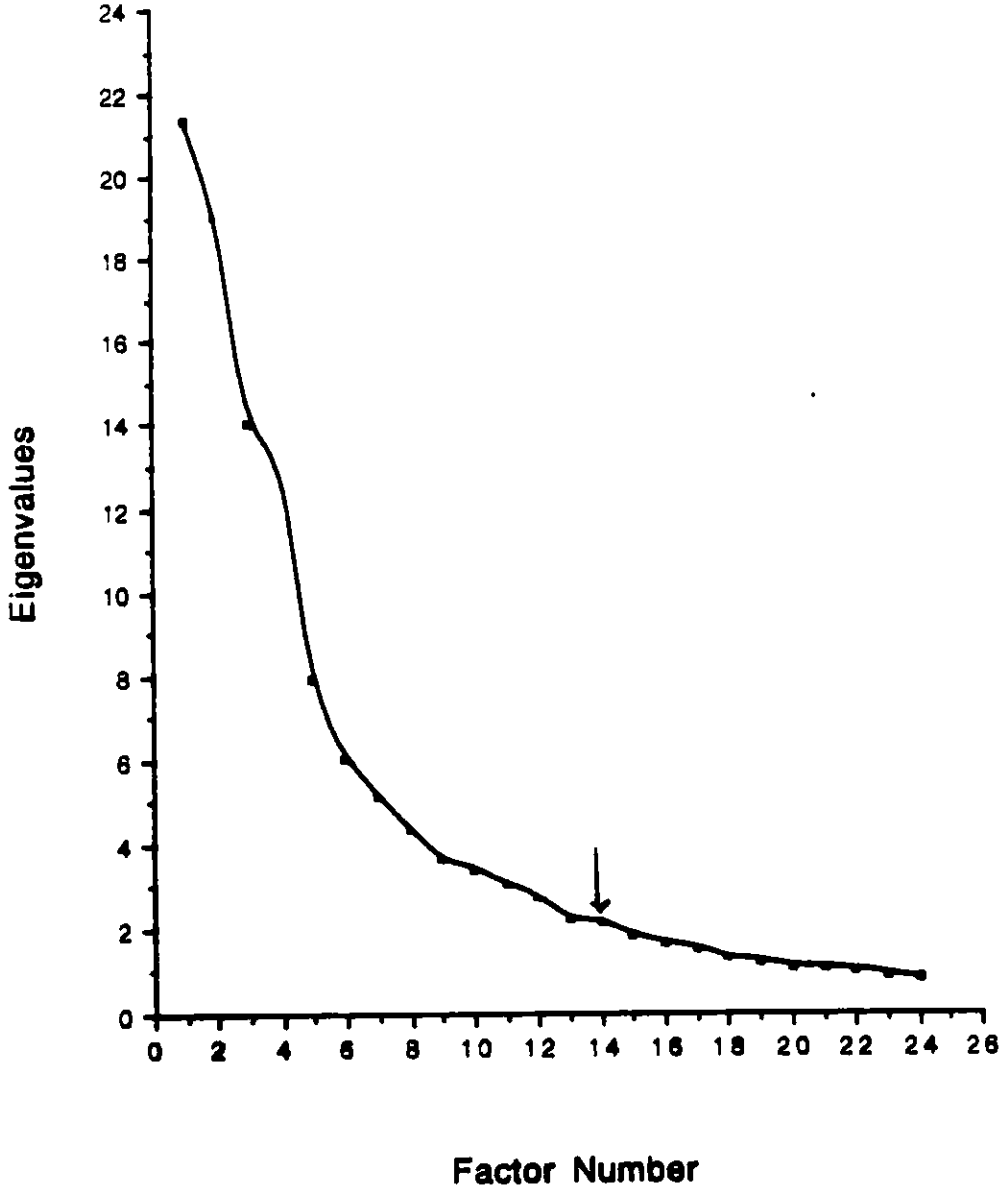


Figure 2. Scree plot. Arrow indicates where the distinct break occurs at eigenvalue greater than 2 (fourteen factors extracted)

Table 2.--Percentage contribution of the varimax factors to the common variance

FACTOR	EIGENVALUE	% OF VARIANCE	CUMULATIVE %
1	21.34	16.4	16.4
2	19.03	14.6	31.1
3	14.05	10.8	41.9
4	13.11	10.1	52.0
5	7.89	6.1	58.0
6	6.06	4.7	62.7
7	5.16	4.0	66.7
8	4.37	3.4	70.0
9	3.65	2.8	72.9
10	3.42	2.6	75.5
11	3.08	2.4	77.9
12	2.74	2.1	80.0
13	2.25	1.7	81.7
14	2.19	1.7	83.4
15	1.86	1.4	84.8
16	1.67	1.3	86.1
17	1.54	1.2	87.3
18	1.33	1.0	88.3
19	1.23	1.0	89.3
20	1.11	0.9	90.1
21	1.07	0.8	91.0
22	1.02	0.8	91.8
23	0.92	0.7	92.5
24	0.85	0.7	93.1

the obtained factors). The scree plot displays the total variance associated with each associated with each factor. Typically, the plot shows a distinct break between the steep slope of the large factors and the gradual trailing off of the rest of the factors. The gradual trailing off is called the scree (Cattell, 1965) because it resembles the rubble that forms at the foot of a mountain. This technique allowed for the extraction of fourteen factors and each described a different dimension of the craniofacial complex accounting for 83.4% of the total variance (Table 2 shows the percentage contribution of the varimax factors to the common variance). The remaining ten factors i.e., 15 through 24 (see Table 2) contributed another 8.3% (a total of 93.1%) of the common variance. Also, less than three variables loaded onto each of these factors. Therefore these factors were not considered significant enough to warrant further assessment. For all of the significant (fourteen factors), Tables 3 through 16 depict the variables that associated with each factor, as well as the significant loadings (factor co-efficients) on the various measurements. See Figures 3 through 16 for a display of the associated measurements for each factor.

Factor 1

Linear measurements loaded onto factor 1 (Table 3, Figure 3) essentially explaining the general size of the craniofacial complex (i.e., involving the hard and soft tissue), and contributes 16.4% of the common variance. The first factor was identified as relating to "**vertical and anteroposterior aspects of craniofacial development**", based on the associated measurements. See Table 3 for positive and negative loadings of the variables.

Factor 2

With a contribution of 14.6% of the common variance, this was identified as a factor (Table 4, Figure 4) representing the "**hard and soft tissue angular**

Table 3.--Varimax rotated factor solution for Factor 1

VARIABLES	FACTOR1
ANTERIOR FACE HEIGHT	0.93
FACIAL LENGTH	0.91
FACIAL DEPTH	0.89
MANDIBULAR LENGTH	0.87
LOWER ANTERIOR FACE HEIGHT	0.86
POSTERIOR FACE HEIGHT	0.84
LOWER ANTERIOR DENTAL HEIGHT	-0.87
LOWER POSTERIOR DENTAL HEIGHT	-0.81
LOWER SOFT TISSUE FACE HEIGHT	0.80
NOSE TO CHIN LENGTH	0.80
UPPER POSTERIOR DENTAL HEIGHT	-0.77
CORPUS LENGTH	0.76
POSTERIOR CRANIAL BASE	0.73
LOWER LIP LENGTH	0.72
UPPER ANTERIOR DENTAL HEIGHT	-0.71
RAMUS HEIGHT	0.71
UPPER FACE HEIGHT	0.71
MIDFACE LENGTH	0.69
NOSE LENGTH	0.68
PNS TO ANS	0.65
UPPER SOFT TISSUE FACE HEIGHT	0.64
ANS TO NOSE TIP	0.64
UPPER LIP LENGTH	0.63
BASION TO NASION	0.63
MAX.-MAND DIFFERENTIAL	0.62
ANTERIOR CRANIAL BASE	0.53
A POINT TO SOFT TISSUE A	0.53

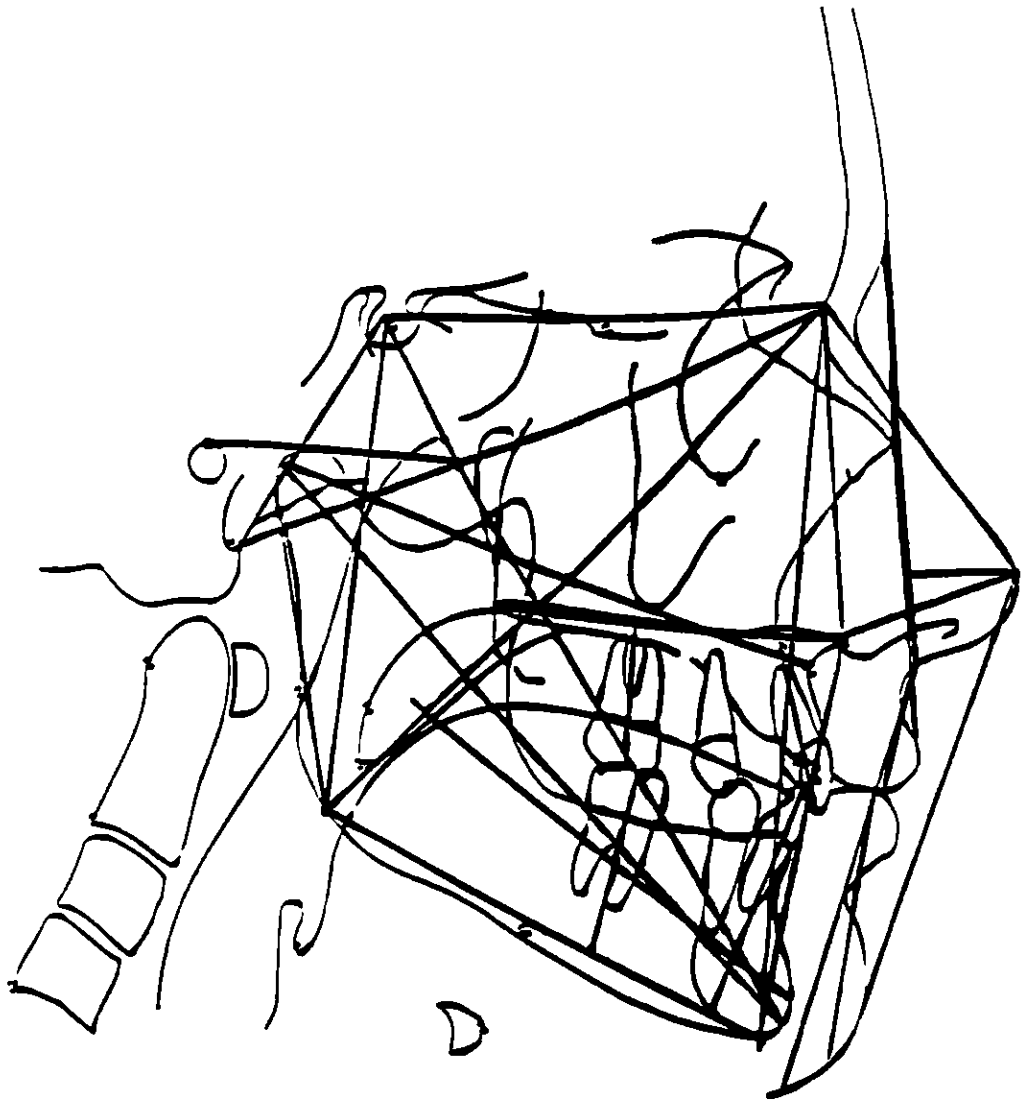


Figure 3. Factor 1 rotation solution. Contributes16.4% of the common variance. (Vertical and AP aspects of craniofacial development)

Table 4.--Varimax rotated factor solution for Factor 2

VARIABLES	FACTOR 2
FACIAL DEPTH	0.84
FACIAL CONVEXITY	0.84
BOLTON TO FACIAL PLANE	0.83
SNB	0.83
SOFT TISSUE FACIAL ANGLE	0.82
SL	0.79
FACIAL AXIS ANGLE	-0.79
Y AXIS TO SN	-0.78
Y AXIS	-0.73
SNA	0.65
MAXILLARY DEPTH	0.60
SN TO OCCLUSAL PLANE	0.58
MAXILLARY HEIGHT	0.53
Z ANGLE	0.53
H LINE	0.57
SN TO MANDIBULAR PLANE	0.54
MANDIBULAR PLANE ANGLE	0.52
OCCLUSAL PLANE ANGLE	0.52

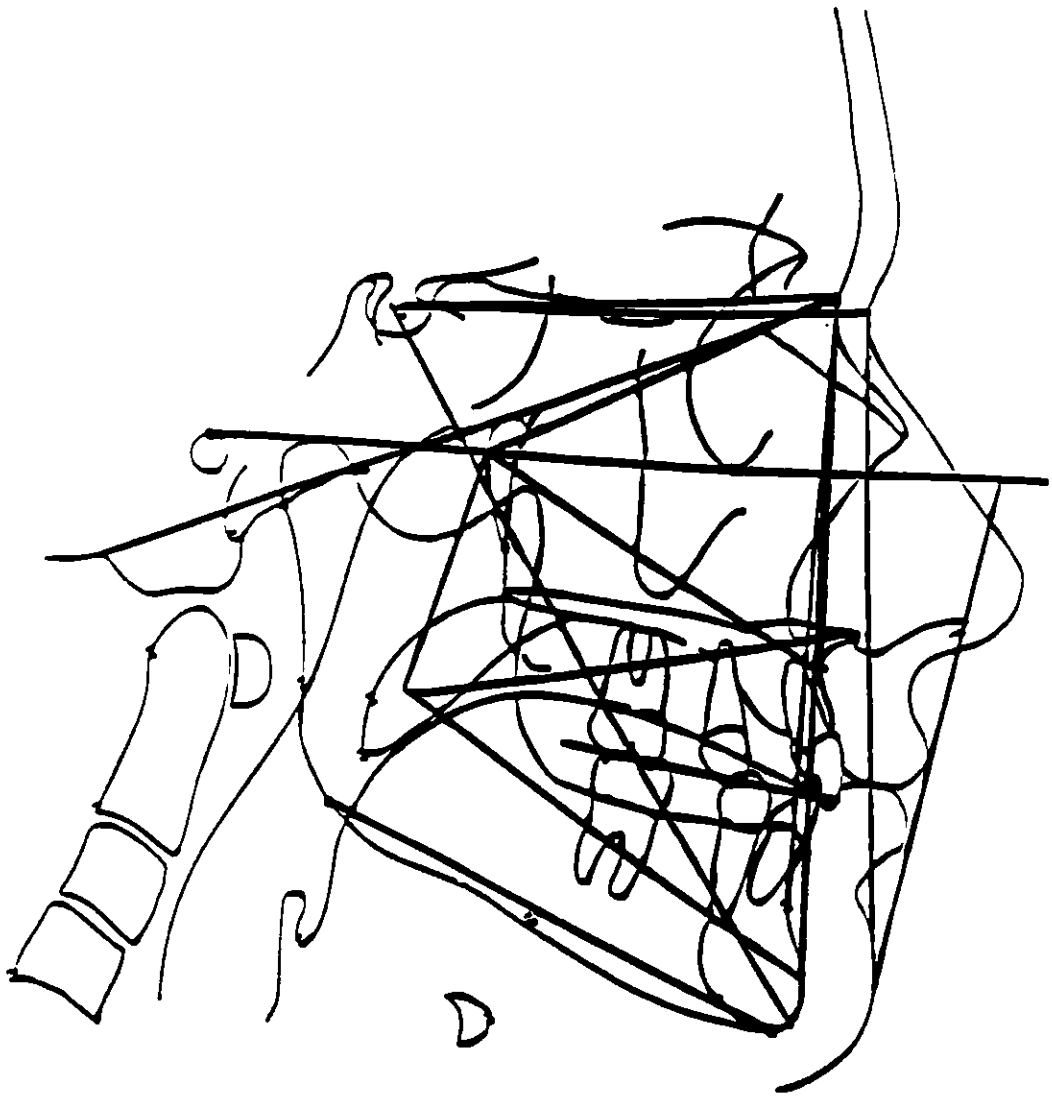


Figure 4. Factor 2 rotation solution. Contributes 14.6% of the common variance. (Hard and soft-tissue angular relationships of the maxilla and mandible)

relationships of the maxilla and mandible". See Table 4 for positive and negative correlation of variables.

Factor 3

The factor contributed 10.8% of the common variance and was identified as a factor (Table 5, Figure 5) that represents "**relationship of the skeletal dental and soft tissue structures of the maxilla and the mandible to each other".** The positive and negative loadings are seen in Table 5.

Factor 4

This contributed 10.1% (Table 6, Figure 6) of the common variance and was identified as describing the "**lower incisor position".** See Table 6 for positive and negative loading values.

Factor 5

This factor (Table 7, Figure 7) was identified as determining the "**mandibular shape angle**" and contributed 6.1% of the common variance. Positive and negative correlations are displayed in Table 7.

Factor 6

This was identified as a factor (Table 8, Figure 8) which determines the **"linear anteroposterior position of the maxilla and mandible and the overlying soft tissue".** A contribution of 4.7% of the common variance is made by this factor. See Table 8 for positive and negative loading values.

Factor 7

Contributing 4.0% of the common variance, this factor (Table 9, Figure 9) was identified as relating to the underlying dimension dealing with the "**linear and angular position of the upper incisor".** See Table 9 for a display of the positive and the negative correlations.

Table 5.--Varimax rotated factor solution for Factor 3

VARIABLES	FACTOR 3
MAX.-MAND DIFFERENTIAL	-0.56
MAXILLARY DEPTH	0.52
ANB	0.85
AB PLANE	0.84
NASOMENTAL ANGLE	0.82
ANGLE OF CONVEXITY	0.81
SOFT TISSUE CONVEXITY	0.80
FACIAL CONVEXITY ANGLE	0.80
H ANGLE	0.78
Z ANGLE	0.68
NASOFACIAL ANGLE	0.67
H LINE	-0.64
UPPER 1 TO FACIAL PLANE	0.58
MOLAR RELATION	-0.56
SP DISTANCE	0.54
ILS DISTANCE	-0.54
INCISOR OVERJET	0.55

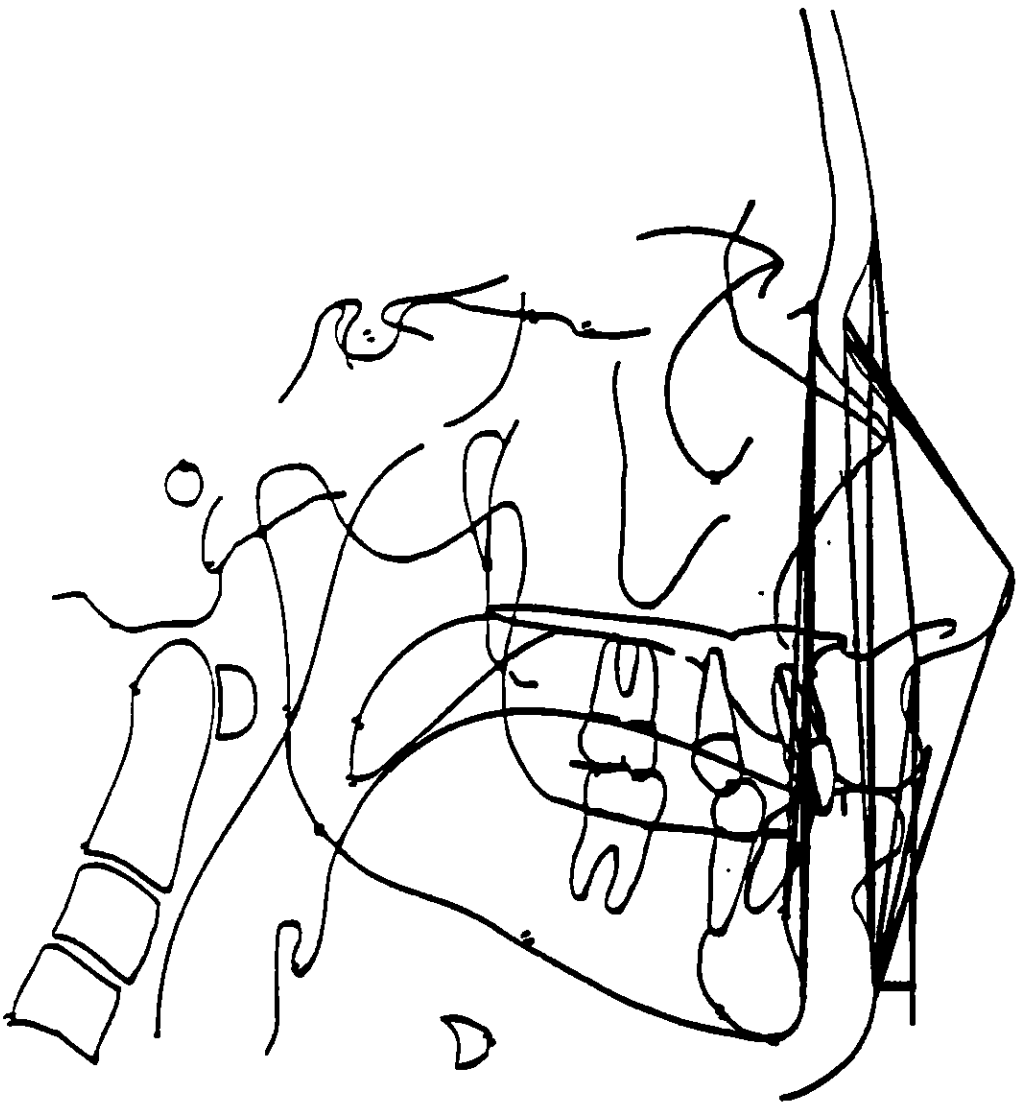


Figure 5. Factor 3 rotation solution. Contributes 10.8% of the common variance. (Relationship of the skeletal, dental and soft-tissue structures of the maxilla and the mandible to each other)

Table 6--Varimax rotated factor solution for Factor 4

VARIABLES	FACTOR 4
LOWER 1 TO NB	-0.94
FMIA	0.86
LOWER 1 TO OCCLUSAL PLANE	-0.85
LOWER 1 TO APo (ANGULAR)	-0.84
SN TO LOWER 1	0.84
LOWER 1 TO PALATAL PLANE	0.80
LOWER 1 TO NB (LINEAR)	0.79
LOWER 1 TO MANDIBULAR PLANE	-0.77
INTERINCISAL	0.71
LOWER 1 TO FACIAL PLANE	0.71
LOWER 1 TO APo (LINEAR)	0.66

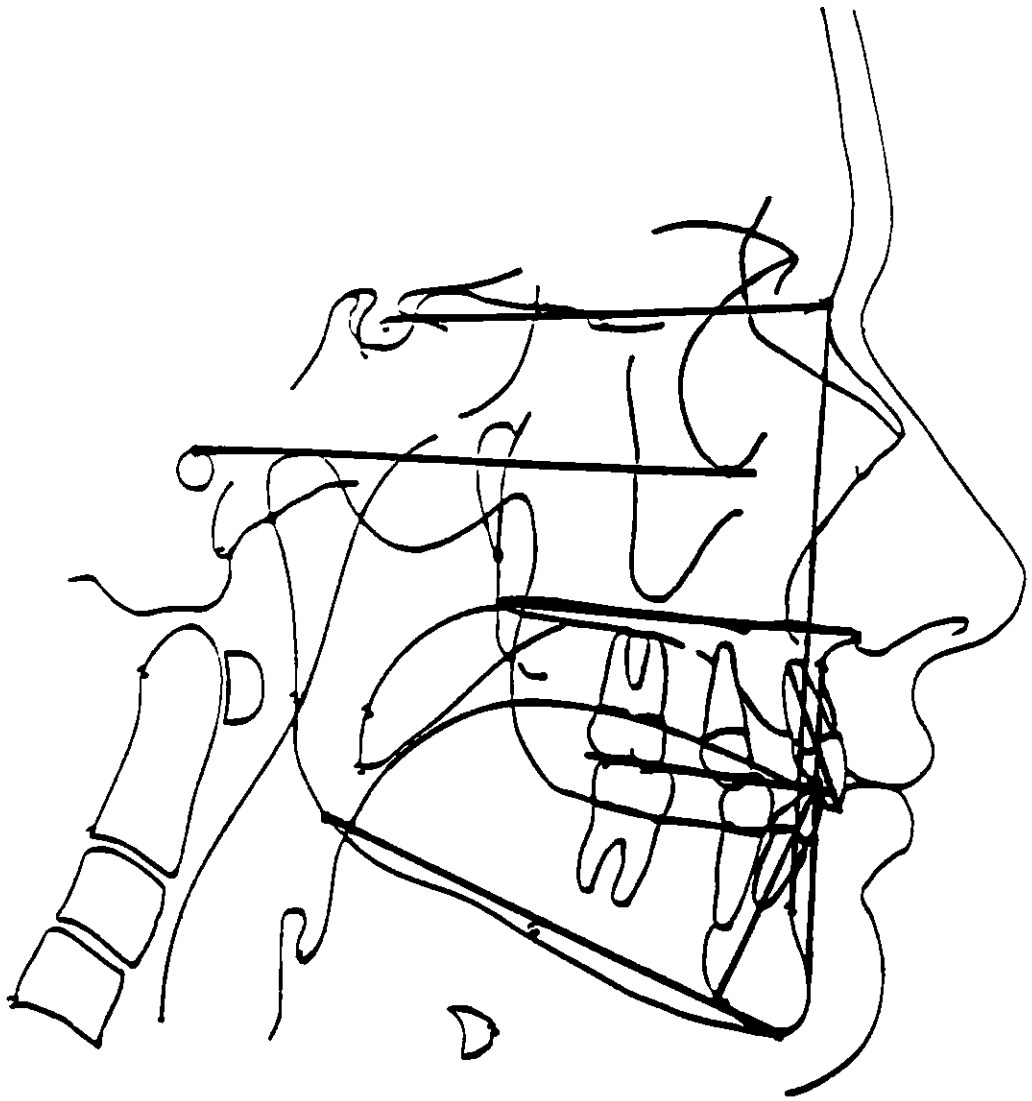


Figure 6. Factor 4 rotation solution. Contributes 10.1% of the common variance. (Lower incisor position)

Table 7.--Varimax rotated factor solution for Factor 5

VARIABLES	FACTOR 5
LOWER 1 TO MANDIBULAR PLANE	-0.54
FACIAL TAPER	-0.90
GONIAL ANGLE	0.79
LOWER GONIAL ANGLE	0.78
SN TO MANDIBULAR PLANE	0.78
PFH-AFH	-0.77
MANDIBULAR PLANE ANGLE	0.77
MANDIBULAR ARC	0.56
OCCLUSAL PLANE TO GoGn	0.62

Table 8.--Varimax rotated factor solution for Factor 6

VARIABLES	FACTOR 6
MANDIBULAR PROGNATHISM	0.95
POGONION TO N PERPENDICULAR	0.94
A POINT TO N PERPENDICULAR	0.89
MAXILLARY PROGNATHISM	0.87
SP DISTANCE	-0.68
UPPER 6 TO PTV	0.67
ILS DISTANCE	0.62
LL DISTANCE	0.60
UPPER 1 TO A VERTICAL	0.52

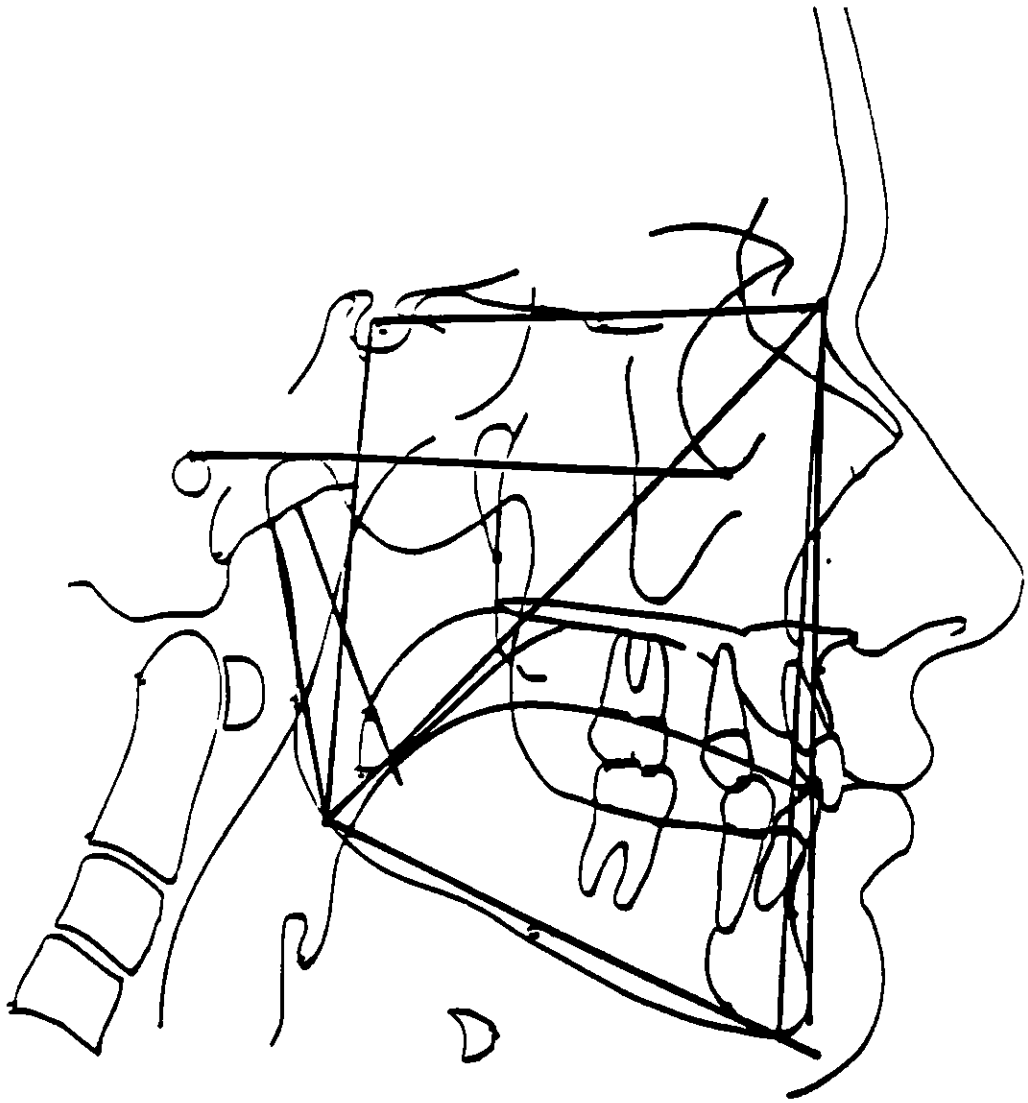


Figure 7. Factor 5 rotation solution. Contributes 6.1% of the common variance. (Mandibular shape angle)

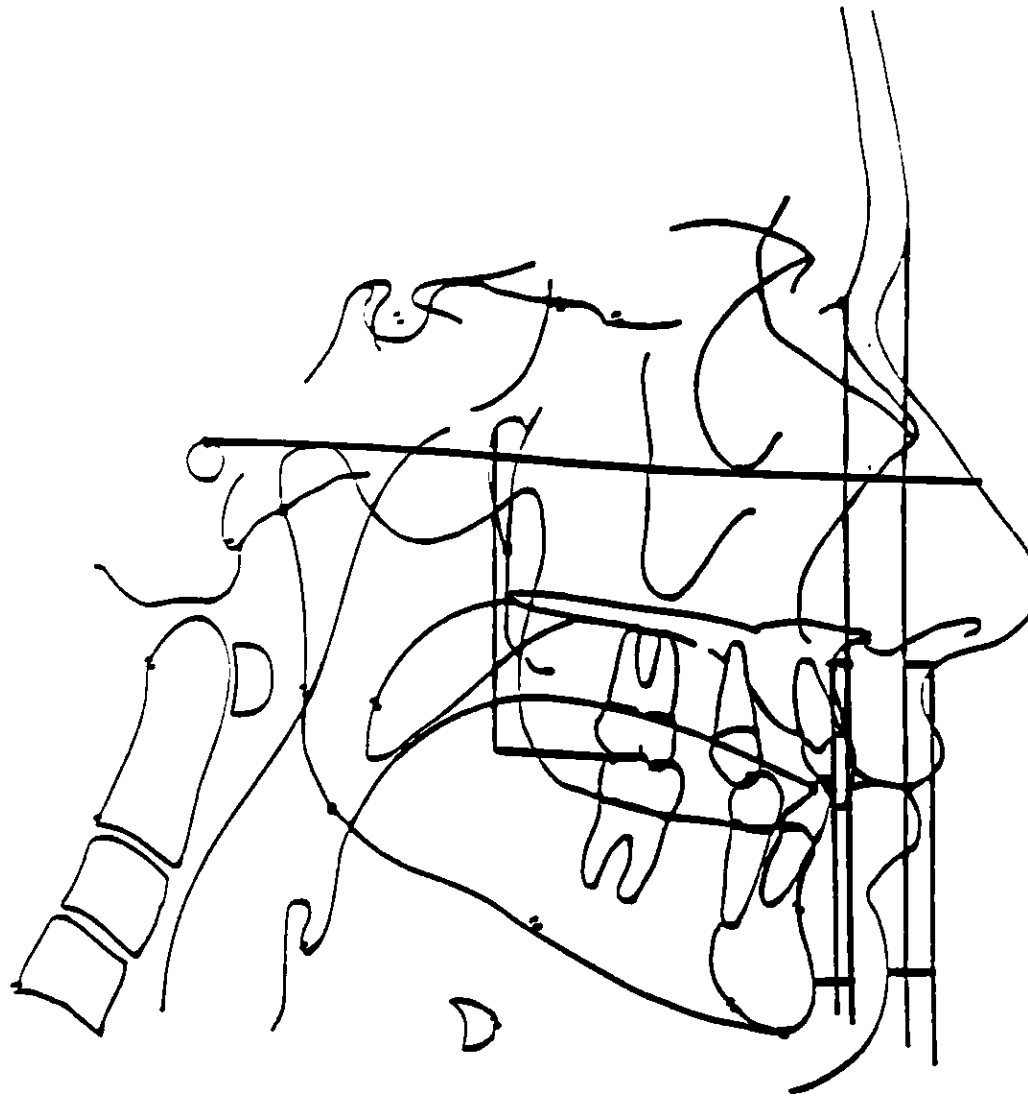


Figure 8. for Factor 6 rotation solution. Contributes 4.7% of the common variance. (Linear AP position of the maxilla and mandible and the overlying soft-tissue)

Table 9.--Varimax rotated factor solution for Factor 7

VARIABLES	FACTOR 7
UPPER 1 TO FACIAL PLANE	0.57
INTERINCISAL	-0.64
UPPER 1 TO APo (ANGULAR)	0.80
UPPER 1 TO NA	0.78
UPPER 1 TO APo (LINEAR)	-0.78
UPPER 1 TO FH	0.77
UPPER 1 TO NA (LINEAR)	-0.77
UPPER 1 TO A VERTICAL	0.72
MAXILLARY ARCH LENGTH	0.66
INCISOR OVERJET	0.59
STOMION INCISOR LENGTH	-0.57

Table 10.--Varimax rotated factor solution for Factor 8

VARIABLES	FACTOR 8
SADDLE ANGLE	0.92
CRANIAL BASE ANGLE	0.90
ARTICULAR ANGLE	-0.78
SE	0.68

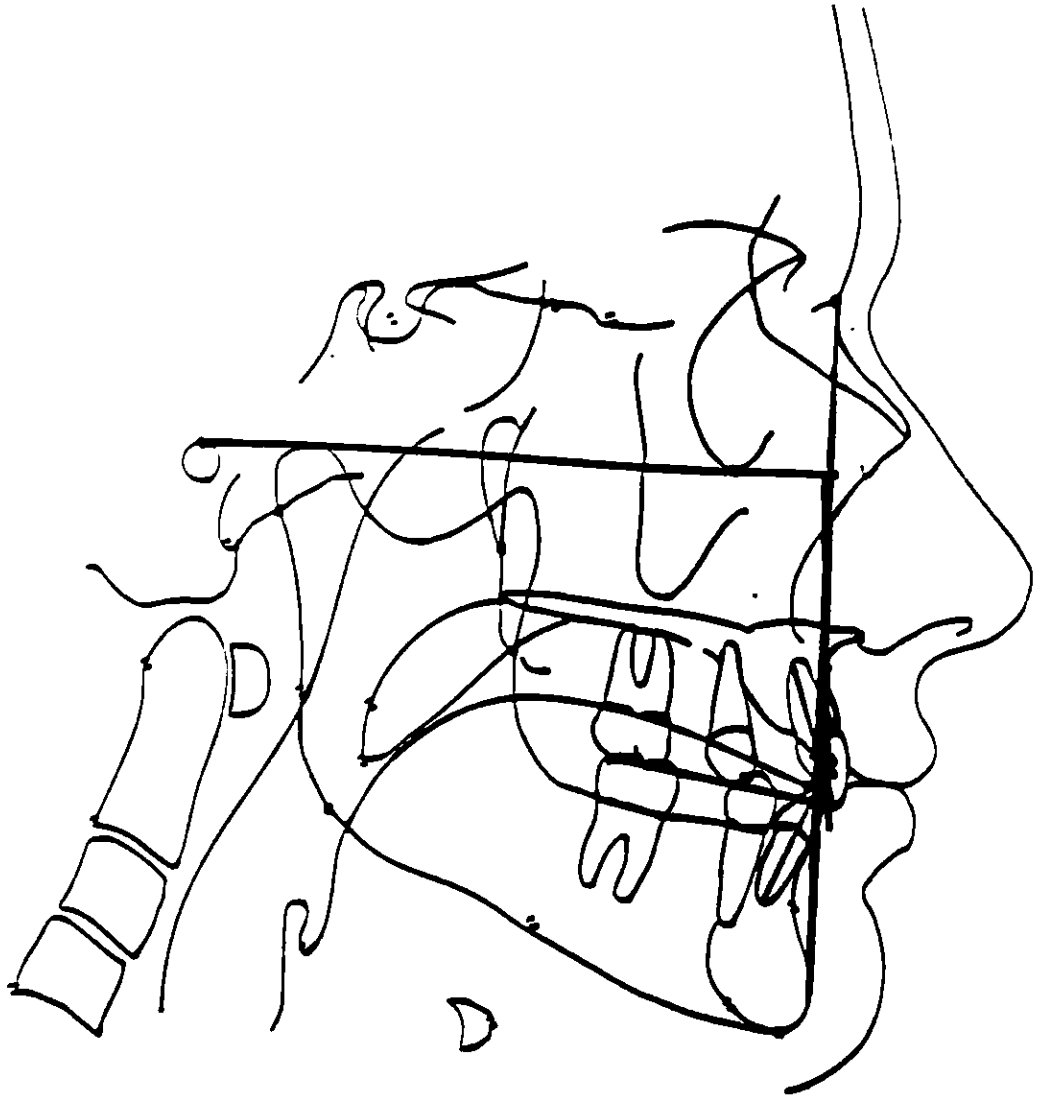


Figure 9. Factor 7 rotation solution. Contributes 4.0% of the common variance. (Linear and angular position of the upper incisor)

Factor 8

With a contribution of 3.4% of the common variance, this factor was (Table 10, Figure 10) identified as bearing a relationship to the "**degree of backward divergence of the posterior face**". Positive and negative correlations are displayed in Table 10.

Factor 9

This factor (Table 11, Figure 11) was related to determining the "**upper lip relationships)**" A contribution of 2.8% is made by this factor. See Table 11 for the correlation values.

Factor 10

The factor (Table 12, Figure 12) was identified as determining the "**vertical facial proportions**" and contributed 2.6% of the common variation. See Table 12 for positive and negative correlation.

Factor 11

This factor (Table 13, Figure 13) was identified as determining the "**lower lip relationships**", and accounted for 2.4% of the common variance. See Table 13 for positive and negative loading values.

Factor 12

Contributing 2.1% of the common variance this factor (Table 14, Figure 14) was identified as determining the "**degree of divergence of the horizontal planes of the upper face**". See Table 14 for a display of the factors.

Factor 13

This factor (Table 15, Figure 15) was identified as being related to the "**occlusal plane relationships**". A contribution of 1.7% of the common variance was made by this factor. Positive and negative correlations are shown in Table 15.

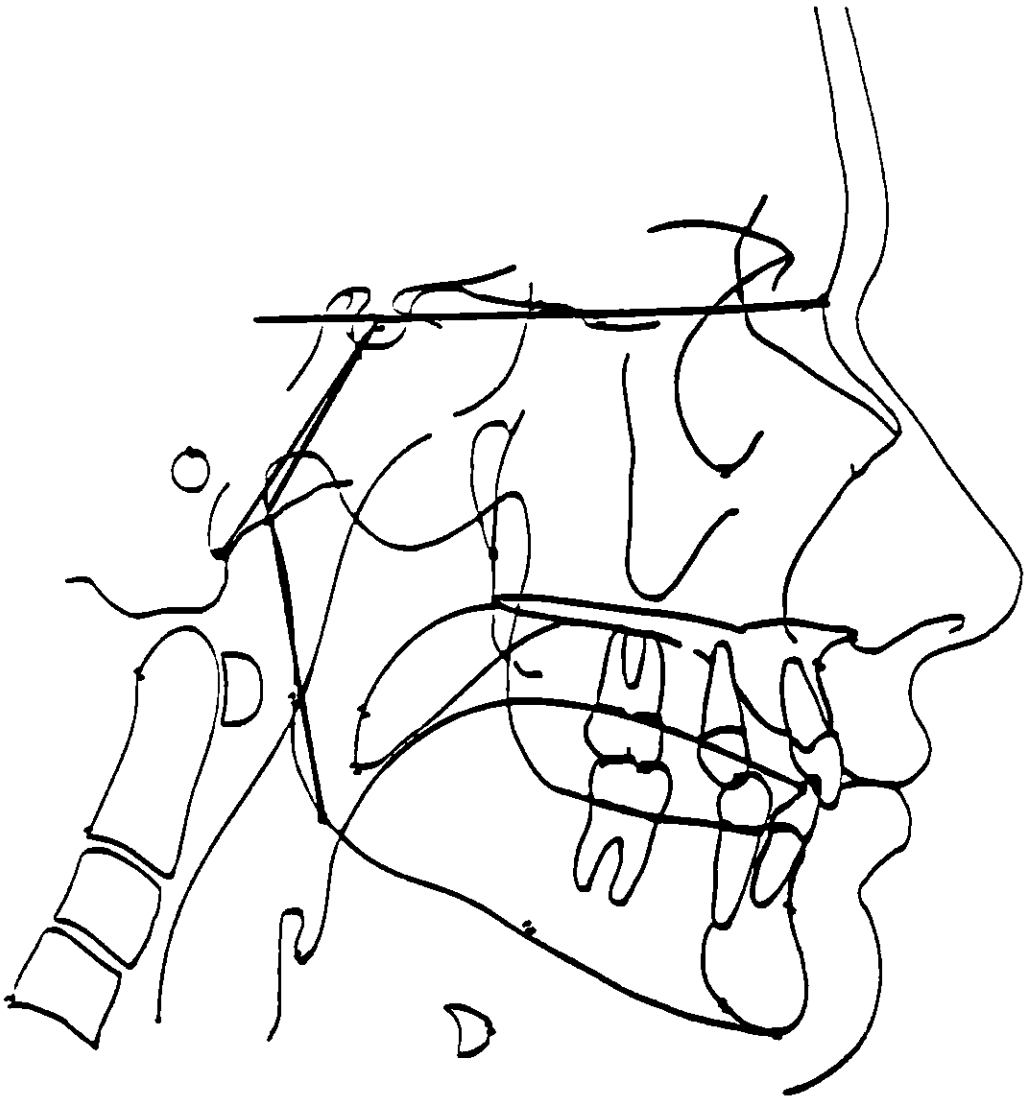


Figure 10. Factor 8 rotation solution. Contributes 3.4% of the common variance. (Degree of backward divergence of the posterior face)

Table 11.--Varimax rotated factor solution for Factor 9

VARIABLES	FACTOR 9
SLS DISTANCE	-0.85
NASOLABIAL ANGLE	0.84
UPPER LIP DISTANCE	-0.78
UPPER LIP THICKNESS	0.74

Table 12.--Varimax rotated factor solution for Factor 10

VARIABLES	FACTOR 10
UFH-LFH	0.78
UFH-LFH (SOFT TISSUE)	0.61
SN PALATAL PLANE	0.60
PALATAL PLANE	0.58
UPPER FACE HEIGHT	0.57
NOSE LENGTH	0.51

Table 13.--Varimax rotated factor solution for Factor 11

VARIABLES	FACTOR 11
LOWER LIP TO E PLANE	0.72
LOWER LIP THICKNESS	0.72
LOWER LIP TO H LINE	0.69
MENTOLABIAL SULCUS TO H LINE	0.57

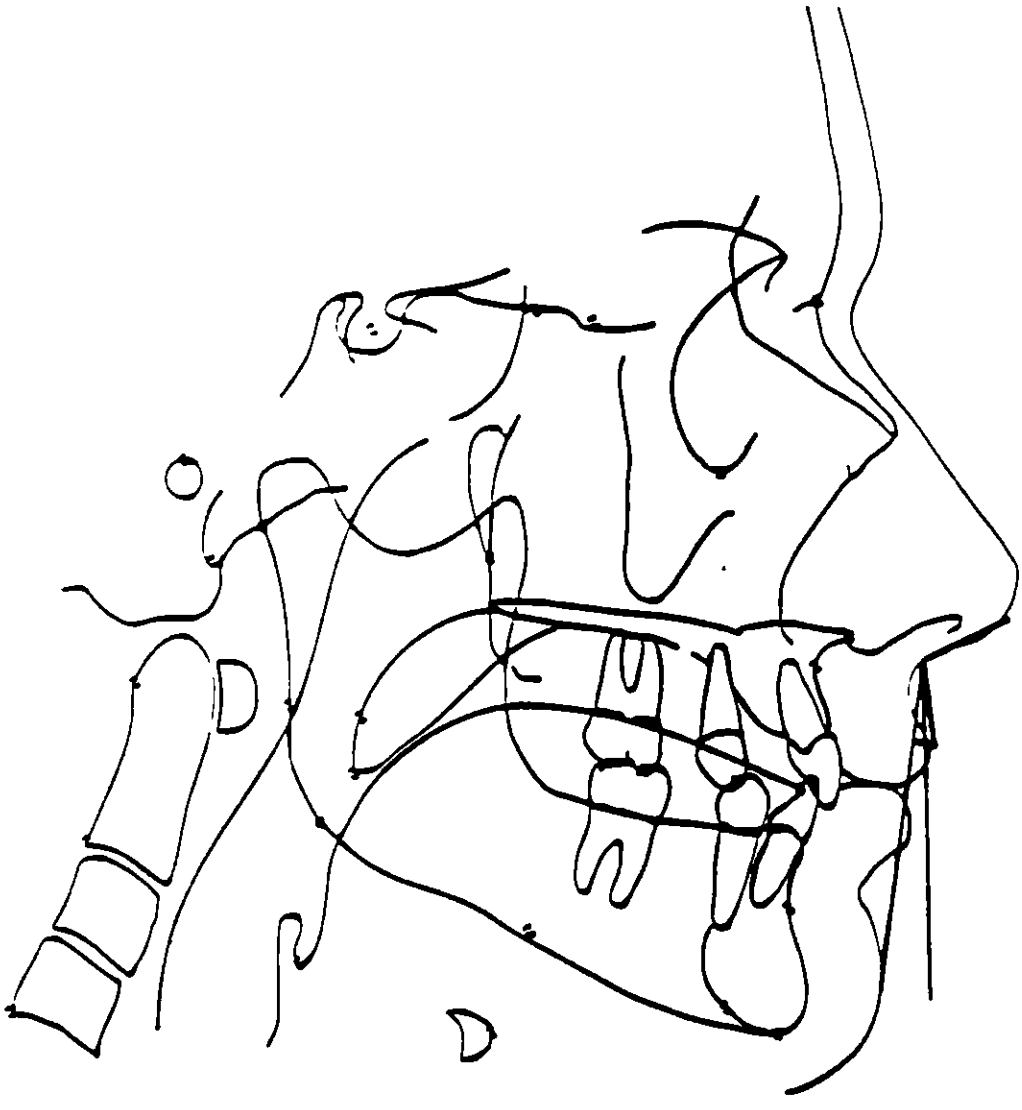


Figure 11. Factor 9 rotation solution. Contributes 2.8% of the common variance. (Upper lip relationships)

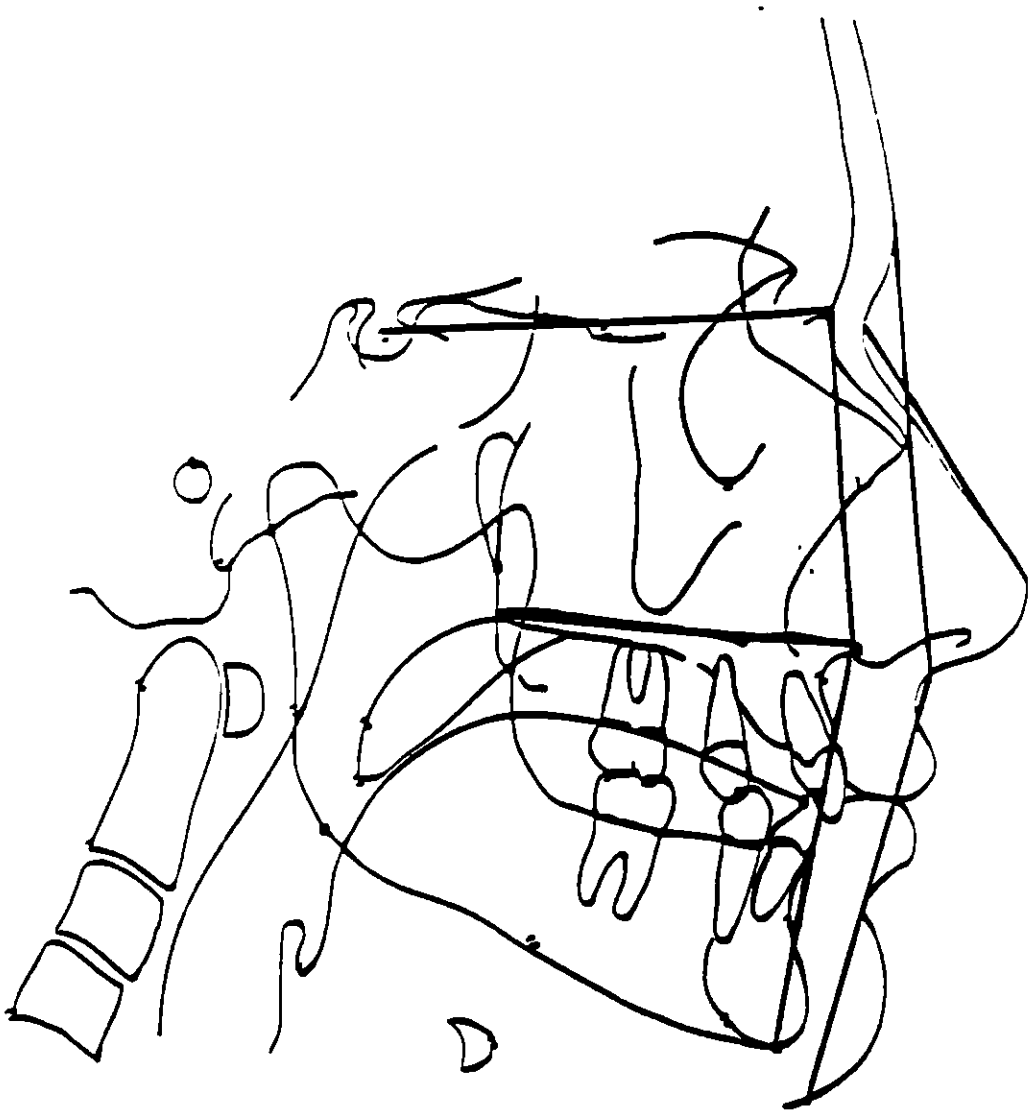


Figure 12. Factor 10 rotation solution. Contributes 2.6% of the common variance. (Vertical facial proportions)

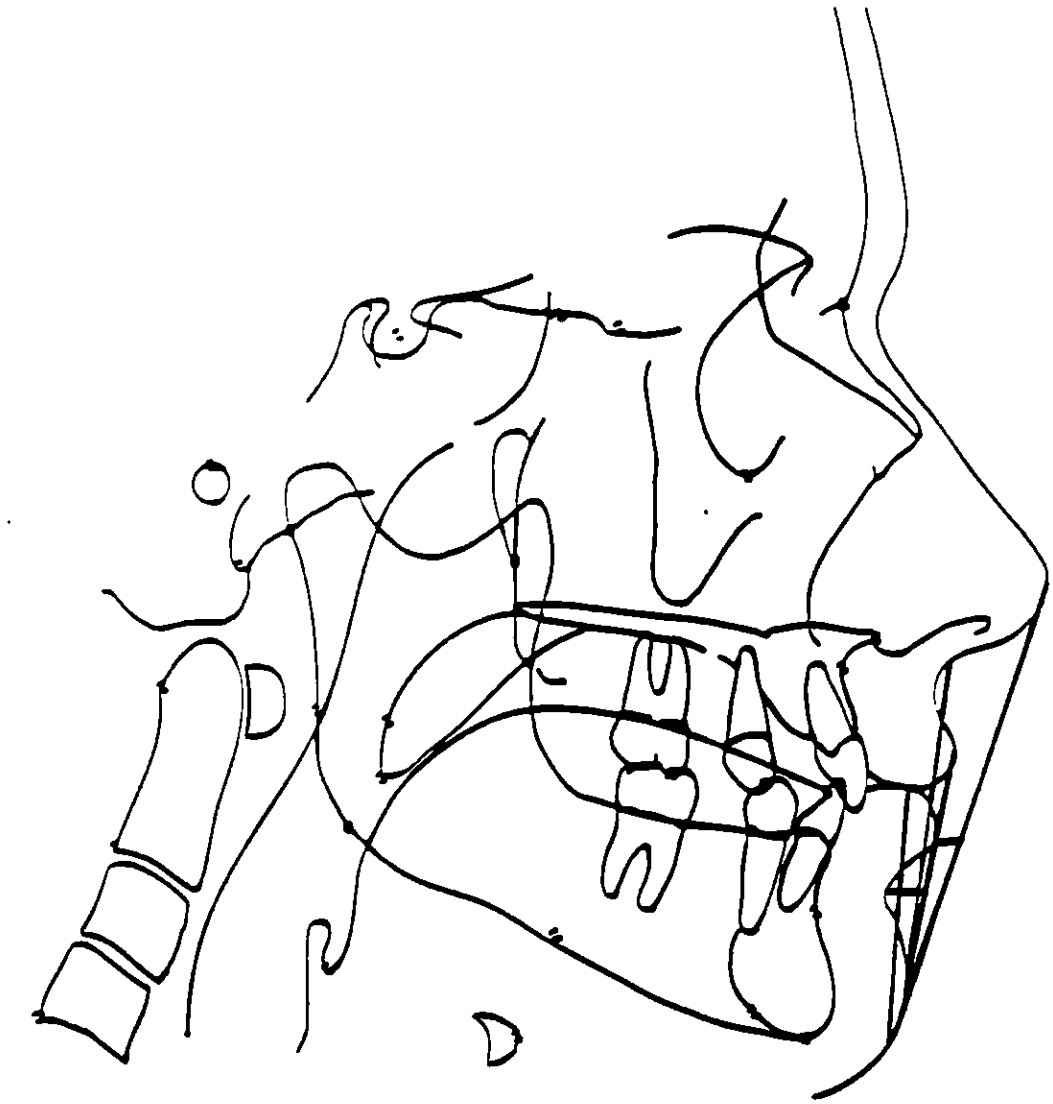


Figure 13. Factor 11 rotation solution. Contributes 2.4% of the common variance. (Lower lip relationships)

Table 14.--Varimax rotated factor solution for Factor 12

VARIABLES	FACTOR 12
CRANIAL DEFLECTION	0.88
SN TO FH	0.77
PALATAL PLANE	-0.55

Table 15.--Varimax rotated factor solution for Factor 13

VARIABLES	FACTOR 13
OCCLUSAL PLANE TO XI	-0.82
OCCLUSAL PLANE INCLINATION	0.71
OCCLUSAL PLANE TO GOGN	0.62
OCCLUSAL PLANE ANGLE	-0.53

Table 16.--Varimax rotated factor solution for Factor 14

VARIABLES	FACTOR 14
VERTICAL LIP TO CHIN RATIO	0.78
LIP EMBRASURE TO OCCLUSAL PLANE	0.65
UPPER LIP LENGTH	0.53

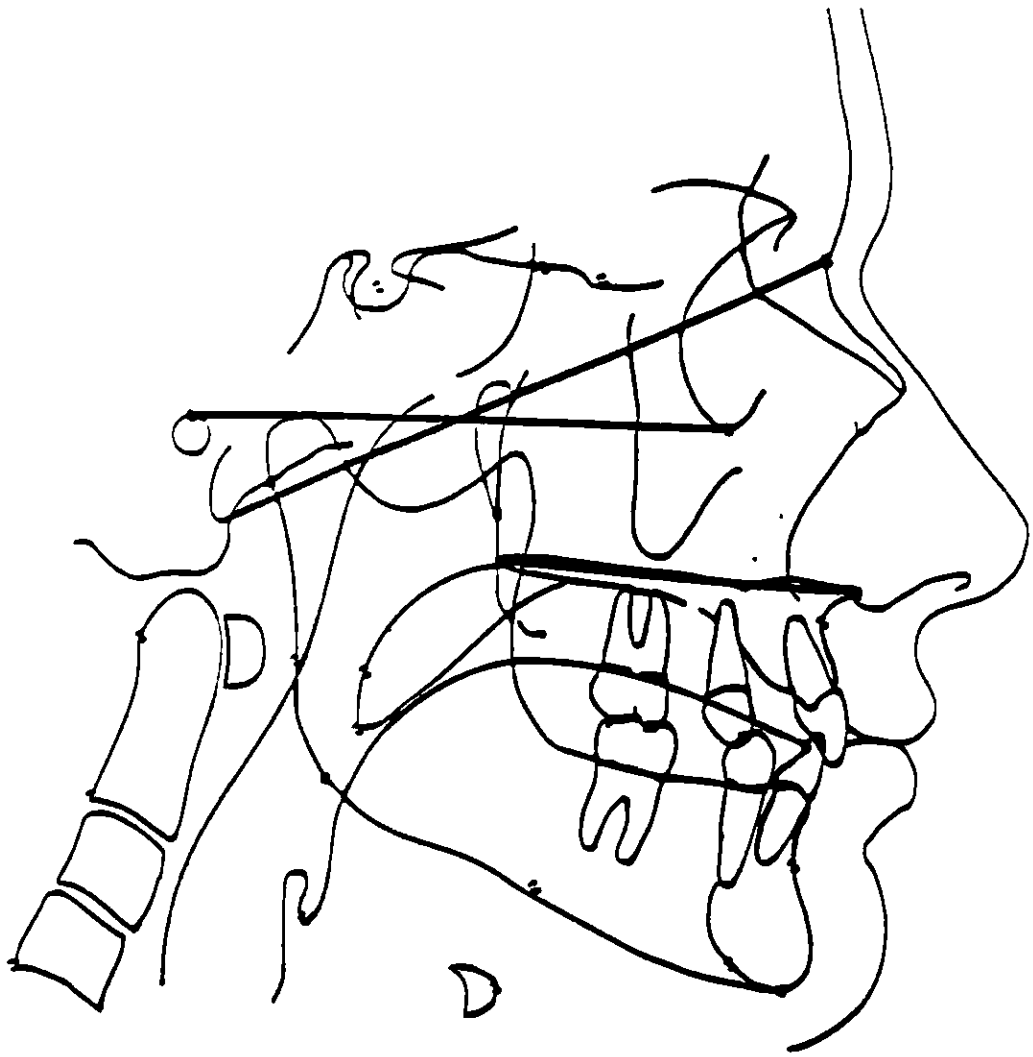


Figure 14. Factor 12 rotation solution. Contributes 2.1% of the common variance. (Degree of divergence of the horizontal planes of the upper face)

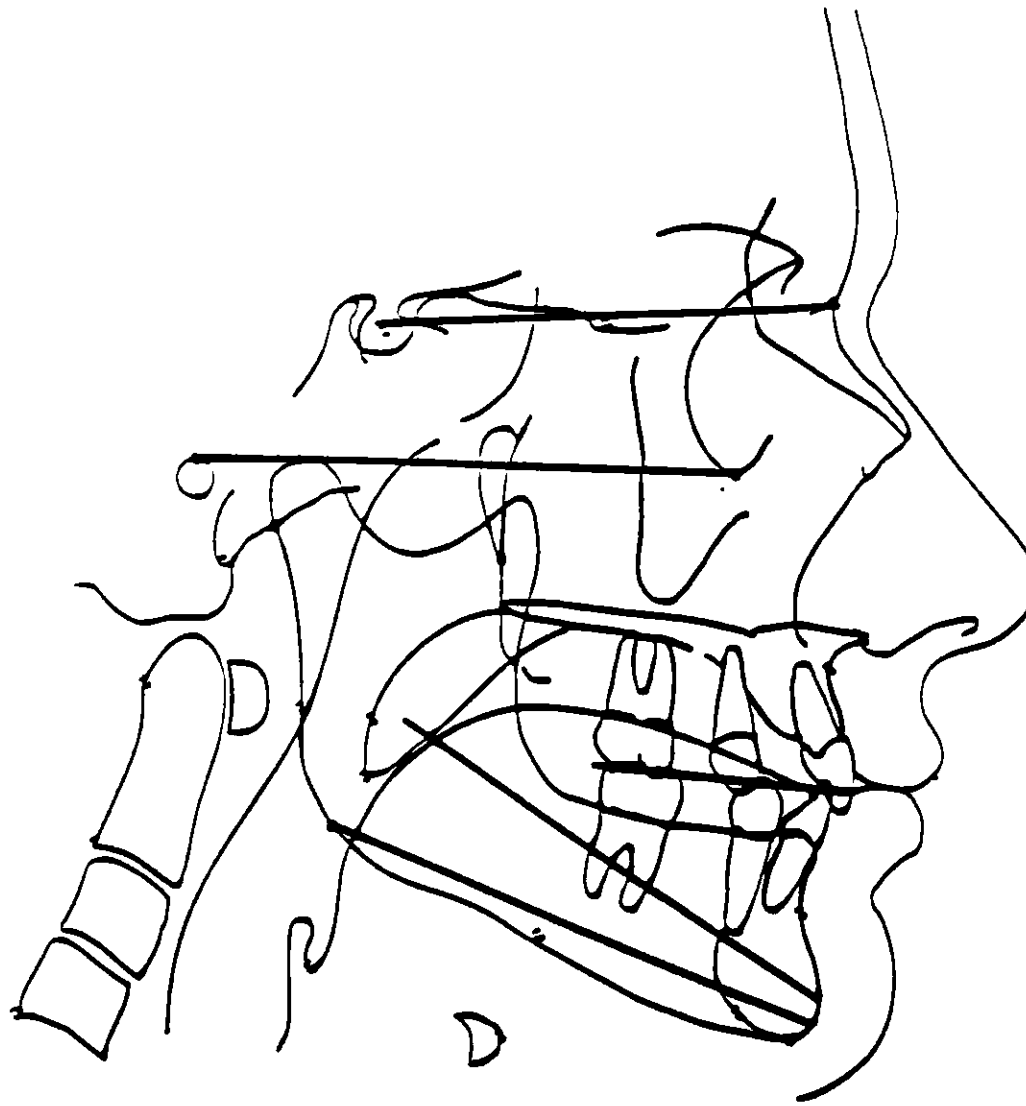


Figure 15. Factor 13 rotation solution. Contributes 1.7% of the common variance. (Occlusal plane relationships)

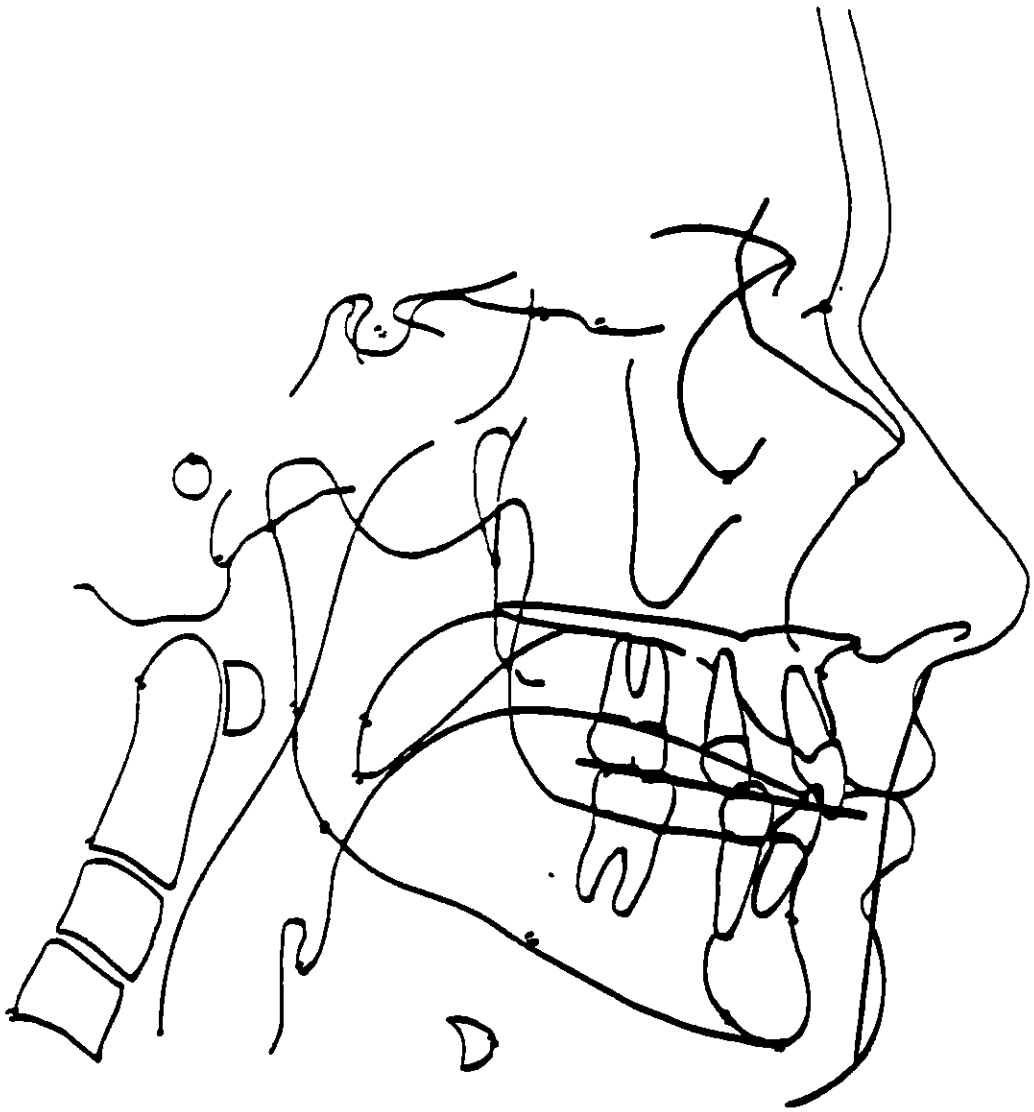


Figure 16. Factor 14 rotation solution. Contributes 1.7% of the common variance. (Vertical relationship of the upper lip)

Factor 14

The final factor (Table 16, Figure 16) was identified as relating to the "**vertical relationship of the upper lip**" and contributed 1.7% of the common variation. See Table 16 for correlation values.

To summarize, eleven factors were related mainly to hard-tissue dimensions, while three factors were related to soft-tissue dimensions. Soft-tissue dimensions included upper lip relationships (Factor 9), lower lip relationships (Factor 11), and vertical relationships of the upper lip (Factor 14). In comparison with the previous study (Spillas, 1993), the present study accounted for exactly the same amount of variation (83.4%) in the craniofacial complex. Also, eleven factors were related to hard tissue dimensions and three to soft tissue dimensions in both these studies, with factor 6, 12 and 13 being related to soft tissue in the previous study.

Objective Two

Subjective Evaluation

Due to the large number of variables that loaded onto certain factors, a minimum of atleast three variables were selected by the orthodontists from these factors, whereas, only one variable was selected from those factors that had <7 variables. The results were combined in such a way that the most common variables were chosen i.e. if four out of five orthodontists chose a particular variable, then this was chosen as the common variable. Subsequently, a reduced set of nineteen variables were chosen from the fourteen factors (See Figure 17 for a display of the associated measurements). These variables were as follows:

1. Posterior face height-Factor 1
2. Mandibular length-Factor 1
3. SNA-Factor 2

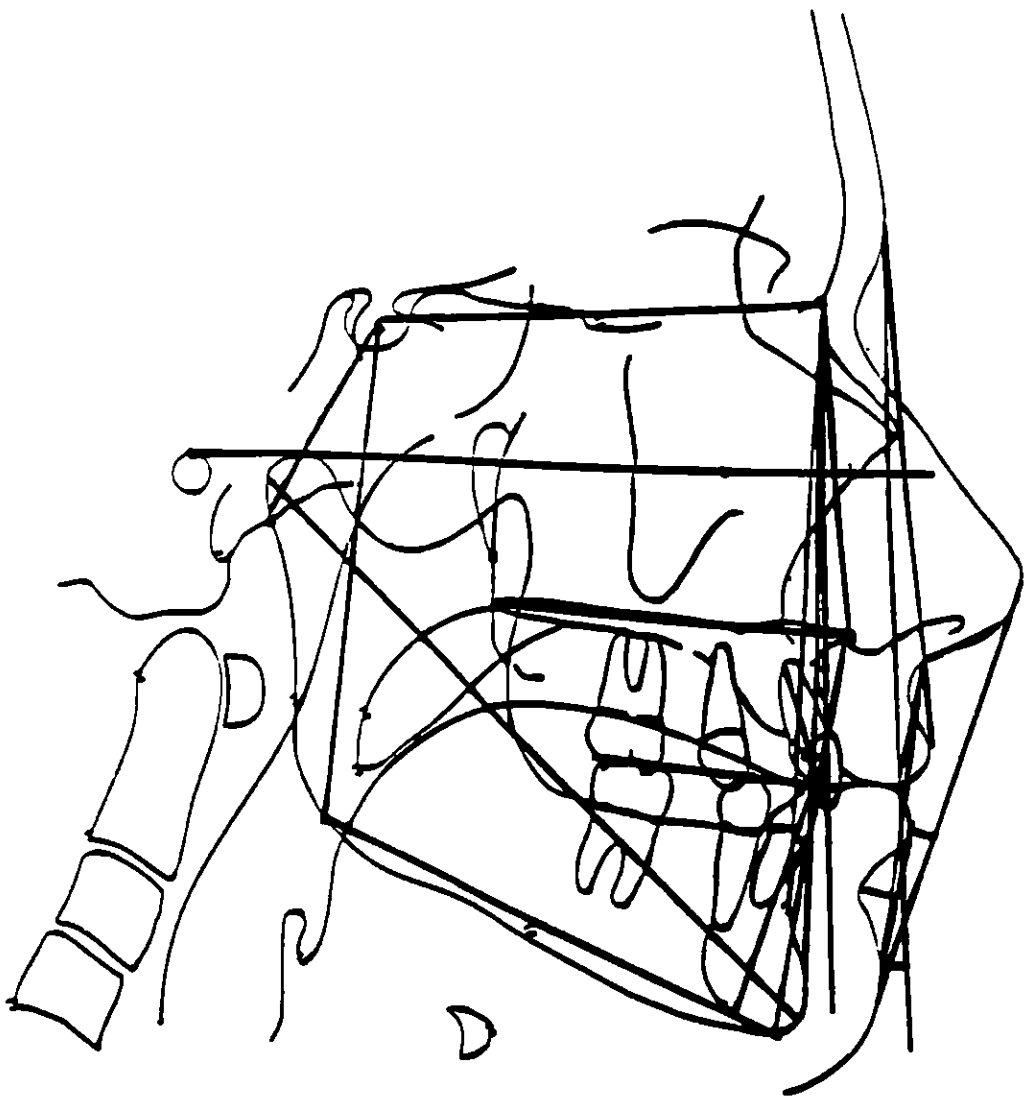


Figure 17. Scatter (pictorial display) of measurements for the reduced number of selected variables (19 variables)

4. SNB-Factor 2
5. Facial convexity angle-Factor 3
6. Lower incisor to mandibular plane-Factor 4
7. Lower incisor to APo (Linear)-Factor 4
8. Mandibular plane angle-Factor 5
9. Mandibular prognathism-Factor 6
10. A point to N perpendicular-Factor 6
11. Upper incisor to FH-Factor 7
12. Saddle angle-Factor 8
13. Nasolabial angle-Factor 9
14. UFH:LFH (Hard tissue)-Factor 10
15. Mentolabial sulcus-Factor 11
16. Lower lip to E plane-Factor 11
17. Palatal plane angle-Factor 12
18. Occlusal plane angle-Factor 13
19. Upper lip length-Factor 14

Objective Three

Discriminant Analysis

The mean and standard deviation of the cephalometric variables between the treatment not needed group (Group 0) and the treatment needed group (Group 1) of the twelve year old individuals were calculated (See Table 17 for a display of the measurements). The final nineteen variables were entered in a linear discriminant model and subjected to two methods of variable selection.

Table 17.--Means and Standard Deviations of twelve year old age groups

Variables	12 year old			
	TNN		TN	
	Mean	S.D.	Mean	S.D.
Aptnprp	-3.95	2.64	-2.46	4.81
Fclcnvx	86.48	2.48	86.98	2.97
Lw1Apo	-0.84	1.22	-1.45	2.29
Lwr1mp	90.40	4.89	93.40	7.05
LowrlpE	2.25	2.07	-0.31	2.86
Mandlth	110.50	3.76	113.00	5.18
Manplag	26.21	3.02	25.59	4.98
Manprog	-9.34	4.95	-7.04	9.10
Mlslcus	4.87	1.51	5.75	1.48
Nslabag	129.90	11.20	124.10	11.10
Occlpla	10.15	2.90	8.85	4.12
Palplan	1.95	3.09	-2.59	3.24
Posfcht	71.33	4.19	75.55	4.80
Sadangl	122.40	3.30	122.10	5.11
SNA	81.79	2.50	80.89	3.72
SNB	78.99	2.32	77.29	3.22
Ufh-Lfh	86.84	6.80	82.02	9.15
Uplplth	22.38	2.04	20.38	2.35
Uppr1fh	107.50	3.79	110.80	7.99

TNN: Treatment not needed group
TN: Treatment needed group

Forced entry of all variables. All nineteen predictor variables were forced into the discriminant function. Unstandardized discriminant coefficients were computed (Table 18) and when all variables were forced into the discriminant function, the percentage of cases correctly classified in the TNN and TN category were 100% and 96.7%, respectively. The overall percentage of grouped cases correctly classified was 98.3%. Effectiveness of the discriminant function was additionally evaluated by the eigenvalue and canonical discriminant correlation as indicated in Table 19.

The Stepwise procedure. The criterion used for variable selection was to minimize the Wilks' Lambda. For the stepwise procedure, the first variable that entered the discriminant function model was palatal plane. At subsequent steps upper lip length, posterior face height, SNB, mandibular prognathism, upper incisor to FH were included in the model respectively. The selected variables in the stepwise procedure resulted in a reduced number of variables that best separated the two groups. Summary of the classification results by the stepwise procedure is indicated in Table 19 By using the stepwise method, the percentage of cases correctly classified in the non-treatment needed and treatment needed groups were 96.7% and 96.7%, respectively. Compared to the first method, the stepwise procedure which selected only important discriminant variables into the model, can classify subjects almost equally efficiently. Additionally, in the stepwise procedure, a smaller eigenvalue and canonical correlation coefficient were found. When compared to the first method, this indicated that between-group variability is less relative to within-group and total variability.

Cephalometric Index

The effectiveness of the discriminant function was greater when all predictor variables were forced into the discriminant function. The discriminant function

Table 18--Unstandardized canonical discriminant function coefficients for the 12 year old: Forced entry of all variables

VARIABLES	COEFFICIENTS
A POINT TO N PERPENDICULAR	0.20
FACIAL CONVEXITY	0.11
LOWER 1 TO APo (LINEAR)	0.15
LOWER 1 TO MANDIBULAR PLANE	0.12
LOWER LIP TO E PLANE	-0.02
MANDIBULAR LENGTH	-0.03
MANDIBULAR PLANE ANGLE	0.17
MANDIBULAR PROGNATHISM	0.01
MENTOLABIAL SULCUS	2.05
NASOLABIAL ANGLE	-0.01
OCCLUSAL PLANE ANGLE	0.12
PALATAL PLANE ANGLE	-0.28
POSTERIOR FACE HEIGHT	0.21
SADDLE ANGLE	-5.41
SNA	-0.27
SNB	-0.11
UFH_LFH	0.02
UPPER LIP LENGTH	-0.46
UPPER1FH	0.13
CONSTANT	-11.90

Table 19--Classification results of two methods of variable selection (Forced-entry and Stepwise method,12 yr. old)

	No. of Cases	Forced-entry	Stepwise method
Non-treated	30	30 (100%)	30 (100%)
Treated	30	29 (96.7%)	29 (96.7%)
Eigenvalue		4.76	3.76
Canon. Corr.		0.90	0.88

Table 20.--Classification results of two methods of variable selection (Forced-entry and Stepwise method, 6-18 yr. old)

	No. of Cases	Forced-entry	Stepwise method
Non-treated	150	150 (100%)	150 (100%)
Treated	150	149 (99.3%)	148 (98.7%)
Eigenvalue		7.15	6.73
Canon. Corr.		0.93	0.93

equation for the best model derived from the "forced entry" variable method is given as follows:

D = 0.20(APTNPERP) + 0.11(FACLCNVX + 0.15(LOW1APO_) + 0.12 (LOWR1MPL) - 0.02(LOWRLIPE) - 0.03(MANDLGTH)+ 0.17 (MANPLAGL) + 0.01(MANPROGN) + 2.05(MLSULCUS) - 0.01 (NASLBANG) + 0.12(OCCLPLAN) - 0.28(PALPLANE) + 0.21 (POSFACHT) - 5.41(SADANGLE) - 0.27(SNA) - 0.11(SNB) + 0.02. (UFH_LFH) - 0.46(UPLPLGTH) + 0.13(UPPER1FH).

Further, discriminant function was computed also for the entire sample. The means and standard deviations of the cephalometric variables was calculated and is displayed in Table 21. Similarly, the nineteen variables were entered in a linear discriminant model and subject to the same two methods as described above. Forced entry of all the nineteen variables resulted in different coefficient values. (See Table 22 for the unstandardized canonical discriminant function coefficients). Classification results are summarized in Table 20. When all variables were forced into the discriminant function the percentage of cases correctly classified in the TNN and TN were 100% and 99.3%, respectively. The overall percentage of grouped cases correctly classified was 99.67%. In the stepwise procedure the first variable that entered the discriminant function model was posterior face height. At the following steps mandibular length, lower incisor to mandibular plane, palatal plane, facial convexity, mandibular prognathism, mandibular plane angle, saddle angle, nasolabial angle, and upper lip length were included in the model. By using the stepwise method, the percentage of subjects correctly classified in the TNN and TN groups were 100% and 98.7%, respectively. The overall percentage of grouped cases correctly classified was 99.33%. Also, in the stepwise procedure, a smaller eigenvalue and canonical correlation coefficient were

Table 21.--Means and Standard Deviations of 6-18 year old age group

Variables	6-18 year old			
	TNN		TN	
	Mean	S.D.	Mean	S.D.
Aptnprp	-2.80	3.25	-0.13	5.24
Fclcnvx	86.55	2.75	87.10	3.12
Lw1Apo	-0.50	1.61	-1.83	2.59
Lwr1mp	89.30	5.14	92.89	7.41
LowrlpE	2.40	2.58	0.31	2.65
Mandlth	110.20	10.60	113.50	8.47
Manplag	26.10	3.28	25.75	5.18
Manprog	-7.90	6.23	-2.09	10.00
Mlslcus	4.45	2.24	5.40	1.63
Nslabag	125.00	11.10	123.10	14.30
Occlpla	10.10	3.59	8.46	4.08
Palplan	2.11	3.15	-1.96	3.35
Posfcht	71.64	8.52	60.75	7.02
Sadangl	121.50	4.09	122.10	5.37
SNA	82.25	2.90	81.14	3.92
SNB	79.40	2.73	77.76	3.75
Ufh-Lfh	85.17	6.71	79.93	7.66
Uplplth	22.11	2.72	20.75	3.02
Uppr1fh	104.20	17.30	112.50	8.30

TNN: Treatment not needed group
TN: Treatment needed group

Table 22.--Unstandardized canonical discriminant function coefficients for the 6-18 year old: Forced entry of all variables

VARIABLES	COEFFICIENTS
A POINT TO N PERPENDICULAR	0.08
FACIAL CONVEXITY	0.34
LOWER 1 TO APo (LINEAR)	0.06
LOWER 1 TO MANDIBULAR PLANE	-0.04
LOWER LIP TO E PLANE	0.04
MANDIBULAR LENGTH	-0.26
MANDIBULAR PLANE ANGLE	0.17
MANDIBULAR PROGNATHISM	-0.09
MENTOLABIAL SULCUS	-0.02
NASOLABIAL ANGLE	-0.01
OCCLUSAL PLANE ANGLE	-2.31
PALATAL PLANE ANGLE	0.15
POSTERIOR FACE HEIGHT	0.28
SADDLE ANGLE	0.07
SNA	-0.15
SNB	0.19
UFH_LFH	1.14
UPPER LIP LENGTH	0.08
UPPER1FH	8.17
CONSTANT	-32.54

Table 23.--A partial display of the reliability coefficients is depicted

Variable	Mean Difference	Intra class Corr. Coeff.
Anterior face ht.	-0.273	0.998
A pt. to N perp.	-0.153	0.998
Bolton to Fac. Pl.	0.040	0.992
Canine relation	-0.074	0.902
Corpus length	0.387	0.970
Facial convexity	-0.173	0.985
Articular angle	0.106	0.989

found. When compared to the first method, this indicated that between-group variability is less relative to within-group and total variability.

The cephalometric index score (calculated by averaging discriminant functions evaluated at group means) using the forced all method for the twelve year old subjects was 0. Thus, subjects with a score less than 0 are included in the TNN group and those above 0 are included in the TN group.

In conclusion, the effectiveness of the discriminant function to seperate orthodontic treatment needed group from the no orthodontic treatment needed group is well depicted. Certain cephalometric variables are more important at one age group and less important at another age group as is shown by the stepwise discriminant

Error Analysis

To examine the accuracy of the digitizing system in terms of reproducibility of the coordinate measurements, fifteen randomly selected lateral cephalometric radiographs (i.e., three films from each age group) were redigitized on a seperate occasion. Intra-class correlation coefficient was computed for reliability. The data indicated that for any given variable, the intra-class correlation coefficients ranged from 0.902 to 0.99. A portion of the results from the intra-class correlation tests are presented in Table 23.

DISCUSSION

Reduction Of Cephalometric Variables

Factor Assessment

Cephalometric radiology has been an essential aid in assessing craniofacial morphology of the dentofacial complex. A number of cephalometric analyses are used today and the majority of them describe only a portion of the total variability in the craniofacial complex. To get a full appreciation of craniofacial growth and morphology, it would be more beneficial to the clinician to study the complex as a whole rather than in incomplete parts. An assessment of maximum variation would entail utilizing a number of carefully selected measurements from among the several contemporary analyses used today. Since this can be quite laborious and time-consuming if used subjectively, multivariate analyses such as factor analysis can be used to identify the least number of variables that can account for the most variation.

One hundred and thirty-four dissimilar cephalometric measurements were selected for the present study which was in accordance with a previous study (Spillas, 1993). These measurements were subjected to varimax-orthogonal rotated factor matrix solution on the 150 subjects that were selected for this study. These cephalograms were randomly collected from the orthodontic department at Case Western Reserve University, and these individuals were presumed to have required orthodontic treatment based on the fact that they had available records. The technique of factor analysis essentially provides the simplest description of the observed data and resulted in the extraction of fourteen factors which accounted for 83.4% of the total variability in the craniofacial complex. Obviously, while any individuals

craniofacial morphology may be characterized by a high positive or negative score for a certain factor, it should be kept in mind that most individuals represent a combination of all the factors.

Factor 1, which consisted of the interactions from many linear measurements, related to the "general size of the craniofacial complex in a vertical and anteroposterior dimension". An individual with high values in many of these associated linear measurements (anterior face height, facial length, midface length, ramus height etc.,) would be a very long-faced person. There would also be an enlargement of the overall craniofacial structures. Low values of these associated measurements would make the face shorter with a deep bite tendency

Factor 2 represented the combination of variables that described the "hard and soft tissue angular relationships of the maxilla and mandible". With increased values for SNA, SNB, maxillary depth, facial convexity, SL, Bolton facial plane and decreased values for Y-axis, SN to mandibular plane, a facial type with prognathic mandible and a concave facial profile is described. Conversely, the opposite would manifest a retrognathic mandible with a convex facial profile, steep occlusal plane inclination and long facial height angle.

Factor 3 represents the "relationship of the skeletal, dental and soft-tissue structures of the maxilla and the mandible to each other". When values such as ANB, AB plane angle, maxillomandibular differential, facial convexity angle are high, this would describe an individual with a convex profile either having prognathic maxilla or retrognathic mandible or a combination of the two. At approximately equal values, the facial profile approaches an orthognathic situation. The soft tissue relationship is expressed with variables such as soft tissue concexity, H angle, Z angle, etc.

Factor 4 was a composite of the interactions of many linear and angular measurements that assessed the "lower incisor position". Low values in some of the associated measurements (FMIA, SN to lower 1 , lower 1 to palatal plane) and high values in other measurements (lower 1 to NB, lower 1 to mandibular plane, Lower 1 to APo) would describe an individual with less incisor proclination, decreased overjet and anterior cross bite tendency. Conversely, the opposite reading suggests an individual with increased overjet and upright lower incisors.

Factor 5 was identified in determining the "mandibular plane angle". Higher than average values for any of the involved measurements (gonial angle, SN to mandibular plane, PFH:AFH) will manifest itself as a steep mandibular plane angle and may also predispose an individual to a skeletal openbite. Conversely, a low mandibular plane implies a skeletal deep bite.

Factor 6 determined the "linear anteroposterior position of the maxilla and the mandible and the overlying soft-tissue". A high positive loading value for variables such as pogonion to N perpendicular, A point to N perpendicular, maxillary prognathism, mandibular prognathism, soft tissue pogonion distance would describe an individual with a bimaxillary protrusive facial profile, while a negative value would describe an individual with a retrognathic maxilla and mandible.

Factor 7 assessed the "linear and angular position of the upper incisor". Basically the measurements upper 1 to facial plane, interincisor angle, upper 1 to NA, upper 1 to FH define the angular protrusion or procumbency of the upper incisors, and, upper 1 to A vertical, upper 1 to APo' and incisor overjet give a linear relationship of the protrusion of the upper incisors.

Factor 8 was referred to as describing the "degree of backward divergence of the posterior face". This dimension expressed the angular function of the saddle

angle, cranial base angle and articular angle. A large saddle angle (cranial base angle) will carry the articular fossa and the mandibular condyle downward and backward in a growing individual. This will further increase the backward divergence of the face. Also, a large articular angle in the presence of a large saddle angle will make the face considerably more backward divergent than if the saddle angle was small.

Factor 9 related to the "upper lip relationships". High values for nasolabial angle and superior labial sulcus distance would suggest a facial profile with a prominent nose, retroclined maxillary incisors and an unaesthetic facial profile. Conversely the opposite would suggest a profile with proclined maxillary incisors, short nose and prominent upper lip. A range in values of upper lip thickness and distance would also affect the nasolabial angle.

Factor 10 was identified as determining the "vertical facial proportions". This description seemed appropriate based on a high loading found for the measurement UFH to LFH (hard and soft tissue). Clearly this compares the vertical dimensions of the upper and lower facial components. A lower loading value was found for SN to palatal plane. Its association with Factor 10 may be due to its influence on the upper face height dimensions. Conceivably, an increase in this angle may cause an increase in the vertical dimension of the face.

Factor 11 assessed the "lower lip relationships". The assessment of the lips with respect to the E plane, indicates soft tissue balance between the lips and the profile. A protrusive lower lip will result in values beyond the esthetic plane. The measurement lower lip to H line gives a profile relationship of the lower lip to the upper lip and chin. Mentolabial sulcus to the H line is often influenced by the inclination of the lower and the upper incisors and the prominence of the chin.

Factor 12 determined the "degree of divergence of the horizontal planes of the upper face". Certainly, high values in all the associated measurements (palatal plane, cranial deflection, SN to FH). would describe a facial profile with an increased dimension of the upper half of the face. Conversely, lower values of these measurements would manifest a decreased dimension of the upper face and a tendency towards a skeletal open bite.

Factor 13 was identified as determining the "occlusal plane relationships". Any increase in measurements SN to occlusal plane, occlusal plane inclination, occlusal plane to GoGn would have a tendency for the occlusal plane to be inclined posteriorly upward with a tendency for a deep bite. A combination of these measurements helps segregate the skeletal from the dental problems, whereas, consideration of only one measurement for instance, occlusal plane to GoGn, would not be sufficient to do that.

Factor 14 assessed the "vertical relationships of the upper lip". Vertical lip to chin ratio, lip embrasure to occlusal plane and upper lip length offered valuable information in terms of the vertical relationship of the upper lip to the occlusal plane, anterior teeth and the lower lip. It is also important from an esthetic standpoint in terms of treatment planning since an individual with a short upper lip would generally display excessive gingiva on smiling thereby modifying the plan of treatment to a certain degree.

The factors that were extracted were quite similar to the factors derived by Spillas (1993). Certain variables were interchanged in their factor loadings when a comparison of these factors were carried out. This is highly likely since two seperate groups (treatment needed versus no treatment needed) were compared and the risk factors (variables) for the TN group were expected to be different. The factors that

were extracted from the present study included variables that clearly represented different dimensions of the craniofacial complex. However, with the previous study (Spillas 1993), the distinction was not clearly identified due to the facial balance being harmonious and all the cephalometric variables being highly interreleted with each other.

Factorial Complexity

Factorial complexity is a characteristic of an observed variable and relates to the number of common factors with (significant) loadings on that particular variable. Apparently some of the variables in this study appeared to participate with more than one factor, just as it was demonstrated in the study by Spillas (1993). Thus it shows that some factors are intricate enough that a given variable may load with more than one factor.

Generally, when a given variable loads with more than one factor, there is usually a very high loading value for this variable with one factor, while the loading values for any of the remaining factors remain low. With factorial complexity, this is not the case as all loading values are moderate to low in magnitude. During the growth and development period of the craniofacial complex, a host of different growth processes occur simultaneously at any given time. Thus, it is not surprising that factorial complexity occured in the present study because of the many highly interrelated and correlated craniofacial variables under examination. As a result, there is greater difficulty in obtaining a sharp and more distinct separation of the unique factors. This is true with any aspect of study relating to growth and development due to the numerous uncertainties in this field.

Subjective Evaluation

The second step was to choose the most important measurements from these fourteen factors and was accomplished by a group of five experienced orthodontists. A reduced set of nineteen variables were selected for the construction of the cephalometric index.

Posterior face height (PFH) was chosen as one of the nineteen variables and was the millimeter linear distance from the sella to gonion. An increase in PFH is generally associated with an increase in lower anterior face height, skeletal open bite tendency and an increased mandibular plane angle. All these findings have an impact on the facial esthetics and hence this was considered an important variable in treatment planning decisions. It is interesting to note that a great deal of changes take place in the PFH in the preadolescent child (Nanda 1955)

Mandibular length was also considered as one of the important variables for the cephalometric index. This was described as the millimeter linear distance from condylion to gnathion by McNamara (1972) and he demonstrated that a geometric relationship existed between effective midfacial length and effective mandibular length. An increase or decrease in the lower facial height can have a profound effect on the horizontal relationship of the maxilla and the mandible. Thus, since this measurement gives an indication of the sagittal jaw relationships it was considered to be an important variable in assessing treatment need.

Upper lip length was measured from the subnasale to the upper lip stomion. An individual exhibiting excessive amount of teeth at rest or excessive gingival display on smiling could be faced either with the problem of overerupted maxillary anterior teeth, severely retroclined teeth, enlarged gingiva or a short upper lip. The first three considerations can be used to modify treatment planning but a short upper

lip cannot modify the plan to a great extent. Hence, this variable is important to identify hidden problems.

The angle that relates the mandibular incisors to the mandibular apical base was called IMPA (incisor mandibular plane angle). This was the first angle that was researched by Tweed (1946, 1969) and was part of the diagnostic facial triangle. He stated that the lower incisors cannot be extended beyond their apical base since this can encroach upon the lip muscles which is not believed to be a stable position and hence show a tendency towards relapse. Also, the inclination of the lower incisor can have some effect on the mentolabial sulcus e.g., increase in the inclination can increase the mentolabial sulcus which can be unesthetic. Thus, this variable can influence treatment decisions such as extraction versus non-extraction and hence was considered an important choice.

The linear relationship of the lower incisor to the line from A point on the maxilla to the pogonion is another measurements that is valuable from an esthetic standpoint. This was first described by Begg (1956) and takes into consideration the anteroposterior relationship of the lower incisor with respect to both the jaw bones. The mentolabial sulcus will increase in depth depending on how far forward these teeth are of the APo line and conversely will flatten the far behind they are of the line.

The SNA, SNB angles were developed by Riedel (1957) and gave the angular relationship of the maxilla and the mandible in an anteroposterior direction. Since then these angles have been used in a variety of analyses (Downs 1948, Steiner 1953, Begg 1956, Jarabak and Fizzell 1972). The SNA angle shows majority of the changes in the initial years of life whereas, the SNB shows most of the changes around the prepubertal age. It is important to note that the variation in the slope of the SN can change values of both these angles, which explains the lack of clinical correlation

occasionally seen with the value of these measurements. Despite this drawback these angles are used by a majority of orthodontists since it gives a quick and easy assessment of the skeletal relationship of the two jaws.

Mandibular prognathism was described by Legan and Burstone (1980) and measures the horizontal distance of the soft tissue pogonion to the plane glabella perpendicular (perpendicular from the glabella to the constructed horizontal plane). This is a quick way of assessing linear mandibular position in an anteroposterior direction despite the fact that measurements such as hard tissue chin, length of the mandible, position of the mandible and the soft tissue chin are other important considerations in evaluating this position. The assessment of any existent jaw problem in the mandible was most certainly given by this variable.

Since not only the angular but also the linear relationship of the jaws is considered to be important by most orthodontists, the measurement A point to N perpendicular was chosen as one of the variables. This was described by McNamara (1984) and measures the anteroposterior relationship of the maxilla. If the A point is too far forward of the perpendicular it is assigned a positive value and the individual has a prognathic maxilla whereas, too far behind would assign a negative value with the maxilla being retrognathic. Thus, this measurement gives an indication of whether, or not, jaw problems exist in the maxilla.

Ricketts (1968) suggested the use of the measurement, lower lip to the E (Esthetic) plane in order to evaluate the position of the lower lip relative to a tangent between the soft tissue chin and the top of the nose. In an ideal situation the lip is slightly posterior to the E plane. This measurement is of considerable importance in deciding whether to extract or not in a borderline extraction case and good lower lip relationships. It is important to consider the length of the nose since it can make a

difference in this measurement, for instance, a long nose would place the lower lip further behind the esthstic plane and conversely a short nose would place them further forward. Also, the thickness of the lower lip should be accounted for before evaluating this relationship.

The nasolabial angle is formed by the intersection of a line originating at subnasale, tangent to the mean of the lower border of the nose and a line from subnasale to labrale superiorus. This angle is of considerable importance in deciding treatment modalities and treatment mechanics especially from an esthetic standpoint. Very often patients with an acute nasolabial angle have proclined maxillary incisors and hence review of this angle is important when contemplating orthodontic treatment. Movement of the maxillary incisors in any of the three planes of space can influence the nasolabial angle.

Facial convexity is considered an important diagnostic criteria by a number of orthodontists since it gives the profile relationship of the maxilla and the mandible to each other. This measurement is determined by drawing a line from nasion to pogonion (facial plane) and determining the inferior angle that this makes with the FH. Low values can suggest a convergent profile, high values a divergent profile and normal values a more orthognathic profile. It is important to remember that a face is more convex in the initial years of life and then becomes more orthognathic when the mandible catches up with growth in the prepubertal age period.

Palatal plane angle is the relationship of the palatal plane (ANS-PNS) to the FH plane. This plane seems to be different at different age groups and could be related to the pattern of eruption of the teeth or a discrepancy in the vertical skeletal relationship. A positive value would indicate the ANS to be further down anteriorly and a negative value would be indicative of the PNS being further down. Quite often

when the palatal plane is displaced downward posteriorly a tendency toward skeletal open bite, long posterior face height and a retrognathic facial type is evident. All these are important considerations in treatment planning and hence the choice of the palatal plane can be justified.

The mandibular plane angle (FMA) is the measurement of the mandibular plane (Go-Me) to the FH plane. This was the second angle of the diagnostic facial triangle that described by Tweed (1946, 1969) and is a skeletal angle descriptive of the degree of existing facial divergence. Low values would indicate a short lower anterior face height and deep bite tendency whereas high values would indicate a long lower face height and an open bite tendency. All of these considerations make it an important variable in modifying treatment mechanics and in evaluating the problem.

The occlusal plane angle is the relationship of the plane of occlusion in maximum intercuspation to that with the FH plane. This measurement can vary according to the level of eruption of the teeth, cant of the occlusal plane and the curve of spee. A high value would indicate that the occlusal plane is tipped down in the anterior region and conversely a low value would indicate that the occlusal plane is tipped down posteriorly. Change in values in the occlusal plane relationship generally indicate a dental problem and hence can be of considerable importance in diagnosis.

The saddle angle was stated to describe the "cranial base bend" between the anterior and posterior cranial bases. This is the angle formed by the points nasion, sella and articulare. A large angle was an indicator that the mandibular fossa was more posterior in direction for the remaining increment. Thus, if the angle was large and the mandibular body length the same or smaller, the face would be more

retrognathic. Thus the flexure of the saddle angle is important when considering the direction of growth in the posterior cranial base.

The inclination of the maxillary incisor to the FH plane is one way of measuring the proclination of the maxillary incisor. This proclination generally influences the position of the upper lip, the amount of tooth and gingival display and the amount of overjet and hence is an important diagnostic criteria for assessing orthodontic treatment need.

The depth of the soft tissue B point is considered the mentolabial sulcus and is influenced by the position of the hard tissue B point, position of the lower incisor, thickness of the lower lip and protrusion of the lower lip. An ideal balance of this sulcus is important in achieving desired facial characteristics and hence valuable in evaluating the desired treatment mechanics.

The hard tissue relationship of the UFH to the LFH influences the frontal and profile relationship of the face. The ratio can help identify whether the problem lies in the upper half or the lower half of the face and make treatment decisions accordingly. There is relative extrusion of the posterior teeth in most orthodontic treatment and uncontrolled biomechanics can accentuate this problem and make a long LFH even longer which is esthetically undesirable. Hence a consideration of this relationship is valuable in targeting the problems in the required area and thus having optimum treatment results.

Cephalometric Index

The above mentioned nineteen variables were used to develop a cephalometric index. This index was constructed with the use of discriminant analysis to classify subjects based on risk factor variables. A number of valid methods are available for including the variables in the discriminant model. Stepwise

variable selection is one way of determining which variables are most important in separating the two groups. This procedure includes the most predicting variable in the discriminant model and terminates when there are no more variables that meet the selection criteria. This procedure has one limitation. Variables with low individual discriminant power may be ignored even though they may have high discriminant power when considered as part of a group. The stepwise procedure will not allow these variables to enter the discriminant model. Because of this limitation, the present study also employed another method to select variables for the index. The second method forces all the variables into the model.

Discriminant analysis was conducted on the twelve year old subjects who were a subset of the experimental group and the control group.. Hence, a total of sixty subjects were included, thirty in each group (fifteen males and fifteen females). When using the stepwise method, only seven variables met the selection criteria. The variables that related to hard tissue were palatal plane, posterior face height, SNB, mandibular prognathism, and upper incisor to FH. Those related to soft tissue were upper lip length and lower lip to E plane. The classification rate for the stepwise and the forced all method were high, but, was slightly higher when all variables were forced into the equation.

To our knowledge, there are no previous studies that have used discriminant analysis to determine cephalometric predictor variables which are important in distinguishing subjects who need orthodontic treatment from the ones who don't need treatment.

The palatal plane was the first variable that was chosen by the stepwise method in discriminating the two groups. Previous studies (Broadbent 1937, Brodie 1940) have stated that the palatal plane appeared to maintain a parallel relation to the

cranial base over the growth period in the population studied by these investigators. This observation led to the view that the maxilla is lowered without rotation in the vertical plane. However implant studies by Bjork (1955, 1966) have demonstrated that the maxilla undergoes extensive differential remodeling during the growth period. This involves resorptive lowering of the nasal floor that in most instances is greater anteriorly than posteriorly. Rotation of the maxilla was evident not only in the vertical aspect, but also in the transverse plane and in the sagittal plane. This complicated displacement of the maxilla was thought to be because of the intricate shape of the palatine bone. Schudy (1964) stated that the maxillary molars usually contributed more than the mandibular molars towards increase in vertical height. It was quite common to observe a tipping of either end of the palatal plane solely as a result of growth. The sample studied by him showed tipping of the posterior end of the palate more often than the anterior end. Kim (1974) illustrated that the overbite depth indicator-ODI (combination of the angle of the A-B plane to the mandibular plane and the angle of the palatal plane to the FH) played an important role in providing information regarding the behavior of vertical relationships. Thus, two persons with the same ODI values could actually present two different problems, one being in the maxilla and the other in the mandible. Hence, inclusion of the inclination of the palatal plane in the ODI was very valuable in diagnosing a case that can have masked skeletal vertical problems. The vertical rotational changes were also demonstrated by Doppel et al., (1994) where it was shown that the ANS-PNS line used to evaluate rotational changes of the maxilla demonstrated lack of reliability as appropriate landmarks for superimposition and interpretation of changes. The angle formed by this line and their implants was found to vary from 8^{o} downward and backward to -5^{o} upward and forward. Nanda and Merrill (1994) showed that the

inclination of the palatal plane can vary a great deal. Also, coincident with the eruption of the maxillary second molars, horizontal and vertical displacement of the maxilla occured in the tuberosity region which could change the inclination of the palatal plane.

The present study was in agreement with the findings of (Schudy 1964, Kim 1974, Doppel et al., 1994) where rotation of the palatal plane and remodelling changes inflicted considerable variability in the positions of both PNS and ANS. The average angular inclination of the palatal plane to the FH in the non-treated group was 1.95^{o} with a standard deviation of 3.09^{o}. The treatment needed group had a mean angulation of -2.59^{o} with a standard deviation of 3.24^{o}.There could also be other reasons for these findings. Blueher (1959) pointed out that the delineation of the PNS in the headplate of a pre-adolescent youngster can be difficult since it can be obscured by the shadow of the erupting second molars. This error is possible , but if present, was duplicated from tracing to tracing thus minimizing its significance. The importance of head position in taking lateral cephalograms was made clear by Masumoto (1970) who found that significant error may be introduced in projection of a landmark lateral to the sagittal plane by varying head position. Julius (1971) found that patients could rotate their head as much as 3^{o} and tip their heads 5^{o} while positioned firmly in a cephalostat. This could have been the reason why the anatomic porion in the experimental group (standardization not very rigid) was slightly superior to the porion of the control group where cephalograms were taken by the more rigid standards of the Bolton-Brush cephalometer. Moreover, one cannot forget that all the patients in the treatment needed group were either undergoing or had just completed orthodontic treatment. Hence, the effects of treatment cannot be ruled out. Doppel et al., (1994) showed that there is considerable variability in the relationship

of the rotation of the maxilla to the rotation of the palatal plane in patients that received orthodontic treatment. Pancherz and Pancherz (1993) pointed out that patients who used Herbst appliance showed a downward tipping of the palatal plane (47%), an upward tipping (29%) and no change in 24% of the subjects. Some authors (Klien 1957, Brown 1978, Nanda and Merrill 1994) reported a downward tipping of the anterior aspect of the palatal plane in patients undergoing treatment with extraoral force. How exactly this force on the molars caused palatal tipping was not elucidated further in any of the studies. Thus, there are also differences in opinion with regard to the tipping of the palatal plane in patients undergoing orthodontic treatment. This study seems to be in agreement with that of Pancherz and Pancherz (1993). It is also possible that different treatment mechanics could change the inclination of the palate i.e., Begg versus Edgewise.

Upper lip length was the second predictable variable that was extracted by the stepwise method. This length was measured as suggested by Burstone (1967), from the subnasale to the stomion. The approximate average length was found to be 24 mm for boys and 20 mm for girls. Zylinski et al., (1992) reported an average length of 20.7 mm and 23.7 mm in preadolescent boys and men respectively. In patients with malocclusion e.g. Class II Div. I, the upper lip could be as short as 16 mm and as long as 26 mm. Hence, a lot of variation in upper lip length is encountered in malocclusion. Nanda et al. (1990) studied individuals between 7-18 years of age and found that the length of the upper lip among other soft tissue structures increased by varying amounts and was completed by fifteen years of age. Besides the length of the upper lip the inclination of the maxillary and mandibular incisors was also responsible for the change in lip position. Wisth and Boe (1975) pointed out that the lip structure influenced the reproducibility of reference points e.g., incompetent lips

or stretched out lips. The present study found that the mean upper lip length was smaller in treatment needed group. Hence, as stated above, a combination of short lip length and proclination of the maxillary incisors could have resulted in a short upper lip, which was an important feature in distinguishing the two groups.

Nanda (1955) noticed an increased rate of growth in the mandibular body length when compared to the posterior face height (PFH) at 6-9 years of age and exactly the opposite in individuals between the ages of 13-16 years. The PFH continued to grow minimally even after nineteen years of age. These findings were found to be quite significant since it agreed with the usual clinical finding of increasing prominence of the mandibular angle in the preadolescent child. Nahoum (1972) concluded that most open-bites were deficient in growth of the upper face and the posterior face, however, some varieties had adequate PFH and hence did not necessarily discriminate between the skeletal open-bite and deep-bite faces (Nahoum et al., 1972, Ellis and McNamara 1984). A compensatory increase in lower anterior face height was however found in both types. Most investigators seem to agree with that finding (Sassouni and Nanda 1964, Sassouni 1969, Issacson and Nahoum 1971, Ellis and McNamara 1984). Thus, although PFH was an important criteria, the ratio of PFH:AFH was suggested as a better variable in determining the prognosis for the orthodontic correction of anterior open-bite or open-bite tendency.

The SNB angle was developed by Riedel (1948) and gave the relationship of the mandible in an anteroposterior direction. Eighty degrees was considered the norm by Riedel. Since then the SNB angle has been included in a variety of analysis (Downs 1948, Steiner 1953, Begg 1956, Jarabak and Fizzell 1972). Several investigators (Broadbent 1937, Bjork 1955, Nanda 1971, Bishara and Peterson 1984) have reported a significant increase in the lower face in males during the pubertal

period. Gramling (1995) studied five measurements to determine if there were any predictive characteristics of Class II malocclusions. The SNB was one of the measurements and was found that the sum of the weighted values of the five cranial and dental angles seemed to have significant predictive value in the differential diagnosis and treatment of the Class II malocclusion. The present study showed similar results in that SNB was one of the 19 predictor variables in distinguishing patients who need orthodontic treatment from the ones who do not need treatment. Moore (1976) cautioned about the variation in the slope of the SN that can be encountered and hence change the values of SNA and SNB. This fact may in part provide the answer to those situations in which the clinical evaluation of the patient suggests a different remedy than the cephalometric evaluation

Burstone (1967) stated that the variability in lip thickness must be considered one major factor which can influence the amount of protrusion or retrusion of the lips. Also the fact that there is a relaxed lip position which is independent or partially dependent on teeth and their supporting alveolar processes.thus amounting to considerable variation in the position of the lips in an anteroposterior direction. Thus a patient with Class II malocclusion can have either protrusive or retrusive lips depending on the postural variation. Ricketts (1968) suggested the use of the measurement, lower lip to E plane in order to evaluate the position of the lower lip relative to a tangent between the soft tissue chin and the tip of the nose. In an ideal situation the lower lip was found to be 2.0 mm posterior to the esthetic plane in adult females and slightly more posterior in males. The study by Bishara and Peterson (1984) and Nanda et al., (1990) was in accordance with the previous study and it was pointed out that the position of the lower lip could change with the size of the length

of the nose. In the present study the treatment group was more retrusive to the E plane when compared to the non-treatment group.

This was described by Legan and Burstone (1980) and measures the horizontal distance of the soft tissue pogonion to the plane glabella perpendicular (to the constructed horizontal plane), the average of which was found to be 0^{o}. This gave an indication of mandibular prognathism, that is, as the magnitude of mandibular deficiency became more severe, the measurement was more negative. They cautioned that this measurement should be evaluated in conjunction with other measurements such as, measurement of the hard tissue chin, length of the mandible, position of the mandible and soft tissue chin and or a combination of any of these measurements. In any case, it was considered a quick way of assessing mandibular position in an anteroposterior direction in relation to the FH plane and was consistent with the results of the present study.

The last measurement that was selected by the stepwise method was the inclination of the maxillary incisors to the FH plane. This is one way of measuring upper incisor proclination and is a measure of the axial inclination of the maxillary incisors to the FH. A mean of 106.9^{o} was demonstrated by Petraitis (1957) and a range of $94\text{-}120.5^{o}$ was found to be normal. Riedel (1957) found a mean value of 111^{o}. It is important to note that the proclination of the upper incisor may or may not influence the position of the upper lip (Burstone 1967). The treatment group in the present sample had more proclined incisors than the non-treatment group.

The same analysis was repeated on the total sample of three hundred individuals, 150 in each group (seventy-five males and seventy-five females each) who ranged from 6-18 years of age. When the stepwise method was used, ten variables met the selection criteria. The variables selected in a descending order were

posterior face height, mandibular length, lower incisor to mandibular plane, palatal plane, facial convexity, mandibular prognathism, mandibular plane angle, saddle angle, nasolabial angle and upper lip length. The classification rate for this group of subjects was also slightly higher when all variables were forced into the equation.

Of the ten variables selected posterior face height, palatal plane, mandibular prognathism and upper lip length have already been elucidated in the previous paragraphs. Mandibular length was the second important variable chosen by the stepwise method. This was described as the millimeter linear distance from condylion to gnathion by McNamara (1984) and from condylion to pogonion by Harvold (1974). Condylion can be a difficult landmark to locate but the use of intensifying screens to improve the quality of the radiographs facilitates its location. The norms developed by McNamara (1984) represent a geometric relationship between effective midfacial length and effective mandibular length and are not directly related to the age or sex of the individual. Also, an increase or decrease in the lower anterior facial height can have a profound effect on the horizontal relationship of the maxilla and the mandible. Hence, although the length of the mandible is important, the sagittal jaw relationship is not exclusively dependent on this variable like other interrelated variables of the craniofacial complex.

The IMPA (incisor to mandibular plane angle) was the first angle of the diagnostic facial triangle described by Tweed (1946,1969). This angle relates the mandibular incisors to the mandibular apical base, the normal range of which was calculated to be $90^{o}+5^{o}$. Margolis (1943), Spiedel and Stoner (1944) substantiated this finding to some extent. Margolis also stated that there appeared to be a relationship between the incisor mandibular plane angle and the contour of the lower

third of the face. Tweed and Margolis considered the IMPA important in diagnosis and treatment and so did the present study.

Facial convexity was the term coined by Jarabak and Fizzell (1972) in his analysis and was considered an important diagnostic factor. Begg (1956) used the same measurement in his analysis and called it the facial plane angle. This angle was originally developed by Downs (1948) and called the Facial angle. This angle is an expression of the degree of recession or protrusion of the chin and is determined by drawing a line from nasion to pogonion (facial plane) and determining the inferior angle that this makes with the FH. The sample ranged from 87.8^{O} to 95^{O} with a mean value of 82^{O} The present showed an average value of 86.55^{O} for the non-treatment group and 87.1^{O} being the mean value for the other group.

The mandibular plane angle (FMA) was the second angle of the diagnostic facial triangle described by Tweed (1946, 1969). This is a skeletal angle descriptive of the degree of existing facial divergence with a normal variation of $16\text{-}35^{O}$ and the average being 25^{O}. Downs (1948) found the vertical growth to be greater in the area of the ramus than at the profile and found a range of values from $22\text{-}28^{O}$. Nanda (1971) considered the SN-MP (another way of measuring mandibular plane) to remain stable throughout the growth period. Schudy (1964) showed a low correlation coefficient for the SN-MP angle and the overbite relationship. Gramling (1995) studied five measurements to determine if there were predictive characteristics of Class II malocclusion and found that the weighted values of these measurements (FMA included) seemed to have significant predictive value in the differential diagnosis of Class II malocclusion. Thus, although the FMA is not a good indicator of the overbite relationship it does have its significance in diagnosing other problems which is in accordance with the findings of the present study.

The saddle angle was considered to be of importance by Jarabak and Fizzell (1972) and was stated to describe the "cranial base bend" between the anterior and the posterior cranial bases. This is the angle formed by the anatomic landmarks nasion, sella and articulare, the mean of which was determined to be $122^{o}+5^{o}$. A large angle was an indication that the growth of the mandibular fossa was more posterior in direction for the remaining growth increment. Bjork (1951), Jarabak and Fizzell (1972), Jarvinen (1980,1984) pointed to the fact that if the saddle angle was large and the mandibular body length the same as or smaller than the anterior cranial base, the face would be retrognathic. The converse of this is also true. Thus the flexure of the saddle angle is important when considering the direction of growth in the posterior cranial base. Lewis and Roche (1977) concluded that the change in this angle is dominant in the first two years and is very minimal thereafter.

Burstone (1967) realized that it might be useful to measure the protrusion of the upper lip relative to the inferior border of the nose from an esthetic standpoint. This was called the nasolabial angle and is formed by the intersection of a line originating at subnasale, tangent to the mean of the lower border of the nose and a line from subnasale to labrale superius, the mean value of which was determined to be 74^{o}. It is important to note that this angle is influenced by the position of the anterior maxilla, the shape of the nose and habitual tensing of the upper lip. Fitzgerald et al., (1992) found the mean values to be $114.08^{o}+ 9.58^{o}$. Elias (1980) stated that it was not essential to find patients with proclined incisors and an acute nasolabial angle. Review of the nasolabial angle is important when contemplating orthodontic treatment since movement of the maxillary incisors in any of the three planes of space can influence this area (1992). The present study also finds this angle to be of importance in diagnosing orthodontic treatment need.

In conclusion, the present study attempted to classify subjects who needed orthodontic treatment from those who did not need treatment with the help of a multivariate statistical procedure, essentially discriminant analysis. On the basis of the variables selected, good discrimination was found between the two groups; the twelve year old and 6-18 year old sample. The stepwise method that selects a reduced number of variables also had good discriminating ability in both these samples. But, whether it makes clinical sense to distinguish the two groups on the basis of the selected variables is questionable since the reduced number of variables are not sufficient enough to diagnose the problems in the craniofacial complex.

Limitations of the study

It is important to realize that cephalometric radiographs provide only a two-dimensional static image of a very irregular three-dimensional object. Hence information derived from a lateral cephalometric radiograph cannot be extrapolated to the three-dimensional anatomical structures. Another limitation of this study may be the accuracy of cephalometric landmark identification. In some instances landmarks like A point, ANS, mandibular condyle were difficult to trace, however, they were traced to the best of the investigators ability. Also, the location of the anatomic porion seemed slightly higher than that of the controls due to the not so rigid standards sometimes observed in the pretreatment lateral cephalograms when compared to the cephalograms taken by the Broadbent-Bolton cephalometer.

The study population used in this investigation was limited to Caucasian males and females. Certainly, one must be cautious as to not make generalization to the rest of the population with different ethnic groups. In addition, there might be some sample bias due to the fact that it was assumed that the experimental group needed orthodontic treatment based on the fact that they were undergoing some form

of orthodontic treatment. Also, the control sample from the study by Spillas (1993), were considered not to have required treatment based on optimum facial characteristics and good Class I molar occlusion.

There is also some degree of subjectivity using factor analysis. In the analysis of craniofacial variables, the number, identity and magnitude of the factors may be arbitrarily determined by the investigator in the selection of variables. The common practice of using factor analysis for the detection and subsequent measurement of hidden biological factors seems less fortunate, because the factors will often be fortuitous reflecting the bias of the investigator.

An important limitation of lateral cephalograms is that problems or concerns in the transverse dimension, e.g., posterior crossbite, narrow maxilla etc., are not addressed. Inspite of that, it most certainly is a widely available and inexpensive way of gaining valuable information about the craniofacial complex. Although seven and ten variables were picked out in the stepwise method of discriminant analysis in the twelve year olds and 6-18 year old respectively and were of statistical significance, whether utilizing such minimum variables makes clinical sense is questionable. Constructing a cephalometric index to differentiate patients who need orthodontic treatment from the ones who do not is an important step in testing the index in the general population.

Future Studies

Studies in the future should utilize a population sample that contains subjects across the various ethnic groups, with adequate subject-to-variable ratios. In a similar study with a sample population consisting of African-American males and females, for example, many would hypothetize that a different pattern of variable loading activity would result, but the same factors should be extracted because the

investigation is still involved with the craniofacial complex of the human species. A comparison of one ethnic group to another to see if the same underlying factors result, would certainly lend a better and more thorough interpretation of the morphology of the craniofacial complex. Another interesting prospect would be to apply factor analysis to the finished cases to see if the variables load similar to the study of Spillas (1993).

The most logical next step would be to evaluate the validity of the cephalometric index using another group of sample. Also, a different group of orthodontists can be used to select the reduced number of variables from the fourteen extracted factors. These common variables can then be subjected to discriminant analysis to see if they perform as well as the variables that were selected in the present study, in separating the treatment needed group from the ones who do not need treatment. Also, the stepwise method of analysis can be compared to the present study in terms of the number and the nature of the variables that were selected by this technique.

Since the best predictor variables outlined by the stepwise procedure were different at the twelve year age period and the 6-18 year old age period, a logical sequel would also be to perform this technique, using the same variables selected in the present study, on groups of sample at different age levels to see if the predictor variables change over a period of time.

Another interesting prospect related to the present investigation would be to assess treatment outcome by obtaining posttreatment lateral cephalograms and conducting discriminant analysis to see if these subjects classify in the non-treatment category. This index can also be used in combination with an occlusal index to

provide more accurate and meaningful measure of orthodontic treatment need and outcome assessment.

SUMMARY AND CONCLUSIONS

A total of 134 measurements representing linear and angular assessments of the craniofacial complex, were digitized using 150 pretreatment lateral cephalometric radiographs from a clinic sample. These radiographs were used to collect data at five different age groups (6-8.6 y, 8.7-11 y, 11.1-13.6 y, 13.7-16 y, and 16.1-18.6 y), with fifteen males and fifteen females (all caucasian) in each group. In an effort to locate specific areas of variability within the craniofacial complex factor analysis was performed. Fourteen factors were extracted which accounted for 83.4% of the total variance in the craniofacial complex, testing the validity of the previous of the previous study. A set of reduced variables were chosen from these fourteen factors by a group of five experienced orthodontists, practicing in the Cleveland area. Nineteen variables were selected to construct the cephalometric index yielding an easily quantifiable way of separating the treatment needed group (clinic sample) from the non-treatment group (Bolton sample). The cephalometric index was derived using discriminant analysis by the forced entry method and the stepwise procedure to determine the best predictor variables, on the twelve year old group of subjects, ages 6-18 year old.

Analysis of the data yielded the following results, first four pertaining to the group of twelve year old subjects and the ones thereafter to the 6-18 year old age group:

1) The cephalometric index score derived using the discriminant analysis could be used to differentiate subjects who need orthodontic treatment from the ones who do not need treatment.

2) When all predictor variables were forced into the discriminant function,

96.7% of the cases were correctly classified in the treatment needed group whereas 100% were correctly classified in the non-treatment group.

3) When using the stepwise procedure palatal plane, upper lip length, posterior face height, SNB, lower lip to E plane, mandibular prognathism and appear 1 to FH were the most important discriminant variables. The stepwise method correctly classified 96.7% of treatment needed cases and 96.7% of no treatment needed cases. The effectiveness of the cephalometric index score derived using the forced-entry method was negligibly superior to that derived using the stepwise method. This was true based on the classification rate, the eigenvalue and the canonical discriminant correlation.

4) In comparing the means of the cephalometric variables 17 out of the 19 variables were significantly different in the two groups.

5) The cephalometric index score derived using the discriminant analysis could be used to differentiate the two groups.

6) When all the predictor variables were forced into the discriminant function, 99.3% of the cases were correctly classified in the treatment needed group whereas 100% of the cases were correctly classified in the non-treatment group.

7) When using the stepwise procedure posterior face height, mandibular length, lower 1 to mandibular plane, palatal plane, facial convexity mandibular prognathism, mandibular plane angle, saddle angle nasolabial angle and upper lip length were the most important variables. The stepwise method correctly classified 98.7% of treatment needed cases and 100% of non-treatment cases. The effectiveness of the cephalometric index score derived using the forced-entry method was slightly superior to that derived using the stepwise method. This was once again true based on the classification rate, eigenvalue and the canonical discriminant correlation.

In conclusion, the findings from the present study indicated that a reduced number of fourteen factors accounted for 83.4% of the craniofacial variation in orthodontic diagnoses and treatment planning. This study also demonstrated the feasibility of deriving an easily quantifiable cephalometric index useful in separating

those individuals who needed orthodontic treatment from those who did not. Thus, the derived discriminant model, using all of the possibly predictive cephalometric variables, can be used to identify treatment needed subjects from the population. It is hoped that the cephalometric index derived from the present study will be validated, and subsequently used to assess treatment outcome in combination with the occlusal index.

APPENDIX A

In regard to Factor 1, please choose the six variables you find most valuable in Cephalometric analysis :

1. Anterior face height
2. Facial depth
3. Mandibular length
4. Facial length
5. Midface length
6. Corpus length
7. Posterior face height
8. Upper face height
9. Lower anterior dental height
10. Lower anterior face height
11. Nose to chin length
12. PNS to ANS
13. Basion to Nasion
14. Ramus height
15. Anterior cranial base
16. Nose length
17. ANS to nose tip
18. Upper posterior dental height
19. Lower posterior dental height
20. Upper soft tissue face height
21. Lower soft tissue face height
22. Posterior cranial base
23. Lower lip length
24. Max-Mand differential
25. SE
26. Porion location
27. Upper anterior dental height
28. A-Point to soft tissue A
29. SL
30. Pogonion to NB
31. Upper lip length
32. Maxillary arch length

In regard to Factor 2, please choose the three variables you find most valuable in Cephalometric Analysis:

1. SNA
2. Bolton facial plane
3. SNB
4 Maxillary depth
5. Facial axis angle
6. Y axis to SN
7. Y axis
8. Maxillary height
9. Lower facial height angle
10. Ramus position
11. Facial convexity
12. Soft tissue facial angle
13. Z angle
14. H angle
15. H line

In regard to Factor 3, please choose the <u>two</u> variables you find most valuable in Cephalometric analysis:

1. Maxillomandibular differential
2. ANB
3. AB plane
4. Nasomental angle
5. Angle of convexity
6. Soft tissue convexity
7. Facial convexity angle
8. Nasofacial angle
9. Molar relation

In regard to Factor 4, please choose the <u>two</u> variable you find most valuable in Cephalometric analysis:

1. Lower 1 to facial plane
2. FMIA
3. Lower 1 to occlusal plane
4. Lower 1 to APo (angular)
5. Sn to lower 1
6. Lower 1 to palatal plane
7. Lower 1 to NB (linear)
8. Lower 1 to mandibular plane
9. Interincisal
10. Lower 1 to NB (angular)
11. Lower 1 to APo (linear)

In regard to Factor 5, please choose the <u>one</u> variable you find most valuable in Cephalometric analysis:

1. Facial taper
2. Gonial angle
3. Lower gonial angle
4. Sn to mandibular plane
5. Mandibular plane angle
6. PFH:AFH
7. Mandibular arc

In regard to Factor 6, please choose the two variables you find most valuable in Cephalometric analysis:

1. Mandibular prognathism
2. Pogonion to N perpendicular
3. A point to N perpendicular
4. Maxillary prognathism
5. Soft tissue pogonion distance
6. Upper 6 to pterygoid vertical
7. Interlabial sulcus distance
8. Lower lip distance

In regard to Factor 7, please choose the <u>two</u> variable you find most valuable in Cephalometric analysis:

1. Upper 1 to facial plane
2. Uper 1 to APo (angular)
3. Upper 1 to NA (angular)
4. Upper 1 to APo (linear)
5. Upper 1 to FH
6. Upper 1 to NA (linear)
7. Upper 1 to A vertical
8. Maxillary arch length
9. Incisor overjet
10. Stomion incisor length

In regard to Factor 8, please choose the <u>one</u> variable you find most valuable in Cephalometric analysis:

1. Saddle angle
2. Cranial base angle
3. Articular angle

In regard to Factor 9, please choose the <u>one</u> variable you find most valuable in Cephalometric analysis:

1. Superior labial sulcus distance
2. Nasolabial angle
3. Upper lip distance
4. Upper lip thickness

In regard to Factor 10, please choose the <u>one</u> variable you find most valuable in Cephalometric analysis:

1. UFH
2. UFH:LFH
3. UFH:LFH (soft tissue)
4. Nose length
5. SN to palatal plane

In regard to Factor 11, please choose the <u>one</u> variable you find most valuable in Cephalometric analysis:

1. Lowr lip to E plane
2. Lower lip thickness
3. Lower lip to H line
4. Mentolabial sulcus to H line

In regard to Factor 12, please choose the <u>one</u> variable you find most valuable in Cephalometric analysis:

1. Palatal plane
2. Cranial deflection
3. SN to FH

In regard to Factor 13, please choose the one variable you find most valuable in Cephalometric analysis:

1. SN to occlusal plane
2. Occlusal plane to XI point
3. Occlusal plane inclination
4. Oclusal plane to GoGn
5. Occlusal plane

In regard to Factor 14, please choose the <u>one</u> variable you find most valuable in Cephalometric analysis:

1. Vertical lip to chin ratio
2. Lip embrasure to occlusal plane
3. Upper lip length

APPENDIX B

CWRU LANDMARK REGIMEN

Points 1-25: **Soft tissue outline:**

1: Glabella
2: Superior Nasion
3: Nasion
4: Inferior Nasion
5: Nasal Dorsum
6: Inferior Dorsum
7: Superior Nasale
8: Pronasale
9: Inferior Nasale
10: Columnella
11: Subnasale
12: Philtrum
13: Labrale Superius
14: Middle Upper Lip
15: Stomion Superior
16: Stomion Inferior
17: Middle Lower Lip
18: Labrale Inferius
19: Superior Labio-mental Fold
20: Labio-mental Fold
21: Inferior Labio-mental Fold
22: Pogonion
23: Gnathion
24: Menton
25: Cervical Point

Points 26-31: **Frontal landmarks:**

26: Frontal 1
27: Frontal 2
28: Nasion
29: Nasal 1
30: Nasal 2
31: Nasal 3

Point 32: **Orbitale**

Points 33-38: **Pterygomaxillary fissure:**

33: Ptm 1
34: Ptm
35: Ptm 2
36: Ptm 3
37: Ptm 4

Points 38-50: **Maxilla** (Note: points **38** and **50** are similar):

38: Posterior Nasal Spine
39: Superior Maxilla 1
40: Superior Maxilla 2
41: Superior Maxilla 3
42: Superior Maxilla 4
43: Superior Maxilla 5
44: Anterior Nasal Spine
45: Sub-ANS
46: A-Point
47: Inferior Maxilla 1
48: Inferior Maxilla 2
49: Inferior Maxilla 3
50: Posterior Nasal Spine

Points 51-53: **Soft palate:**

51: Uvula 1
52: Uvula 2
53: Uvula 3

Points 54-56: **Posterior pharyngeal wall:**

54: Pharyngeal Wall 1
(The point at which a line from the most superior-posterior point on the soft palate paralleling to the B-Go (i.e., "B-point" to "Gonion") line, intersects the pharyngeal wall).

55: Pharyngeal Wall 2
(The point at which the "functional occlusal plane" intersects the pharyngeal wall).

56: Pharyngeal Wall 3
(The point at which a line from the inferior tip of the soft palate paralleling the B-Go line, intersects the pharyngeal wall).

Points 57-59: **Maxillary incisor plus the center of rotation:**

57: Upper 1 Root Apex
58: Upper 1 Cusp Tip
59: Upper 1 Center of Rotation

Points 60-61: **Maxillary canine:**

60: Upper 3 Root Apex
61: Upper 3 Cusp Tip

Point 62: **Cusp tip of maxillary first bicuspid**

Points 63-64: **Maxillary first molar:**

63: Upper 6 Root Apex
64: Upper 6 Cusp Tip (Middle)

Points 65-66: **Mandibular first molar:**

65: Lower 6 Cusp Tip (Middle)
66: Lower 6 Root Apex (Middle)

Point 67: **Cusp tip of mandibular first bicuspid**

Points 68-69: **Mandibular canine:**

68: Lower 3 Cusp Tip
69: Lower 3 Root Apex

Points 70-72: **Mandibular incisor plus the center of rotation:**

70: Lower 1 Cusp Tip
71: Lower 1 Root Apex
72: Lower 1 Center of Rotation

Points 73-75: **Inner cortical plate of mandibular symphysis:**

73: Internal Cortex 1
74: Internal Cortex 2
75: Internal Cortex 3

Points 76-78: **Outer cortical plate of mandibular symphysis:**

76: External Cortex 1
77: External Cortex 2
78: External Cortex 3

Points 79-83: **B-point to mandibular symphysis:**

79: B-point
80: Anterior Genioplasty Point
81: Pogonion
82: Gnathion
83: Menton

Points 84-87: **Lower border of mandible:**

84: Posterior Genioplasty Point
85: Antegonial
86: Inferior Gonion
87: Gonion

Points 88-90: **Posterior ramus:**

88: Posterior Gonion
89: Posterior Ramus
90: Anatomic Articulare

Points 90-95: **Condyle:**

90: Anatomic Articulare
91: Condyle 1
92: Condylion
93: Condyle 2
94: Condyle 3
95: Condyle 4

Points 96-99: Sigmoid notch:

96: Sigmoid 1
97: Sigmoid
98: Sigmoid 2
99: Coronoid 1

Points 100-104: Coronoid and anterior ramus:

100: Coronoid
101: Coronoid 2
102: Anterior Ramus 1
103: Anterior Ramus
104: Anterior Ramus 2

Point 105: Center of rotation of mandible

Points 106-111: Spheno-occipital-synchondrosis to Basion:
(Note: points **90** and **107** are similar):

106: Spheno-occipital-synchondrosis
107: Anatomic Articulare
108: Basion 1
109: Basion
110: Basion 2
111: Posterior Clinoid 1

Points 112-118: Planum sphenoidale to cribriform plate:

112: Tuberculum Sella 3
113: Planum Sphenoidale
114: Cribriform 1
115: Cribriform 2
116: Cribriform 3
117: Cribriform 4
118: Cribriform 5

Points 119-123: Anterior cranial base:

119: Anterior Cranial Base 1
120: Anterior Cranial Base 2
121: Anterior Cranial Base 3
122: Anterior Cranial Base 4
123: Anterior Cranial Base 5

Points 124-127: Ethmoid triad for superimposition:

124: Ethmoid Triangle 1
125: Ethmoid Triangle 2
126: Ethmoid Triangle 3
127: Ethmoid Triangle 4

Point 128: Sella

Point 129: Porion

Point 130: Bolton articulare

Point 131: Bolton point

Point 132: C3-anterior inferior point on third cervical vertebra

Point 133: Base of epiglottis

Point 134: Hyoidale-superior anterior point on hyoid body

Point 135: Most posterior occlusal contact of maxillary and mandibular molars on functional occlusal plane.

Points 136-137: Fiducial points for superimposition of cranial base:

136: Cranial Base Fiducial 1
137: Cranial Base Fiducial 2

Points 138-139: Fiducial points for superimposition of maxilla:

138: Maxillary Fiducial 1
139: Maxillary Fiducial 2

Points 140-141: Fiducial points for superimposition of mandible:

140: Mandibular Fiducial 1
141: Mandibular Fiducial 2

Points 142-146: Key ridge outline:

142: Key Ridge 1
143: Key Ridge 2
144: Key Ridge 3
145: Key Ridge
146: Key Ridge 4

Points 147-148: Fiducial vertical lines:

147: Vertical Fiducial 1
148: Vertical Fiducial 2

Points 149-152: Corner fiducial points:

149: Vertical Fiducial 1
150: Vertical Fiducial 2
151: Vertical Fiducial 3
152: Vertical Fiducial 4

APPENDIX C

VARIABLES USED FOR FACTOR ANALYSIS

Jarabak Analysis:

1. **Saddle angle** (The angle formed by the anatomical landmarks: Nasion, Sella, Articulare).

2. **Articular angle** (The angle formed by the anatomical landmarks: Sella, Articulare, Gonion).

3. **Gonial angle** (The angle formed by the anatomical landmarks: Articulare, Gonion, Menton).

4. **Anterior cranial base** (The (millimeter) linear distance between Sella and Nasion).

5. **Posterior cranial base** (The (millimeter) linear distance between Sella and Articulare).

6. **Upper gonial angle** (The angle formed by the anatomical landmarks: Articulare, Gonion, Nasion).

7. **Lower gonial angle** (The angle formed by the anatomical landmarks: Nasion, Gonion, Menton).

8. **Ramus height** (The (millimeter) linear distance between Articulare and Gonion).

9. **Body length** (The (millimeter) linear distance between Gonion and Menton).

10. **SNA angle** (The angle formed by the anatomical landmarks: Sella, Nasion, A point).

11. **SNB angle** (The angle formed by the anatomical landmarks: Sella, Nasion, B point).

12. **ANB angle** (The angle formed by the anatomical landmarks: A point, Nasion, B point).

13. **SN-GoGn angle** (The angle formed by the anatomical landmarks. Sella, Nasion and the plane: Gonion-Gnathion).

14 **Facial depth** (The (millimeter) linear distance between Nasion and Gonion).

15. **Facial length** (The (millimeter) linear distance between Sella and Gnathion).

16. **Y-axis to SN angle** (The angle formed by the anatomical planes: Y-axis and Sella-Nasion).

17 **Posterior face height** (The (millimeter) linear distance between Sella and Gonion).

18. **Anterior face height** (The (millimeter) linear distance between Nasion and Menton).

19. **Posterior face height : Anterior face height** (The ratio between measurement "17." and measurement "18." expressed as a percentage).

20. **SNPg angle** (The angle formed by the anatomical landmarks: Sella, Nasion, Pogonion).

21. **Facial Convexity** (The angle formed by the anatomical planes: Frankfort Horizontal and Nasion-Pogonion).

22. **OP-GoGn angle** (The angle formed by the anatomical planes: Occlusal Plane and Gonion-Gnathion).

23. **Interincisal angle** (The angle formed by the anatomical planes: long axis of Upper 1 and long axis of Lower 1).

24. **Lower 1 to GoGn** (The angle formed by the anatomical planes: long axis of lower 1 and Gonion-Gnathion).

25. **Lower 1 to GoGn'** (The (millimeter) linear distance between the planes: long axis of lower 1 and Gonion-Gnathion).

26. **Upper 1 to SN** (The angle formed by the anatomical planes: long axis of Upper 1 and Sella-Nasion).

27 **Upper 1 to facial plane** (The (millimeter) linear distance between Upper incisor edge and the plane: Nasion-Pogonion).

28. **Lower 1 to facial plane** (The (millimeter) linear distance between Lower incisor edge and the plane: Nasion-Pogonion).

29. **Upper lip to E** (The (millimeter) linear distance between the most prominent point on upper lip and the Esthetic [nose-chin] plane).

30. **Lower lip to E** (The (millimeter) linear distance between the most prominent point on lower lip and the Esthetic [nose-chin] plane).

Ricketts Analysis:

31. **Molar relation** (The (millimeter) linear distance between the distal surfaces of the permanent upper and lower first molars measured along the occlusal plane).

32. **Canine relation** (The (millimeter) linear distance between the cusp tips of upper and lower canines measured along the occlusal plane).

33. **Incisor overjet** (The (millimeter) linear distance between the incisal tips of the upper and lower incisors measured along the occlusal plane).

34. **Incisor overbite** (The (millimeter) linear distance between the tips of the upper and lower incisors measured perpendicular to the occlusal plane).

35. **Lower incisor extrusion** (The (millimeter) linear distance between the tip of the lower incisor and the occlusal plane).

36. **Interincisal angle** (The angle formed by the long axes of the central incisors).

37 **A-point convexity** (The (millimeter) linear distance between A-point and the facial plane [Nasion-Pogonion]).

38. **Lower face height angle** (The angle formed by the anatomical landmarks: anterior nasal spine, center of the ramus [Xi], PM).

39. **Upper 6 to PTV** (The (millimeter) linear distance between the anatomical plane: pterygoid vertical [the back of the maxilla] and the distal of the upper first molar).

40. **Lower 1 to A-PO'** (The (millimeter) linear distance between the cusp tip of the lower incisor and the line defining the jaws: the "A-point to Pogonion" plane).

41. **Upper 1 to A-PO'** (The (millimeter) linear distance between the cusp tip of the upper incisor and the "A-point to Pogonion" plane).

42. **Lower 1 to A-PO** (The angle formed by the anatomical planes: the long axis of the lower incisor and the "A-point to Pogonion" plane).

43. **Upper 1 to A-PO** (The angle formed by the anatomical planes: the long axis of the upper incisor and the "A-point to Pogonion" plane).

44. **Occlusal plane to Xi point** (The (millimeter) linear distance between the occlusal plane and the center of the ramus [Xi-point]).

45. **Occlusal plane inclination** (The counterclockwise angle formed by the anatomical planes: the corpus axis of the mandible and the occlusal plane).

46. **Lower lip to E** (The (millimeter) linear distance between the lower lip [labrale inferius] and the esthetic [nose-chin] plane).

47. **Upper lip length** (The (millimeter) linear distance between the anatomical landmarks: anterior nasal spine and the embrasure area of the lips).

48. **Lip embrasure to occlusal plane** (The (millimeter) linear distance between the embrasure area of the lips and the occlusal plane).

49. **Facial depth angle** (The angle formed by the anatomical planes: the facial plane and the Frankfort Horizontal Plane [i e., Downs facial angle]).

50. **Facial axis angle** (The angle formed by the anatomical planes: the facial axis plane [Pt to Gn] and Basion-Nasion).

51. **Facial taper angle** (The angle formed by the anatomical planes: the mandibular plane measured to the facial plane).

52. **Mandibular plane angle** (The angle formed by the anatomical planes: Mandibular plane measured to the Frankfort Horizontal plane).

53. **Maxillary depth angle** (The angle formed by the anatomical planes: Frankfort Horizonal plane and the plane from Nasion to Point A).

54. **Maxillary height angle** (The angle formed by the anatomical landmarks: Nasion, CF [the intersection of Frankfort and PTV] and "A-point").

55. **Palatal plane angle** (The angle formed by the anatomical planes: Frankfort Horizontal plane and the palatal plane).

56. **Cranial deflection angle** (The angle formed by the anatomical planes: Basion-Nasion and Frankfort Horizontal plane).

57. **Anterior cranial length** (The (millimeter) linear distance between CC-point and Nasion).

58. **Posterior facial height** (The (millimeter) linear distance between Gonion and CF-point).

59. **Ramus position angle** (The angle formed by the anatomical planes: the Frankfort Horizontal plane and the CF-XI plane).

60. **Porion location [TMJ]** (The (millimeter) linear distance between the anatomical landmarks. Porion and Pterygoid vertical).

61 **Mandibular arc angle** (The angle formed between the corpus and the condyle axes).

62. **Corpus length** (The (millimeter) linear distance between Xi-point and the intersection of the planes: Xi-PM and A-PO).

Downs Analysis:

63. **Facial angle** (The angle formed by the anatomical planes: Frankfort Horizontal plane and facial plane).

64. **Angle of convexity** (The angle formed by the anatomical landmarks: Nasion, A-point, Pogonion).

65. **A-B plane angle** (The angle formed by the facial plane and the line constructed from "A-point" to "B-point").

66. **Mandibular plane angle** (The angle formed by the anatomical planes: Mandibular plane and Frankfort Horizontal plane).

67. **Y- Axis angle** (The angle formed by the Frankfort Horizontal plane and the line constructed from Sella-Gnathion).

68. **Occlusal plane angle** (The angle formed by the anatomical planes: Frankfort Horizontal plane and the occlusal plane).

69. **Interincisal angle** (The angle formed by the long axes of the central incisors).

70. **Lower incisor to occlusal plane** (The angle formed by the long axis of the lower incisor [clockwise] and the occlusal plane measured from the occlusal plane perpendicular).

71. **Lower incisor to mandibular plane** (The angle formed by the mandibular plane and the long axis of the lower incisor [clockwise]).

72. **Upper incisor to A-Pg** (The (millimeter) linear distance between the upper incisor edge to the A-point - Pogonion plane).

Harvold Analysis:

73. **Mandibular unit length** (The (millimeter) linear distance from Condylion to Pogonion).

74. **Maxillary unit length** (The (millimeter) linear distance from Condylion to Anterior Nasal Spine).

75. **Unit difference** (The unit difference between Mandibular unit length and Maxillary unit length, measured in millimeters).

76. **Lower face height** (The vertical (millimeter) distance from Anterior Nasal Spine to Gnathion).

Steiner Analysis:

77. **SNA angle** (The angle formed by the anatomical landmarks: Sella. Nasion, A-point).

78. **SNB angle** (The angle formed by the anatomical landmarks: Sella, Nasion, B-point).

79. **ANB angle** (The angle formed by the anatomical landmarks: A point, Nasion, B-point).

80. **Upper 1 to NA** (The angle formed by the long axis of Upper 1 and the Nasion - A-point plane).

81. **Upper 1 to NA'** (The (millimeter) linear distance from the Upper incisor edge to the Nasion - A-point plane).

82. **Lower 1 to NB** (The angle formed by the long axis of Lower 1 and Nasion - B-point plane).

83. **Lower 1 to NB'** (The (millimeter) linear distance from the Lower incisor edge to the Nasion - B-point plane).

84. **Pogonion to NB** (The (millimeter) linear distance from Pogonion to the Nasion - B-point plane).

85. **PO and Lower 1 to NB** (The unit difference between Lower 1 to NB' and Pogonion to NB, measured in millimeters).

86. **S L** (The (millimeter) linear distance from Sella to Pogonion measured along the Sella-Nasion plane).

87. **S E** (The (millimeter) linear distance from Sella to Articulare measured along the Sella-Nasion plane).

88. **Interincisal** (The angle formed by the long axes of the Upper and Lower central incisors).

89. **SN to OP** (The angle formed by the anatomical planes: Sella-Nasion plane and the Occlusal plane).

90. **SN to GoGn** (The angle formed by the anatomical planes: Sella-Nasion plane and the Gonion-Gnathion plane).

Reidel Analysis:

91. **SNA angle** (The angle formed by the anatomical landmarks: Sella, Nasion, A-point).

92. **SNB angle** (The angle formed by the anatomical landmarks: Sella, Nasion, B-point).

93. **ANB angle** (The angle formed by the anatomical landmarks: A-point, Nasion, B-point).

94. **Upper 1 to FH** (The angle formed by the long axis of Upper 1 and the Frankfort Horizontal plane).

95. **FH-NA** (The angle formed by the anatomical planes: Frankfort Horizontal plane and the Nasion - A-point plane).

Tweed Analysis:

96. **FMA** (The angle formed by the anatomical planes: Mandibular plane and the Frankfort Horizontal plane).

97. **IMPA** (The angle formed by the anatomical plane: Mandibular plane and the long axis of Lower 1).

98. **FMIA** (The angle formed by the anatomical plane: Frankfort Horizontal plane and the long axis of Lower 1).

McNamara Analysis:

99. **A point to N perpendicular** (The (millimeter) linear distance from A-point to Nasion-perpendicular [to Frankfort Horizontal]).

100. **Mandibular length** (The (millimeter) linear distance from Condylion to Gnathion).

101. **Midface length** (The (millimeter) linear distance from Condylion to A-point).

102. **Maxillary-Mandibular differential** (The unit difference between Mandibular length and Midface length; in millimeters).

103. **LAFH** (The vertical (millimeter) distance from Anterior nasal spine to Menton).

104. **Mandibular plane angle** (The angle formed by the anatomical planes: Mandibular plane and the Frankfort Horizontal plane).

105. **Facial Axis angle** (The angle formed by the anatomical planes: Frankfort Horizontal plane and the facial axis).

106. **Pogonion to N-perpendicular** (The (millimeter) linear distance from Pogonion to Nasion-perpendicular [to Frankfort Horizontal]).

107. **Upper 1 to AV** (The (millimeter) linear distance from the Upper incisor edge to A-point vertical [perpendicular to Frankfort]).

108. **Lower 1 to A-Pg** (The (millimeter) linear distance from Lower incisor edge to the A-point - Pogonion plane).

Begg Analysis:

109. **SNA angle** (The angle formed by the anatomical landmarks: Sella, Nasion, A-point).

110. **SNB angle** (The angle formed by the anatomical landmarks: Sella, Nasion, B-point).

111 **ANB angle** (The angle formed by the anatomical landmarks: A-point, Nasion, B-point).

112. **SN-Mandibular plane** (The angle formed by the anatomical planes: Sella-Nasion and Mandibular plane).

113. **Lower 1 to Mandibular plane** (The angle formed by the Mandibular plane and the long axis of Lower 1).

114. **SN-Occlusal plane** (The angle formed by the anatomical planes: Sella-Nasion and the Occlusal plane).

115. **Angle of Convexity** (The angle formed by the anatomical landmarks: Nasion, A-point, Pogonion).

116. **Facial plane angle** (The angle formed by the anatomical planes: Frankfort Horizontal plane and the facial plane).

117. **Upper 1 to SN** (The angle formed by the long axis of Upper 1 and the Sella-Nasion plane).

118. **Lower 1 to APog** (The (millimeter) linear distance from the Lower incisor edge to the A-point - Pogonion plane).

Wits Analysis:

119. **A-point to B-point** (The (millimeter) linear distance from the perpendicular lines drawn from the functional occlusal plane to A-point and B-point, measured along the functional occlusal plane).

Soft-Tissue Analysis:
(Powell and Humphreys)

120. **Nasofrontal angle** (The angle formed by a line tangent to soft-tissue Glabella through Nasion, [the deepest depression at the roof of the nose], which will intersect a line tangent to the nasal dorsum).

121. **Nasofacial angle** (The angle formed by a vertical line touching the forehead [Glabella] and chin [Pogonion], and intersected by the dorsal plane of the nose).

122. **Nasomental angle** (The angle formed by the nasal dorsal line and the nasomental line [nasal tip to soft-tissue Pogonion]).

Soft-Tissue Analysis:
(Holdaway)

123. **H angle** (The angle formed by a straight line from the point of the soft-tissue chin tangent to the upper lip, and the N-Po plane).

124. **H line** (The angle formed by a tangent to the soft-tissue chin and the upper lip, and the plane Sella-Nasion).

Soft-Tissue Analysis:
(Spradley et al.)

125. **SLS distance** (The (millimeter) horizontal distance from the superior labial sulcus to Subnasale [located by bisecting the angle formed by the columnella of the nose and the drape of the upper lip] vertical perpendicular to the Frankfort Horizontal plane).

126. **UL distance** (The (millimeter) horizontal distance from the most anterior point of the Upper lip [Labrale Superius] to Subnasale vertical).

127. **LL distance** (The (millimeter) horizontal distance from the most anterior point of the Lower lip [Labrale Inferius] to Subnasale vertical).

128. **ILS distance** (The (millimeter) horizontal distance from the inferior labial sulcus to Subnasale vertical).

129. **SP distance** (The (millimeter) horizontal distance from soft-tissue Pogonion to Subnasale vertical).

Soft-Tissue Analysis:
(Merrifield)

130. **Z angle** (The inferior angle formed by the intersection of the Profile line [a line tangent to the soft-tissue chin and to the most anterior point of the upper lip], and Frankfort Horizontal).

Soft-Tissue Analysis:
(Burstone)

131. **Interlabial gap** (The (millimeter) vertical distance between Upper lip stomion and Lower lip stomion).

132. **Upper lip length** (The (millimeter) linear distance from Subnasale to upper lip Stomion).

133. **Lower lip length** (The (millimeter) linear distance from lower lip Stomion to Soft-tissue Gnathion).

134. **Stomion-incision length** (The linear distance from Upper lip Stomion to the Maxillary central incisor edge).

135. **Upper lip thickness** (The (millimeter) perpendicular distance from soft-tissue Subnasale-Pogonion plane to Labrale Superius).

136. **Lower lip thickness** (The (millimeter) perpendicular distance from soft-tissue Subnasale-Pogonion plane to Labrale Inferius).

137. **Nasolabial angle** (The angle formed by Columnella and the drape of the Upper lip).

138. **Upper soft-tissue facial height** (The (millimeter) vertical distance from Glabella to Subnasale).

139. **Lower soft-tissue facial height** (The (millimeter) vertical distance from Subnasale to Menton).

140. **UFH : LFH** (The soft-tissue ratio of Upper facial height to Lower facial height, expressed as a percentage).

Soft-Tissue Analysis:
(Burstone and Legan)

141. **Facial convexity angle** (The angle formed by the soft-tissue Glabella-Subnasale plane and Subnasale-Pogonion plane).

142. **Maxillary Prognathism** (The (millimeter) horizontal distance of Subnasale to the plane Glabella-perpendicular).

143. **Mandibular Prognathism** (The (millimeter) horizontal distance of soft-tissue Pogonion to the plane Glabella-perpendicular).

144. **Vertical lip / chin ratio** (The ratio between the measurement: Subnasale - Upper lip stomion and the measurement: Lower lip stomion - Gnathion, expressed as a percentage).

145. **Mentolabial sulcus** (The (millimeter) horizontal distance from the Mentolabial sulcus to the plane Labrale inferius - Pogonion).

Soft-Tissue Analysis:
(Holdaway)

146. **Soft-tissue facial angle** (The angle formed by the anatomic plane: Sella-Nasion and the anatomic landmark: Soft-tissue Pogonion).

147 **Nose prominence** (The (millimeter) linear distance of the tip of the nose to a line perpendicular to Frankfort horizontal and running tangent to Labrale Superius).

148. **Upper lip curl** (The (millimeter) linear distance of the Upper lip sulcus depth to a line perpendicular to Frankfort horizontal and running tangent to Labrale Superius).

149. **Sn to H line** (The (millimeter) linear distance from Subnasale to the plane soft-tissue Pogonion - Labrale Superius).

150. **Skeletal profile convexity** (The (millimeter) linear distance of A-point to the plane Nasion-Pogonion).

151. **Lower lip to H line** (The (millimeter) linear distance of Labrale inferius to the soft-tissue plane: Nasion-Pogonion).

152. **Mentolabial sulcus to H line** (The (millimeter) linear distance from the mentolabial sulcus to the soft-tissue plane: Nasion-Pogonion).

Soft-Tissue Analysis:
(Gonzales-Ulloa)

153. **Zero degree Meridian** (The (millimeter) horizontal distance from the chin to a line perpendicular to Frankfort plane through soft-tissue Nasion).

Miscellaneous:

154. **S-N** (The (millimeter) linear distance from Sella to Nasion).

155. **Y-axis length** (The (millimeter) linear distance from Sella to Gnathion).

156. **Posterior cranial base** (The (millimeter) linear distance from Sella to Basion).

157. **Basion-Nasion** (The (millimeter) linear distance from Basion to Nasion).

158. **PNS-ANS** (The (millimeter) linear distance from Posterior nasal spine to Anterior nasal spine).

159. **PNS to A-point** (The (millimeter) linear distance from Posterior nasal spine to A-point).

160. **Maxillary arch length** (The (millimeter) linear distance from the disto-buccal cusp tip of maxillary first molar to the maxillary central incisor edge).

161. **Mandibular arch length** (The (millimeter) linear distance from the disto-buccal cusp tip of mandibular first molar to the mandibular central incisal edge).

162. **Bolton to facial plane** (The angle formed by the anatomic planes: Bolton plane and the Facial plane).

163. **Nasion to soft-tissue Nasion** (The (millimeter) linear distance from Nasion to Soft-tissue Nasion).

164. **ANS-tip of nose** (The (millimeter) linear distance from Anterior nasal spine to the tip of the nose).

165. **A-point to soft-tissue A** (The (millimeter) linear distance from A-point to Soft-tissue A-point).

166. **B-point to soft-tissue B** (The (millimeter) linear distance from B-point to Soft-tissue B-point).

167. **PG to soft-tissue Pg** (The (millimeter) linear distance from Pogonion to Soft-tissue Pogonion).

168. **Nose length** (The (millimeter) linear distance from Soft-tissue Nasion to the Tip of the nose).

169. **Nose-chin length** (The (millimeter) linear distance from the Tip of the nose to Soft-tissue Pogonion).

170. **TFH** (The (millimeter) linear distance from Nasion to Menton).

171. **UFH** (The (millimeter) linear distance from Nasion to Anterior nasal spine).

172. **LFH** (The (millimeter) linear distance from Anterior nasal spine to Menton).

173. **UFH : LFH** (The ratio between UFH and LFH expressed as a percentage).

174. **SN to facial plane** (The angle formed by the anatomic planes: Sella-Nasion and the facial plane).

175. **SN to mand. plane** (The angle formed by the anatomic planes: Sella-Nasion and the mandibular plane).

176. **Cranial base angle** (The angle formed by the anatomic landmarks: Basion, Sella, Nasion).

177. **SN-FH** (The angle formed by the anatomic planes: Sella-Nasion and the Frankfort Horizontal plane).

178. **SN-Palatal plane** (The angle formed by the anatomic planes: Sella-Nasion and the Palatal plane).

179. **Soft-tissue convexity** (The angle formed by the anatomic landmarks: Soft-tissue Nasion, Tip of nose, and Soft-tissue Pogonion).

180. **SN-Lower 1** (The angle formed by the anatomic planes: Sella-Nasion and the long axis of the mandibular central incisor).

181. **Upper 1 to pal. plane** (The angle formed by the long axis of the maxillary central incisor and the Palatal plane).

182. **Lower 1 to pal. plane** (The angle formed by the long axis of the mandibular central incisor and the Palatal plane).

183. **FH-NA** (The angle formed by the anatomic planes: Frankfort Horizontal plane and the Nasion-A point plane).

184. **Upper anterior dental height** (The (millimeter) linear distance from the Maxillary incisor edge to the Palatal plane).

185. **Upper posterior dental height** (The (millimeter) linear distance from the mesio-buccal cusp tip of the Maxillary first molar to the Palatal plane).

186 **Lower anterior dental height** (The (millimeter) linear distance from the Mandibular incisor edge to the Mandibular plane).

187. **Lower posterior dental height** (The (millimeter) linear distance from the mesio-buccal cusp tip of the Mandibular first molar to the Mandibular plane).

APPENDIX D

CORRELATION COEFFICIENTS

	ABPLANE	ANB	ANGOFCON	ANSNOSTP	ANTCRBSE	ANTFACHT
ABPLANE	1.000	.9494**	.9672**	-.1674*	-.0681	-.1158
ANB	.9494**	1.0000	.9660**	-.2759**	-.1578	-.1242
ANGOFCON	.9672**	.9660**	1.0000	-.3523**	-.2557**	-.1639*
ANSNOSTP	-.1674*	-.2759**	-.3523**	1.0000	.5211**	.5784**
ANTCRBSE	-.0681	-.1578	-.2557**	.5211**	1.0000	.3856**
ANTFACHT	-.1158	-.1242	-.1639*	.5794**	.3856**	1.0000
APONTSTA	-.2218**	-.2634**	-.3205**	.6266**	.4202**	.4909**
APTNPERP	.3070**	.3774**	.4085**	-.3204**	-.1891*	.0010
ARTANGLE	.1379	.1887*	.1857*	-.1440	-.1185	.1767*
BASNASON	-.0606	-.1472	-.2224**	.5729**	.8105**	.4971**
BOLFACPL	-.4090**	-.4204**	-.4259**	.2510**	.2932**	-.0070
BPONTSTB	.0135	.0601	.0249	.3776**	.0732	.3980**
CANINREL	-.1094	-.0453	-.0110	.0461	.0938	.2466**
CORPLGTH	-.3941**	-.4219**	-.4635**	.5559**	.5289**	.6966**
CRANDEFL	.0711	.0955	.0891	-.1800*	-.1955*	.1359
CRBASAGL	-.0365	-.0703	-.0406	.1452	-.0941	-.0165
FACAXAGL	.3111**	.3635**	.3713**	-.1185	-.2607**	.4009**
FACDEPTH	-.3933**	-.3935**	-.3920**	.1190	.1292	-.0024
FACLCNVX	-.3933**	-.3935**	-.3920**	.1190	.1292	-.0024
FACLDPTH	.0128	-.0782	-.1777*	.6822**	.6068**	.7908**
FACLLGTH	-.2651**	-.2851**	-.3386**	.6223**	.5906**	.8501**
FACTAPER	.2441**	.1117	.0178	.1028	.2577**	-.3436**
FCCONAGL	.6923**	.6864**	.6607**	.0720	-.0425	.0927
FMIA	-.3725**	-.4194**	-.4248**	-.0395	.0076	-.1586
GONANGLE	-.1472	-.0401	.0501	-.2375**	-.1123	-.0321
HANGLE	.6582**	.7062**	.7099**	-.0509	-.0748	-.1148
HLINE	-.6635**	-.6828**	-.6806**	.1254	.1863*	.0679
ILSDISTN	-.5453**	-.4653**	-.3858**	-.2696**	-.2311**	-.0977
INCISROB	.4698**	.3436**	.2715**	.1752*	.2821**	-.0562
INCISROJ	.5497**	.5244**	.4492**	-.1002	.1171	-.1039
INTERINC	.0001	-.0651	-.0889	-.0441	-.0401	-.0159
INTLABGP	.0169	.0572	.0703	-.2506**	-.0779	.0287
LIPEMBOP	.1432	.1725*	.1783*	-.0165	.1753*	-.1426
LLDISTAN	-.4578**	-.3667**	-.2871**	-.2014*	-.1560	.0092
LO1FACPL	-.1403	-.3404**	-.4624**	.0699	.1472	-.1786*
LO1PALPL	-.3376**	-.4154**	-.4133**	.0628	.0217	-.0974
LOANDNHT	-.1064	-.1472	-.1235	-.4901**	-.4553**	-.7904**
LOANFCHT	-.1652*	-.1035	-.1350	.3913**	.3295**	.9088**
LOGONIAL	-.0824	.0439	.1274	-.0824	-.2680**	.4671**
LOLIPLTH	-.2383**	-.2378**	-.2666**	.4507**	.2658**	.7322**
LOLIPTHK	.0253	-.1306	-.2269**	.1168	.1468	-.1470
LOLPHLIN	-.2270**	-.3600**	-.4333**	.0165	.1197	-.2460**

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	ABPLANE	ANB	ANGOFCON	ANSNOSTP	ANTCRBSE	ANTFACHT
LOPSDNHT	-.1073	-.1061	-.0588	-.5103**	-.4768**	-.7090**
LOSTFCHT	-.1611*	-.1013	-.1233	.3098**	.3050**	.8296**
LOW1APO_	.4718**	.3159**	.2019*	-.1403	.0120	-.2591**
LOW1OCPL	.2201**	.2564**	.2411**	.1807*	.1445	.1886*
LOWER1NB	.2075*	.2933**	.3315**	.0526	.0032	.1556
LOWFHAGL	-.0450	.0798	.0998	-.0070	-.1364	.4748**
LOWR1APO	-.2511**	-.2428**	-.2553**	.2950**	.1975*	.2758**
LOWR1MPL	.3217**	.2879**	.2392**	.1474	.1977*	-.0532
LOWR1NB_	-.1967*	-.3210**	-.3580**	-.1156	-.0177	-.3201**
LOWRLIPE	-.1636*	-.3254**	-.4172**	.2984**	.2184**	.0155
MANDARC	.0146	.0820	.1235	-.2026*	-.0529	-.1034
MANDLGTH	-.3165**	-.3554**	-.4106**	.6673**	.5974**	.7930**

[illegible]	[illegible]	[illegible]	[illegible]**	- [illegible]	- [illegible]**	[illegible]**
[illegible]	[illegible]	- [illegible]	- [illegible]	- [illegible]	- [illegible]	[illegible]
[illegible]	[illegible]**	[illegible]**	[illegible]**	- [illegible]**	- [illegible]	- [illegible]
[illegible]	[illegible]**	[illegible]**	[illegible]**	- [illegible]	- [illegible]	[illegible]**
[illegible]	[illegible]**	[illegible]*	[illegible]	[illegible]**	[illegible]**	[illegible]**
[illegible]	[illegible]	- [illegible]	- [illegible]**	[illegible]**	[illegible]**	- [illegible]
[illegible]	[illegible]**	[illegible]*	- [illegible]	[illegible]**	[illegible]**	- [illegible]*
[illegible]	[illegible]	[illegible]	[illegible]*	- [illegible]*	[illegible]	- [illegible]
[illegible]	- [illegible]**	- [illegible]**	- [illegible]**	[illegible]**	[illegible]	[illegible]**
[illegible]	[illegible]	[illegible]*	[illegible]*	- [illegible]	[illegible]	- [illegible]
MXHEIGHT	[illegible]	- [illegible]	- [illegible]	[illegible]*	- 1383*	[illegible]**
[illegible]	- [illegible]**	- [illegible]**	- [illegible]**	4673**	[illegible]**	[illegible]**
NASLBANG	[illegible]	1467	[illegible]	[illegible]	[illegible]	[illegible]
NASOFACL	[illegible]**	4111**	3397**	[illegible]	1494	- [illegible]
NASOFNTL	[illegible]	- [illegible]	- 1316	- [illegible]	- [illegible]	[illegible]
NASOSNTL	5213**	[illegible]**	[illegible]**	2966**	1930	[illegible]
NOSELGTH	1538	- [illegible]	- 1748	5570**	3496**	[illegible]**
NOSEPROM	1149	- 1114	- 1366	6370**	3213**	3272**
NSCHNLTH	1413	1939	1709	4290**	3339**	[illegible]**
NSTNASON	1139	1542	1197	1907*	1459	[illegible]
OCCLPLAN	2534**	2713**	3169**	- 2393**	- 2538**	- 1515
OCCLPLXI	3355**	3118**	2391**	- 2008*	1164	- 3259**
OPGOGN	- 2130**	- 1962	- 1426	0332	- 1387	3797**
OPINCLIN	- 1421	- 1463*	- 1222	1336	- 1612	4757**
PALPLANE	.0469	- 1216	- 1154	2173**	0304	[illegible]
PFH_AFH	- 1125	- 1307	- 1498	2691**	3433**	- 1145
PNSANS	1356*	1568	0872	3321**	5395**	5014**
POGNPERP	- 2003*	- 1937*	-.1790*	-.1375	- 0594	1614
POGONNB	- 1667	.1819*	4139**	- 4335**	- 4310**	- 2307**
POGSTPOG	- 1253	0021	0125	2367**	1948*	1921*

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	ABPLANE	ANB	ANGOFCON	ANSNOSTP	ANTCRBSE	ANTFACHT
PORIONLC	- 1096	-.1508*	-.2028*	4272**	4120**	3317**
POSCRNBS	0379	- 0213	- 0991	4746**	.3919**	5938**
POSFACHT	-.0153	- 0942	- 1355*	.6120**	.5011**	7171**
RAMPOSTN	3100**	2592**	2225**	- 1125	- 0945	- 0702
RAMUSHGT	-.1915*	-.2524**	-.3133**	.5949**	5259**	5765**
SADANGLE	0271	- 0347	- 0390	2035*	- 1304	0775
SE	0449	-.0356	- 0833	.4368**	1183	4075**
SL	-.3020**	- 3386**	- 3793**	2561**	.5565**	- 0013
SLSDISTC	-.0331	0347	1232	- 3307**	- 1653*	- 1636*
SNA	3296**	4186**	4337**	-.1115	0468	- 0955
SNB	-.3667**	- 3113**	- 2698**	0892	1660*	-.0094
SNFH	.0300	.0283	.0433	- 1044	- 2042*	- 0363
SNLOWER1	-.3739**	-.4189**	- 4301**	.0015	.0960	- 1403
SNMANDPL	.0451	1436	2202**	-.1906*	-.3588**	2428**
SNOCCPLN	.2539**	.2693**	.3112**	-.2840**	-.3631**	- 0699

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	APONTSTA	APTNPERP	ARTANGLE	BASNASON	BOLFACPL	BPONTSTB
ABPLANE	-.2218**	.3070**	.1379	-.0606	-.4090**	.0135
ANB	-.2634**	3774**	.1887*	-.1472	-.4204**	.0601
ANGOFCON	-.3205**	4085**	.1857*	-.2224**	- 4259**	0249
ANSNOSTP	.6266**	-.3204**	-.1440	.5729**	2510**	.3776**
ANTCRBSE	.4202**	-.1891*	-.1185	.8105**	2932**	.0732
ANTFACHT	.4909**	.0010	.1767*	4971**	-.0070	.3980**
APONTSTA	1.0000	-.0299	-.1252	.4795**	.3210**	3548**
APTNPERP	-.0299	1.0000	.0678	-.1688*	.0280	-.1426
ARTANGLE	-.1252	.0678	1.0000	-.3050**	-.2718**	1363
BASNASON	.4795**	-.1688*	-.3050**	1.0000	.2426**	.1296

BOLFACPL	[illegible] **	[illegible]	[illegible]**	[illegible]**	[illegible]	[illegible]
BPONTSTB	.1848**	- .1426	.1461	.1294	[illegible]	[illegible]
CANCLPEL	.1885*	.1484	.0815	.0876	.1847	.2482
CDFPLGTH	.5609**	.0910	- .1122	.5113**	.5883**	.3540**
CFANDEPL	- .0801	.1327	.2611**	- .1489	- .1757**	- .0750
CFBASAGL	.0591	- .0991	- .5822**	.2574**	.0199	- .0375
FACAXAGL	- .0768	.1253	.4615**	- .1339	- .7643**	.1741*
FACDEPTH	.2219**	.1008	- .1783*	.0325	.7533**	- .0552
FACLCNVX	.2219**	.1008	- .1783*	.0325	.7533**	- .0552
FACLDPTH	.5245**	- .1358	- .0286	.7093**	.1147	.3296**
FACLLGTH	.5511**	- .0663	.1216	.5745**	.4077**	.3594**
FACTAPER	.0180	- .1081	- .3403**	.2660**	.0529	- .1422
FCCONAGL	.0695	.2055*	.1152	.0149	- .4194**	.0362
FMIA	- .0803	.0013	- .1442	- .0490	.3315**	- .2637**
GCNANGLE	- .1351	.0625	- .2410**	-.1391	- .1900*	- .1111
HANGLE	.1627*	.1325	.0898	- .0460	- .2923**	.1030
HLINE	.0609	-.0698	- .0909	.0950	.6749**	-.0067
ILSDISTN	- .0894	.4646**	-.0265	- .2510**	.3214**	.0105
INCISROB	.0046	- .0512	.0127	.2450**	-.0995	- .0904
INCISROJ	.0077	.1835*	- .0455	.1285	- .1282	- .0867
INTERINC	- .2126**	.0320	.1174	- .0841	- .1403	- .2064*
INTLABGP	-.1463	.0275	.0972	- .0666	- .0908 .	- .2639**
LIPEMBOP	.1717*	.1202	-.2725**	.2321**	.1762*	- .1799*
LLDISTAN	.0347	.4732**	.0032	- .1750*	.3074**	.0628
LO1FACPL	-.0587	- .1683*	- .1260	.0823	.0975	- .3502**
LO1PALPL	-.0281	.0481	- .1283	-.0239	.3201**	- .2264**
LOANDNHT	-.4823**	-.0939	-.0951	- .5330**	- .0909	- .4494**
LOANFCHT	.4291**	.1003	.2167**	.3994**	.0376	.4139**
LOGONIAL	-.0279	.0858	.3019**	- .2075*	- .3993**	.2009*
LOLIPLTH	.4196**	.1647*	.0756	.3526**	.2001*	.4264**
LOLIPTHK	-.0259	- .0941	- .2020*	.1399	.0823	-.3095**
LOLPHLIN	-.0849	- .2078*	-.1915*	.0666	.2150**	- .3479**

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	APONTSTA	APTNPERP	ARTANGLE	BASNASON	BOLFACPL	BPONTSTB
LOPSDNHT	- .4445**	-.0914	- .0113	-.4997**	-.1493	-.4063**
LOSTFCHT	.4559**	.2464**	.1685*	.3956**	.1515	.3334**
LOW1APO_	-.2726**	.1030	- .0010	- .0294	-.2057*	-.3506**
LOW1OCPL	.2384**	-.0257	- .0415	.2488**	-.0005	.2791**
LOWER1NB	.1344	.0829	.0802	.0276	-.0050	.2599**
LOWFHAGL	-.0100	-.1714*	.3922**	- .0975	-.4915**	.3492**
LOWR1APO	.3522**	-.1669*	-.0239	.1930*	.2447**	.2716**
LOWR1MPL	.1513	-.0217	-.1401	.2148**	.0406	.1386
LOWR1NB_	-.2055*	-.0802	-.1254	-.0664	.0657	-.4656**
LOWRLIPE	.0380	-.0607	- .2234**	.2244**	.2235**	-.2003*
MANDARC	-.1399	-.1491	.1009	- .1570	- .2492**	-.0532
MANDLGTH	.5779**	-.0732	-.0448	.6150**	.5224**	.3518**
MANPLAGL	-.1489	.0303	.3921**	-.2420**	-.5001**	.1530
MANPROGN	.1900*	.8216**	-.0292	-.0549	.2389**	-.1316
MAXDEPTH	-.0751	.4584**	.0078	- .1676*	.3119**	-.0145
MAXPROGN	.2510**	.8570**	.0565	.0082	-.0242	- .0693
MIDFCLTH	.4220**	.0894	- .2442**	.6903**	.4119**	.1821*
MLSHLINE	.2380**	-.2078*	-.1829*	.3332**	.2004*	-.3544**
MLSULCUS	.4156**	-.0622	-.0402	.3836**	.0893	-.0537
MNARCLTH	.0167	.0403	-.0141	.0113	.0711	.0765
MOLRRELN	.2465**	-.0999	.0520	.0466	.3601**	.1043
MXARCLTH	.1404	.0851	.0018	.0801	.1757*	.0501
MXHEIGHT	.0630	-.0911	.2468**	-.0545	-.4529**	.1139
MXMNDIFF	.4440**	-.1895*	.1639*	.2470**	.3707**	.3403**
NASLBANG	-.1110	-.0338	.0175	.0403	-.2105**	-.1127
NASOFACL	.2086*	.2053*	-.0968	.0817	.0604	.1230
NASOFNTL	-.2196**	-.0813	.1330	-.1430	-.2573**	-.0990
NASOMNTL	.2145**	.1912*	-.0630	.1400	-.0749	.1377
NOSELGTH	.4103**	-.0407	.0405	.4575**	-.0299	.2554**
NOSEPROM	-.0058	-.5131**	-.0547	.3506**	-.0325	.1774*
NSCHNLTH	.4155**	.1538	.1518	.4118**	.0297	.3559**
NSTNASON	.1448	.1772*	.0257	.1090	.2154**	.0830

[illegible]	- [illegible]**	[illegible]	[illegible]**	- [illegible]**	- [illegible]**	- [illegible]
[illegible]	- [illegible]**	[illegible]	- [illegible]*	- [illegible]	- [illegible]**	- [illegible]*
OPOION	.1031	- [illegible]	.3878*	.0351	- .4016	[illegible]**
OPINCLIN	.2128*	- [illegible]	.3084**	.[illegible]	- .2447	.3464**
PALPLANE	.1468	.0419	.0003	.0509	- .0112	.1683
PFH_AFH	.2063**	- .0896	- .2317**	.3167**	.4388**	.2469
PNSANS	.3568**	.1427	- .2083	.5934**	.2854**	.[illegible]*
POGNPERP	.1518	.[illegible]**	- .0577	- .0628	.3049**	- .1918*
POGONNB	- .3084**	.2491**	.0843	- .3645**	- .1157	- .1110
POGSTPOG	.4154**	- .[illegible]**	- .0827	.2493**	.1604*	.4173**

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

. is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	APONTSTA	APTNPERP	ARTANGLE	BASNASON	BOLFACPL	BPONTSTB
PORIONLC	.2952**	- .2082*	- .0178	.4364**	.3066**	.1790*
POSCRNBS	.3919**	-.0290	-.1059	.5064**	.0891	.1756*
POSFACHT	.5164**	- .0087	- .0150	.5603**	.2720**	.3420**
RAMPOSTN	-.0344	.2365**	.0197	-.0027	- .3206**	- .0721
RAMUSHGT	.5153**	- .0827	- .2430**	.5799**	.4401**	.3148**
SADANGLE	.0982	-.1056	- .6820**	.2142**	-.1057	.0299
SE	.3030**	- .0918	-.6012**	.4489**	- .0350	.1240
SL	.2904**	-.0017	-.1062	.3421**	.8178**	-.0080
SLSDISTC	.0748	.3655**	.0445	- .1824*	.1147	.0435
SNA	-.0122	.3897**	.1307	-.0672	.4685**	.0710
SNB	.1842*	.1250	-.0062	.0391	.8061**	.0283
SNFH	-.0763	.0181	- .1772*	-.1171	- .2828**	-.1221
SNLOWER1	-.0191	- .0054	-.0726	-.0030	.4311**	-.2101**
SNMANDPL	- .1701*	.0348	.2685**	-.2719**	-.5820**	.0800
SNOCCPLN	-.3422**	.0492	.1805*	-.3846**	-.6890**	- .1002

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

. is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	CANINREL	CORPLGTH	CRANDEFL	CRBASAGL	FACAXAGL	FACDEPTH
ABPLANE	-.1094	- .3941**	.0711	-.0365	.3111**	- .3933**
ANB	-.0453	-.4219**	.0955	-.0703	.3635**	-.3935**
ANGOFCON	-.0110	- .4635**	.0891	-.0406	.3713**	-.3920**
ANSNOSTP	.0461	.5559**	-.1800*	.1452	-.1185	.1190
ANTCRBSE	.0938	.5289**	-.1955*	-.0941	-.2607**	.1292
ANTFACHT	.2466**	.6966**	.1359	- .0165	.4009**	- .0024
APONTSTA	.1885*	.5629**	-.0501	.0591	-.0768	.2219**
APTNPERP	.1484	.0920	.1327	- .0991	.1253	.1008
ARTANGLE	.0305	-.0122	.2611**	-.5822**	.4615**	-.1783*
BASNASON	.0576	.5113**	-.1489	.2574**	-.1339	.0325
BOLFACPL	.1517	.5883**	-.3757**	.0199	-.7643**	.7533**
BPONTSTB	.1162	.2543**	-.0752	-.0075	.1741*	- .0552
CANINREL	1.0000	.2435**	-.0545	- .0021	.0223	.0829
CORPLGTH	.2435**	1.0000	-.1293	-.0867	-.2066*	.4825**
CRANDEFL	-.0545	-.1293	1.0000	-.1807*	.5109**	.1964*
CRBASAGL	-.0021	-.0867	-.1807*	1.0000	-.1288	- .0547
FACAXAGL	.0223	-.2066*	.5109**	-.1288	1.0000	-.5981**
FACDEPTH	.0829	.4825**	.1964*	-.0547	-.5981**	1.0000
FACLCNVX	.0829	.4825**	.1964*	-.0547	-.5981**	1.0000**
FACLDPTH	.1092	.5972**	-.0241	.0277	.1280	.0130
FACLLGTH	.2510**	.8796**	-.0632	-.2343**	-.0261	.3250**
FACTAPER	-.2162**	-.2606**	-.1714*	.0842	-.3246**	-.0610
FCCONAGL	-.0738	-.2404**	.1554	.0282	.3813**	- .3511**
FMIA	-.0407	.1540	.1475	-.0389	-.3777**	.4984**
GONANGLE	.1426	-.0878	.1200	.0792	.1652*	- .0854
HANGLE	-.0617	-.3308**	.0571	.0099	.2382**	-.2991**
HLINE	.1011	.5242**	-.2110**	-.2313**	-.5523**	.6097**
ILSDISTN	.1452	.2532**	-.0254	-.0662	-.1964*	.3472**
INCISROB	-.1748*	-.1114	-.0819	-.0736	-.0652	-.1617*
INCISROJ	.0199	-.1963*	.0443	-.0198	.0648	-.1605*

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LOPEMBCP	.1245	.0[illegible]	- .1066	.0366	- .1[illegible]	.0[illegible]
LOLSTAN	.1482	.1488**	- .1461	- .0781	- .1243	.1461**
LOLFACPL	- .1818*	.0462	.0846	- .1435	- .2822**	.1593
LOLPALPL	.0092	.1969*	- .0840	- .0349	- .3689**	.3529**
LOANDNHT	- .2103**	- .5619**	- .0078	.0442	- .2636**	.1116
LOANFCHT	.2343**	.6888**	.1284	- .1109	.3988**	.0197
LOGONIAL	.2227**	.0775	.3279**	- .0464	.6535**	- .2329**
LOLIPLTH	.1375	.7014**	.0795	- .0308	.1551	.2143**
LOLIPTHK	- .0739	- .0761	.1156	.0795	- .2472**	.1191
LOLPHLIN	- .0391	- .0642	- .0559	.0347	- .3669**	.1971*

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	CANINREL	CORPLGTH	CRANDEFL	CRBASAGL	FACAXAGL	FACDEPTH
LOPSDNHT	- .1735*	- .5284**	.0393	.0792	- .1433	- .0450
LOSTFCHT	.2879**	.6785**	.1414	-.1113	.2973**	.1349
LOW1APO_	- .1997*	- .2707**	.1343	-.0687	.0005	- .1133
LOW1OCPL	.0506	.0305	- .0684	.1500	.1085	- .1012
LOWER1NB	.1084	.0411	- .0599	.0218	.1403	- .0608
LOWFHAGL	.0946	-.0451	.3075**	- .1211	.6987**	-.3766**
LOWR1APO	.1019	.3315**	-.1096	.0325	- .0745	.1651*
LOWR1MPL	-.0527	-.0908	-.1537	.0629	-.0907	-.0765
LOWR1NB_	-.1558	-.0982	.0747	-.0319	-.2601**	.1551
LOWRLIPE	-.0301	.1732*	- .0358	.0904	-.3074**	.2337**
MANDARC	.1108	- .1869*	.1112	-.0636	.1956*	- .1930*
MANDLGTH	.2426**	.9118**	-.1484	-.0424	-.1679*	.4069**
MANPLAGL	.1295	-.0748	.0249	-.0376	.6330**	- .5539**
MANPROGN	.1877*	.3395**	.1135	-.0660	-.0441	.3036**
MAXDEPTH	.0752	.0376	.2667**	-.0958	- .2088*	.5688**
MAXPROGN	.1595	.2343**	.2025*	- .0503	.2162**	.0722
MIDFCLTH	.1345	.6062**	-.2468**	.0290	-.2563**	.2430**
MLSHLINE	- .0328	.0698	-.0323	.0306	- .2645**	.1390
MLSULCUS	.0035	.1618*	-.0104	- .0898	-.0335	.0175
MNARCLTH	.0635	-.0373	-.0829	-.1246	-.0489	-.0030
MOLRRELN	.2931**	.5238**	-.0541	-.1843*	-.1309	.3370**
MXARCLTH	.0666	.1132	- .0647	-.2080*	- .0848	.0960
MXHEIGHT	.0209	.0680	.3403**	.0940	.6470**	- .2735**
MXMNDIFF	.2254**	.7542**	.0161	- .0893	- .0031	.3614**
NASLBANG	-.0762	-.0761	.1671*	- .0071	.1503	-.0679
NASOFACL	-.0291	- .0020	-.1375	.0780	- .0449	-.0126
NASOFNTL	.0146	-.1473	.1551	-.0802	.2485**	-.2118**
NASOMNTL	-.0788	-.0322	- .1109	.1028	.0524	- .1371
NOSELGTH	.1399	.4912**	.0332	.0734	.2389**	- .0590
NOSEPROM	-.1021	.1791*	-.1605*	.1218	- .0305	- .1024
NSCHNLTH	.2405**	.5918**	.0716	-.0471	.3396**	.0094
NSTNASON	.1028	.2220**	-.0406	- .1191	-.0634	.1367
OCCLPLAN	-.0160	-.3106**	-.1334	-.1873*	.4519**	- .6678**
OCCLPLXI	-.1358	-.4345**	.0029	-.0614	-.0316	-.1837*
OPGOGN	.1637*	.2209**	.1626*	.1210	.3110**	- .0086
OPINCLIN	.1605*	.2335**	.1920*	.0151	.4256**	-.1026
PALPLANE	.1453	.1039	-.4168**	.0048	-.0050	-.2753**
PFH_AFH	-.0450	.2041*	-.2135**	-.2753**	- .4256**	.2989**
PNSANS	.1652*	.5574**	-.1209	-.0040	-.1056	.1320*
POGNPERP	.1594	.3642**	.0721	-.0800	-.1231	.3562**
POGONNB	.1285	-.2868**	.0195	.0490	.1196	- .0795
POGSTPOG	.1610*	.1358	-.0674	.0630	-.0548	.0833

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	CANINREL	CORPLGTH	CRANDEFL	CRBASAGL	FACAXAGL	FACDEPTH
PORIONLC	.1182	.4053**	-.3022**	.0044	-.3345**	.1358

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
RAMPDISTN	- .1881	- .1004	- .2833*	.0826	.3881**	- .5180**
RAMPSHGT	.1891	- .1109**	- .1766*	.073	- .1436**	.1164**
SADANGLE	- .1690	- .1871	- .1911	.6624**	- .1148	- .1425
SE	- .0203	.0389*	- .0547	.5380**	.0694	- .0987
SL	.0724	.5714**	- .3511**	- .3402**	- .7325**	.6424**
SLSDISTC	.0397	- .0114	- .0362	- .0633	- .0128	.0569
SNA	.0824	.1976*	- .2041*	- .4864**	- .3256**	.2766**
SNB	.1211	.5216**	- .2854**	- .4239**	- .6240**	.6893**
SNFH	- .0261	- .2871**	.6332**	.5382**	.2212**	.1770*
SNLOWER1	-.0301	.2409**	- .0988	-.2442**	- .4521**	.4180**
SNMANDPL	.1043	- .1789*	.3197**	.2197**	.6717**	- .4148**
SNOCCPLN	- .0302	- .4326**	.2653**	.1583	.5542**	- .5104**

* - Signif. LE .05 ** - Signif. LE .01 2-tailed)

' . ' is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	FACLCNVX	FACLDPTH	FACLLGTH	FACTAPER	FCCONAGL	FMIA
ABPLANE	- .3933**	.0129	-.2651**	.2441**	.6923**	-.3725**
ANB	- .3935**	- .0782	-.2851**	.1117	.6864**	- .4194**
ANGOFCON	-.3920**	- .1777*	-.3386**	.0178	.6607**	- .4248**
ANSNOSTP	.1190	.6822**	.6223**	.1028	.0720	-.0395
ANTCRBSE	.1292	.6068**	.5906**	.2577**	- .0425	.0076
ANTFACHT	-.0024	.7908**	.8501**	-.3436**	.0927	-.1586
APONTSTA	.2219**	.5245**	.5511**	.0180	.0695	-.0503
APTNPERP	.1008	-.1358	-.0663	- .1081	.2055*	.0013
ARTANGLE	- .1783*	- .0286	.1216	-.3403**	.1152	- .1442
BASNASON	.0325	.7093**	.5745**	.2660**	.0149	-.0490
BOLFACPL	.7533**	.1147	.4077**	.0529	-.4194**	.3315**
BPONTSTB	- .0552	.3296**	.3694**	-.1422	.0362	- .2637**
CANINREL	.0829	.1392	.2510**	-.2162**	-.0738	- .2407
CORPLGTH	.4825**	.5972**	.8796**	-.2606**	-.2404**	.1540
CRANDEFL	.1964*	- .0241	-.0632	- .1714*	.1554	.1475
CRBASAGL	-.0547	.0277	-.2343**	.0842	.0282	- .0389
FACAXAGL	-.5981**	.1280	- .0261	-.3246**	.3813**	- .3777**
FACDEPTH	1.0000**	.0130	.3250**	-.0610	-.3511**	.4984**
FACLCNVX	1.0000	.0130	.3250**	-.0610	- .3511**	.4984**
FACLDPTH	.0130	1.0000	.7634**	.2740**	.0877	-.1671*
FACLLGTH	.3250**	.7634**	1.0000	-.2296**	-.1174	.0182
FACTAPER	-.0610	.2740**	-.2296**	1.0000	.0501	-.0367
FCCONAGL	-.3511**	.0877	-.1174	.0501	1.0000	-.3367**
FMIA	.4984**	-.1671*	.0182	-.0367	- .3367**	1.0000
GONANGLE	-.0854	- .4761**	-.1306	-.6402**	.0191	.0638
HANGLE	- .2991**	-.0506	-.2315**	.1043	.7207**	-.4042**
HLINE	.6097**	.0773	.4274**	-.0594	-.7355**	.4576**
ILSDISTN	.3472**	- .2833**	-.0038	-.2465**	-.6494**	.3112**
INCISROB	-.1617*	.2296**	-.0205	.4068**	.3524**	.0808
INCISROJ	-.1605*	.0116	-.1237	.1866*	.3403**	.0074
INTERINC	-.0686	-.0265	-.0458	.0070	.0105	.6272**
INTLABGP	-.0719	-.1064	-.0301	-.2125**	.0200	-.0103
LIPEMBOP	.0296	.0224	-.0723	.2111**	.0505	-.0858
LLDISTAN	.3161**	-.1908*	.0869	-.2749**	-.5954**	.1549
LO1FACPL	.1583	.0219	-.0705	.3208**	-.2441**	.7019**
LO1PALPL	.3529**	- .1121	.0663	-.0375	-.2925**	.8865**
LOANDNHT	.0106	-.7218**	-.7276**	.1739*	-.2007*	.2562**
LOANFCHT	.0197	.6345**	.7953**	-.4386**	-.0004	-.1479
LOGONIAL	-.2329**	- .1184	.1776*	-.8515**	.1442	-.1575
LOLIPLTH	.2143**	.5562**	.7015**	- .2635**	-.1348	.0174
LOLIPTHK	.1151	.0811	-.0791	.3679**	-.0056	.3929**
LOLPHLIN	.1971*	-.0136	-.1032	.3472**	-.3882**	.4555**

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

' . ' is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	FACLCNVX	FACLDPTH	FACLLGTH	FACTAPER	FCCONAGL	FMIA

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LOWLDCPL	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LOWERLNB	- .4618	.4415	.2085	- .0397	.0000	- .0483**
LOWFHAGL	- .0766**	.1907	.0776*	- .5583**	.0779	- .0442**
LOWRLAPO	.1651*	.0963**	.0393**	- .1076	- .1583	- .0661**
LOWPLMPL	- .0765	.0016**	- .1133	.5974**	.1932*	- .0436**
LOWRLNB_	.1854	- .1841*	- .0038**	.0219**	- .0631**	.0397**
LOWPLIPE	.0337**	.1912*	.0200	.0746**	- .0066**	.4526**
MANDARC	- .1931*	- .1551**	- .1396	- .4099**	.0287	- .1429
MANDLGTH	.4069**	.7564**	.9527**	- .1826	- .0787*	.0615
MANPLAGL	- .5539**	- .0366**	- .0053	- .7972**	.0718*	- .0726**
MANPROGN	.0036**	- .0084	.0181	- .1233	- .1494	.2491**
MAXDEPTH	.5088**	- .1446	.0053	- .0530	.2891**	.0757
MAXPROGN	.0722	.0853	.1130	- .1238	.4292**	.0267
MIDFCLTH	.2430**	.7239**	.6598**	.2495**	.1805*	- .0927
MLSHLINE	.1390	.2772**	.1050	.4285**	- .1397*	.2051*
MLSULCUS	.0175	.3624**	.2507**	.2596**	.1594	- .1780*
MNARCLTH	- .0030	- .0934	- .0675	.0405	.0375	- .2548**
MOLRRELN	.3370**	.1393	.4878**	- .3593**	- .4363**	.1718*
MXARCLTH	.0960	- .0332	.1068	- .0534	.0398	- .1182
MXHEIGHT	- .2735**	.2780**	.1621*	- .2924**	.1544	- .0994
MXMNDIFF	.3614**	.4235**	.7639**	- .4532**	- .4205**	.1739*
NASLBANG	-.0679	.1152	.0205	.0459	.4694**	.0986
NASOFACL	- .0126	.0426	.0079	.0984	.4336**	-.1404
NASOFNTL	- .2113**	.0060	- .0854	- .0431	.0353	.0082
NASOMITL	- .1371	.1460	.0166	.1503	.6940**	-.2034*
NOSELGTH	- .0590	.6532**	.5904**	- .1096	.3085**	- .1397
NOSEPROM	- .1024	.4286**	.3301**	.1004	.1745*	-.0621
NSCHNLTH	.0094	.6106**	.7136**	-.3277**	.2122**	- .2828**
NSTNASON	.1367	.2556**	.2172**	.1654*	- .0638	.0616
OCCLPLAN	-.6678**	- .2369**	-.2616**	-.2404**	.2418**	- .2985**
OCCLPLXI	- .1837*	-.0910	-.3425**	.3946**	.1875*	-.0691
OPGOGN	-.0086	-.0755	.2493**	-.7308**	- .0400	- .0498
OPINCLIN	- .1026	.1254	.3290**	-.5397**	.0035	- .1649*
PALPLANE	-.2753**	.1074	.1066	-.0079	.0727	- .1799*
PFH_AFH	.2999**	.4621**	.3007**	.7126**	-.1102	.0377
PNSANS	.1820*	.6050**	.5142**	.0910	.2301**	- .0574
POGNPERP	.3562**	-.0606	.1058	-.0980	-.1915*	.0807**
POGONNB	- .0795	-.4584**	- .3070**	-.3537**	.0628	- .1149
POGSTPOG	.0833	.2309**	.2520**	.0990	- .1734*	- .1627

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

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- - Correlation Coefficients - -

	FACLCNVX	FACLDPTH	FACLLGTH	FACTAPER	FCCONAGL	FMIA
PORIONLC	.1358	.4422**	.4889**	.0833	- .0503	- .0533
POSCRNBS	.0202	.7810**	.6415**	.2403**	.1056	- .0660
POSFACHT	.1803*	.9170**	.7632**	.2780**	.0267	- .1213
RAMPOSTN	-.5482**	-.0073	-.2595**	.1638*	.2026*	- .2441**
RAMUSHGT	.3164**	.7812**	.7259**	.3031**	-.1265	- .0218
SADANGLE	-.1425	.2061*	-.1887*	.2279**	.0649	- .0838
SE	-.0987	.6140**	.2205**	.3165**	.1133	-.1026
SL	.6424**	.2032*	.5070**	.1911*	-.3568**	.3120**
SLSDISTC	.0569	- .2585**	- .1308	-.1487	-.4021**	- .0851
SNA	.3766**	-.0290	.2336**	.0166	.1430	-.0191
SNB	.6893**	.0266	.4559**	-.0648	-.3666**	.2944**
SNFH	.1770*	-.1420	-.3301**	-.0939	.1216	.1244
SNLOWER1	.4180**	- .1082	.1443	-.0001	-.3733**	.9254**
SNMANDPL	-.4148**	- .2787**	-.1501	-.7582**	.2106**	-.1847*
SNOCCPLN	-.5104**	-.3052**	-.4438**	-.2784**	.2981**	-.1912*

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	[illegible]	[illegible]	[illegible]	ILSDISTN	[illegible]	[illegible]
ABPLANE	- .1472	.6842**	- .6435**	- .5481**	.4699**	.5497**
ACNB	- .1401	.7162**	- .6803**	- .4653**	.3436**	.5244**
ANGOFCON	.0801	.7199**	- .6816**	- .3858**	.2718**	.4492**
ANSNOSTP	- .1375**	- .019	.1254	- .2696**	.1782*	- .2224
ANTCPBSE	- .1123	- .1748	.1363*	- .2111**	.2421**	.2171
ANTFACHT	- .0301	- .1148	.1479	- .1[illegible]	.0862	- .1139
APCNTSTA	- .1301	.1627*	.1619	- .1884	.1046	.1[illegible]
APTNPERP	.0605	.1025	- .1698	.4646**	- .0812	.1835*
ARTANGLE	- .2410**	.1698	- .1909	- .1265	.1127	- .0455
BASNASCN	- .1391	- .1463	.1953	- .2810**	.2481**	.1285
BCLFACPL	- .1900*	- .2923**	.6749**	.3214**	- .1995	- .1282
BPCNTSTB	- .1111	.1033	- .1067	.1135	- .0904	- .0867
CANINREL	.1426	- .0617	.1011	.1452	- .1748*	.1199
CCRPLGTH	- .0878	- .3308**	.5242**	.2532**	- .1114	- .1963*
CFANDEFL	.1200	.0571	-.2110**	-.0284	- .0819	.0443
CPBASAGL	.0792	.0399	- .2313**	- .0662	- .0736	- .0198
FACAXAGL	.1652*	.2382**	- .3523**	- .1964*	- .0652	.0648
FACDEPTH	- .0854	- .2991**	.5097**	.3472**	- .1617*	- .1605*
FACLCNVX	- .0854	- .2991**	.5097**	.3472**	- .1617*	- .1605*
FACLDPTH	-.4761**	- .0506	.0773	- .2833**	.2296**	.1116
FACLLGTH	- .1306	- .2315**	.4274**	-.0038	- .0205	- .1237
FACTAPER	-.6402**	.1043	- .0594	-.2465**	.4068**	.1866*
FCCONAGL	.0191	.7207**	-.7355**	- .6494**	.3524**	.3403**
FMIA	.0638	- .4042**	.4576**	.3112**	.0808	.0074
GONANGLE	1.0000	- .0257	-.0966	.1262	- .3076**	.0091
HANGLE	- .0257	1.0000	- .8123**	-.5375**	.3122**	.4228**
HLINE	- .0966	-.8123**	1.0000	.5526**	- .2373**	-.3620**
ILSDISTN	.1262	-.5375**	.5526**	1.0000	- .4647**	-.3285**
INCISROB	- .3076**	.3122**	-.2373**	- .4647**	1.0000	.3181**
INCISROJ	.0091	.4228**	-.3620**	-.3285**	.3181**	1.0000
INTERINC	- .0348	- .2057*	.0896	.0142	.3745**	- .1814*
INTLABGP	.2036*	-.0327	-.0661	- .0551	- .1602	.2078*
LIPEMBOP	.0063	.2663**	- .1063	- .1315	.0823	.2941**
LLDISTAN	.1256	-.3862**	.4491**	.9130**	- .4086**	- .3075**
LO1FACPL	-.2050*	-.3811**	.2836**	.0361	.2512**	.1034
LO1PALPL	.0191	- .4040**	.4532**	.3172**	.1050	- .0713
LOANDNHT	.0655	- .1728*	.0592	.1903*	-.2235**	- .0974
LOANFCHT	.0881	- .1528	.1309	.0551	- .1779*	- .0744
LOGONIAL	.6717**	-.0045	-.1950*	.0577	- .3542**	-.1342
LOLIPLTH	-.0548	-.2878**	.3105**	.2536**	- .0985	- .2292**
LOLIPTHK	-.1908*	-.2884**	.2235**	- .1911*	.2246**	.1572
LOLPHLIN	-.1965*	-.5202**	.4546**	.0366	.0702	.0211

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	GONANGLE	HANGLE	HLINE	ILSDISTN	INCISROB	INCISROJ
LOPSDNHT	.2897**	-.0521	-.0500	.1721*	-.1446	- .0071
LOSTFCHT	.0389	-.1739*	.2153**	.1966	-.1681*	-.0455
LOW1APO_	-.1856*	.0872	- .1825*	-.2561**	.4957**	.4474**
LOW1OCPL	-.1913*	.3207**	-.2423**	-.2369**	-.1143	.0311
LOWER1NB	-.0664	.3305**	-.2259**	-.1444	-.2081*	- .1051
LOWFHAGL	.3613**	.0022	- .2296**	-.1133	-.2877**	- .0636
LOWR1APO	-.1404	-.0734	.1616*	.0381	-.3393**	-.3342**
LOWR1MPL	-.4677**	.3094**	-.2020*	-.2859**	.0930	.0337
LOWR1NB_	-.0748	-.3503**	.2602**	.1434	.1941*	.0831
LOWRLIPE	-.1978*	-.5176**	.4452**	.0506	.1368	- .0068
MANDARC	.5365**	.1340	-.2158**	-.0947	- .1609*	.0516
MANDLGTH	-.1724*	-.2778**	.4638**	.0461	-.0605	-.1588
MANPLAGL	.5856**	.0945	-.3198**	-.0036	-.2420**	-.0598
MANPROGN	.0411	- .2840**	.3268**	.7154**	-.1942*	- .0703
MAXDEPTH	-.0233	.3591**	-.0457	-.0171	.0728	.2580**
MAXPROGN	.0571	.1316	-.1113	.2688**	.0076	.1191
MIDFCLTH	-.2794**	.1593	.0960	-.2702**	.3088**	.2001*
MLSHLINE	-.2829**	-.2178**	.2509**	-.3019**	.3173**	.1742*
MLSULCUS	-.1896*	.2642**	-.0947	-.4381**	.3832**	.2566**

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	- [illegible]	- .1428	[illegible]	[illegible]
[illegible]	[illegible]	- [illegible]	- .2223**	- [illegible]	- [illegible]	- [illegible]
[illegible]	[illegible]	- .3443**	.3311**	.3168**	- .3727**	- [illegible]**
NASLBANG	[illegible]	- [illegible]	- .1168	- .3642**	.2144**	- [illegible]
NASOFACL	- [illegible]	[illegible]**	- .2555**	- .2322**	.2234**	.2554**
NASOFNTL	.1235	- .2714**	- .1497	- .0375	- .0148	- .1434
NASOMNTL	- .1792	.3343**	- .4452**	- .4306**	.3606**	.2792**
NOSELGTH	- .1166	.0523	- .1739	- .2325**	.1243	- .0517
NOSEPROM	- .1097	- .1937*	.0369	- .4721**	.2219*	- .1792*
NSCHNLTH	.0412	.1252	- .0166	- .1145	- .0298	- [illegible]
NSTNASON	- .2540**	- .2314**	.1731*	.0269	.1072	.1432
OCCLPLAN	.2166**	.1364	- .3595**	- .1216	.0545	- .0577
OCCLPLKI	- .0509	.1631*	- .2285**	- .2010*	.2609**	.1554
OPGOGN	.4965**	- .1232	- .0293	.1338	- .3646**	- .0154
OPINCLIN	.2450**	.0118	- .0660	.0259	- .3130**	- .0356
PALPLANE	-.0942	- .0268	.0232	.0295	.0541	- .1767*
PFH_AFH	- .5330**	- .0655	.3690**	- .0999	.2723**	.0225
PNSANS	-.1792*	.0303	.1001	-.2278**	.2557**	.1853*
POGNPERP	.0220	- .2945**	.3504**	.7445**	- .2086*	- .0795
POGONNB	.3701**	.2230**	- .1715*	.2124**	-.2446**	- .0976
POGSTPOG	-.1551	-.0040	.1951*	- .1239	.0938	.0483

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	GONANGLE	HANGLE	HLINE	ILSDISTN	INCISROB	INCISROJ
PORIONLC	-.2586**	- .0819	.2637**	-.1736*	.2056*	-.0609
POSCRNBS	-.2925**	-.0096	.1348	-.2037*	.2198**	.1152
POSFACHT	- .5078**	-.1031	.2221**	-.1411	.1699*	- .0599
RAMPOSTN	-.0850	.1961*	- .3483**	.0228	.0631	.1455
RAMUSHGT	-.3692**	-.2126**	.3949**	-.0444	.0639	-.1339
SADANGLE	- .0239	.0300	- .2765**	-.1191	-.0125	- .0084
SE	-.1865*	.0139	- .1409	-.2081*	.1083	.0652
SL	- .2312**	- .2515**	.6964**	.2121**	.0973	- .0474
SLSDISTC	.1064	.0886	.0222	.5407**	-.2598**	.0920
SNA	-.1650*	.2784**	.2022*	.0213	.1570	.2198**
SNB	-.1425	- .2376**	.7230**	.3723**	-.0929	- .1632*
SNFH	.2093*	.0519	-.3502**	-.0509	-.1365	.0074
SNLOWER1	-.0175	-.4126**	.5789**	.3220**	.1312	.0148
SNMANDPL	.6229**	.1088	- .4513**	-.0277	- .2807**	- .0503
SNOCCPLN	.3281**	.1578	-.5469**	-.1449	-.0316	- .0577

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	INTERINC	INTLABGP	LIPEMBOP	LLDISTAN	LO1FACPL	LO1PALPL
ABPLANE	.0001	.0169	.1432	-.4578**	- .1403	- .3376**
ANB	-.0651	.0572	.1725*	-.3667**	-.3404**	-.4154**
ANGOFCON	-.0889	.0703	.1783*	-.2871**	-.4624**	- .4133**
ANSNOSTP	-.0441	-.2506**	-.0165	-.2014*	.0699	.0628
ANTCRBSE	-.0401	-.0779	.1753*	-.1560	.1472	.0217
ANTFACHT	-.0159	.0287	-.1426	.0092	-.1786*	-.0974
APONTSTA	-.2126**	-.1463	.1717*	.0347	-.0587	- .0281
APTNPERP	.0320	.0275	.1202	.4732**	-.1683*	.0481
ARTANGLE	.1174	.0972	-.2725**	.0032	-.1260	-.1283
BASNASON	-.0841	-.0666	.2321**	-.1750*	.0823	-.0239
BOLFACPL	-.1403	-.0908	.1762*	.3074**	.0975	.3201**
BPONTSTB	-.2064*	-.2639**	-.1799*	.0628	-.3502**	-.2264**
CANINREL	-.0400	.1637*	.1245	.1482	-.1818*	.0292
CORPLGTH	-.0299	-.1061	-.0677	.3168**	.0262	.1968*
CRANDEFL	.0790	.1020	-.1366	-.0161	.0546	-.0540
CRBASAGL	-.1245	-.0495	.1366	-.0780	-.0435	-.0349
FACAXAGL	.0593	.1473	-.2035*	-.1243	-.2622**	-.3689**

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
FACLEPTH	- .065	- .0764	.0024	- .0918*	.0139	- .0[illegible]
FACLLGTH	- .459	- .0811	- .703	.869	- .705	.093
FACTAPER	.0772	- .1108**	.2122**	- .2749**	.3208**	- .175
FCCONAGL	.0115	.0011	.016	- .3854**	- .1441**	- .2128**
FMIA	.6272**	- .0109	- .488	.1649	.7019**	.3765**
GCHANGLE	- .1349	.0036*	.0063	.1256	- .2050*	.1191
HANGLE	- .2157*	- .0107	.2683**	- .3962**	- .3811**	- .4140**
HLINE	.1896	- .1681	- .1163	.4491**	.2836**	.4832**
ILEDISTN	.0142	- .1841	- .1345	.9130**	.0364	.3172**
INCISRCB	.3745**	- .1612	.1823	- .4196**	.2512**	.1253
INCISPOJ	- .1814*	.0078*	.2941**	- .3175**	.0034	- .2713
INTERINC	1.0000	- .0894	- .2308**	- .0975	.1229**	.6572**
INTLABGP	- .0894	1.0000	.1106	- .0687	- .0715	- .0561
LIPEMBOP	- .2308**	.1106	1.0000	- .0845	- .1334	- .0876
LLDISTAN	- .0975	- .0687	- .0845	1.0000	- .1351	.1675*
LO1FACPL	.6129**	- .0715	- .1334	- .1351	1.0000	.6740**
LO1PALPL	.6572**	- .0561	- .0876	.1675*	.6740**	1.0000
LOANDNHT	.1634*	.0746	- .1441	.0193	.4033**	.2477**
LOANFCHT	- .0792	.0910	- .1389	.1505	- .2604**	- .1827*
LOGONIAL	.0074	.2199**	- .2455**	.1148	- .3953**	- .1651
LOLIPLTH	.0099	- .3638**	- .3129**	.3412**	- .0990	.0534
LOLIPTHK	.3464**	- .0711	.0512	- .4726**	.6466**	.3882**
LOLPHLIN	.2895**	.0083	.0583	- .2397**	.6664**	.4241**

* - Signif. LE .05 ** - Signif. LE .01 2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	INTERINC	INTLABGP	LIPEMBOP	LLDISTAN	LO1FACPL	LO1PALPL
LOPSDNHT	.1233	.1607*	- .0803	.0649	.2493**	.2107**
LOSTFCHT	-.0918	.0949	-.0776	.2672**	-.2411**	-.1099
LOW1APO_	.6213**	- .0291	- .0216	- .3642**	.7704**	.4544**
LOW1OCPL	-.7803**	-.0235	.2569**	-.0569	-.6629**	-.8050**
LOWER1NB	- .7590**	- .0139	.1251	.0197	-.7887**	- .8361**
LOWFHAGL	-.0787	.2175**	-.2670**	-.0467	-.3592**	-.3661**
LOWR1APO	- .7192**	-.0606	.0219	.1499	-.4867**	- .6223**
LOWR1MPL	-.6080**	- .1447	.2157**	- .1703*	-.3990**	- .6967**
LOWR1NB_	.6753**	-.0535	-.0971	-.0492	.9276**	.7498**
LOWRLIPE	.3480**	- .1821*	- .0573	-.1972*	.6464**	.4867**
MANDARC	-.0234	.1238	-.0526	- .0940	- .1231	- .0668
MANDLGTH	-.0785	- .0698	-.0428	.1235	-.0269	.1151
MANPLAGL	.0360	.2201**	-.1940*	.0385	-.3633**	- .1819*
MANPROGN	.0966	-.0488	.0142	.6712**	.0736	.3031**
MAXDEPTH	-.1506	.0016	.1930*	.0435	- .2793**	- .2557
MAXPROGN	.0785	-.0110	.0431	.2702**	- .0966	.0861
MIDFCLTH	-.1074	- .1131	.2305**	- .1655*	- .0739	-.0364
MLSHLINE	.1494	-.0200	.2291**	- .2813**	.4919**	.1973*
MLSULCUS	-.1247	-.0064	.2823**	-.1557	.0014	- .1521
MNARCLTH	-.3665**	.0489	.1399	.0620	-.3705**	- .3383**
MOLRRELN	.0024	.0802	-.1040	.3550**	.0139	.2480**
MXARCLTH	-.4410**	.1770*	.1991*	.0328	-.2230**	- .2053*
MXHEIGHT	.1623*	.0110	-.3215**	-.1088	.0448	.0166
MXMNDIFF	-.0125	.0042	-.2772**	.3314**	.0304	.2002*
NASLBANG	.2977**	.1053	-.1589	-.4885**	.1739*	.0983
NASOFACL	-.1278	-.1140	.1250	-.1509	- .2484**	- .1943*
NASOFNTL	.1690*	.1722*	-.2086*	-.0986	.1493	.0631
NASOMNTL	-.0470	- .1679*	.0799	-.3543**	-.2111**	-.1749*
NOSELGTH	.0525	-.0707	-.0535	-.2082*	- .0410	.0119
NOSEPROM	.1262	-.1821*	-.1704*	-.5220**	.1175	.0208
NSCHNLTH	-.1473	.1113	-.0407	.0226	-.3601**	- .2703**
NSTNASON	.1131	-.0230	-.0246	.0367	.1428	.1114
OCCLPLAN	.2637**	.0560	-.2920**	-.1634*	-.0616	- .1308
OCCLPLXI	.1240	- .0458	.0999	-.2787**	.1257	-.0790
OPGOGN	-.2288**	.1850*	.0195	.2319**	-.3793**	- .0990
OPINCLIN	-.2208**	.1092	-.0767	.1545	-.3751**	- .1884*
PALPLANE	.1043	-.1079	-.0105	.0323	-.0159	.2960**
PFH_AFH	-.0384	-.1892*	.1536	-.0896	.1713*	.0443
PNSANS	-.0585	-.0276	.1698*	-.1421	-.0781	-.0456

[illegible]

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

' . ' is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	INTERINC	INTLABGP	LIPEMBOP	LLDISTAN	LO1FACPL	LO1PALPL
PCRIONLC	- .0337	- .0382	.0702	- .1458	- .0030	.0113
POSCRNBS	.0128	- .0437	.0836	- .1846	.1675	- .0419
POSFACHT	- .0267	- .1538	- .0287	- .0632	- .0028	- .0709
RAMPOSTN	.0656	- .1269	.0438	.0324	.1569	- .1342
RAMUSHGT	- .0781	- .1469	.0304	.0216	.0301	.0145
SADANGLE	- .0829	- .0389	.1135	- .1209	.0227	- .0617
SE	- .0587	- .0905	.1286	-.1874*	.0593	- .0736
SL	- .0429	- .1147	.1427	.2056*	.1928*	.3110**
SLSDISTC	- .2639**	.0429	.1565	.6469**	- .2497**	- .1473
SNA	- .1154	- .0236	.1924*	.0829	- .2660**	- .0131
SNB	- .0729	- .0680	.0736	.3631**	- .0237	.2972**
SNFH	- .0231	.0355	-.0367	- .0633	.0327	- .0509
SNLOWER1	.6187**	- .0237	- .0692	.1748*	.6706**	.8815**
SNMANDPL	.0217	.2139**	- .1817*	.0042	- .3105**	- .1870*
SNOCCPLN	.2302**	.0736	- .2918**	- .1909*	-.0370	- .1523

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

' . ' is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	LOANDNHT	LOANFCHT	LOGONIAL	LOLIPLTH	LOLIPTHK	LOLPHLIN
ABPLANE	- .1064	-.1652*	-.0824	-.2383**	.0253	- .2270**
ANB	-.1472	- .1035	.0439	-.2378**	- .1306	- .3600**
ANGOFCON	-.1235	- .1350	.1274	- .2666**	-.2269**	- .4333**
ANSNOSTP	-.4901**	.3913**	-.0824	.4507**	.1168	.0165
ANTCRBSE	- .4553**	.3295**	-.2680**	.2658**	.1468	.1197
ANTFACHT	-.7904**	.9088**	.4671**	.7322**	- .1470	- .2460**
APONTSTA	-.4823**	.4291**	-.0279	.4196**	-.0259	- .0349
APTNPERP	-.0939	.1003	.0858	.1647*	-.0941	- .2078*
ARTANGLE	-.0951	.2167**	.3019**	.0756	-.2020*	- .1915*
BASNASON	-.5330**	.3994**	-.2075*	.3526**	.1399	.0666
BOLFACPL	-.0909	.0376	-.3993**	.2001*	.0823	.2150**
BPONTSTB	-.4494**	.4139**	.2009*	.4264**	-.3095**	- .3479**
CANINREL	-.2103**	.2343**	.2227**	.1375	-.0739	- .0391
CORPLGTH	-.5619**	.6585**	.0775	.7004**	- .0751	- .2621
CRANDEFL	-.0078	.1284	.3279**	.0795	.0156	- .0559
CRBASAGL	.0442	-.1109	-.0464	-.0308	.0795	.0347
FACAXAGL	-.2636**	.3988**	.6535**	.1551	- .2472**	- .3639**
FACDEPTH	.0106	.0197	- .2329**	.2143**	.1151	.1971*
FACLCNVX	.0106	.0197	-.2329**	.2143**	.1151	.1971*
FACLDPTH	-.7218**	.6345**	- .1184	.5562**	.0811	-.0136
FACLLGTH	-.7276**	.7953**	.1776*	.7015**	-.0791	-.1032
FACTAPER	.1739*	- .4386**	-.8515**	-.2635**	.3679**	.3472**
FCCONAGL	-.2007*	-.0004	.1442	-.1348	-.0056	- .3982**
FMIA	.2662**	-.1479	-.1575	.0174	.3929**	.4555**
GONANGLE	.0655	.0881	.6717**	-.0548	-.1908*	-.1965*
HANGLE	-.1728*	-.1528	-.0045	-.2878**	-.2884**	-.5202**
HLINE	.0592	.1309	-.1950*	.3105**	.2235**	.4546**
ILSDISTN	.1903*	.0551	.0577	.2536**	-.1911*	.0366
INCISROB	-.2235**	-.1779*	-.3542**	-.0985	.2246**	.0702
INCISROJ	-.0974	-.0744	-.1342	-.2292**	.1572	.0211
INTERINC	.1634*	- .0792	.0074	.0099	.3464**	.2895**
INTLABGP	.0746	.0910	.2199**	-.3638**	-.0711	.0083
LIPEMBOP	-.1441	-.1389	-.2455**	-.3129**	.0512	.0583
LLDISTAN	.0193	.1505	.1148	.3412**	-.4726**	-.2397**
LO1FACPL	.4033**	-.2604**	-.3953**	-.0990	.6466**	.6664**
LO1PALPL	.2477**	-.1827*	-.1551	.0534	.3882**	.4241**
LOANDNHT	1.0000	-.7878**	-.2883**	-.6254**	.2741**	.3838**

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LOGONIAL	- .0880**	.5174**	- .[illegible]	.0945**	- .0[illegible]**	- .[illegible]**
LOLIPLTH	- .6254**	.7333**	.0945**	- .0[illegible]	- .0862	- .[illegible]**
LOLIPTHK	.0741**	- .2400**	- .3[illegible]**	- .0562	- .[illegible]	.[illegible]**
LOLPHLIN	.3938**	- .2818**	- .4199**	- .2184**	.8874**	- .[illegible]

* - Signif. LE .05 ** - Signif. LE .[illegible] (2-tailed)

' . ' is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	LOANDNHT	LOANFCHT	LOGONIAL	LOLIPLTH	LOLIPTHK	LOLPHLIN
LOPSDNHT	.8342**	- .6757**	- .0441	- .5769**	.0839	.[illegible]*
LOSTFCHT	- .7432**	.9077**	.4361**	.7635**	- .2105**	- .2239**
LOW1APO_	.2936**	- .3395**	- .3180**	- .2567**	.5443**	.4076**
LOW1OCPL	- .3743**	.1765*	- .0430	.0998	- .3441**	- .3723**
LOWER1NB	-.2938**	.1682*	.1077	.0721	- .4431**	- .4669**
LOWFHAGL	- .3473**	.5193**	.[illegible]**	.2690**	- .3450**	- .3495**
LOWR1APO	- .2414**	.2665**	- .0022	.2426**	- .2799**	- .[illegible]*
LOWR1MPL	- .1416	-.1097	- .4475**	-.0738	- .1017	- .[illegible]
LOWR1NB_	.5008**	-.3698**	- .3204**	- .2021*	.5731**	.6145**
LOWRLIFE	.1730*	- .0990	- .3320**	.1127	.8959**	.8233**
MANDARC	.0983	- .0415	.3911**	-.1456	- .1427	-.1337
MANDLGTH	- .6668**	.7239**	.0619	.6806**	-.0358	-.0460
MANPLAGL	- .1513	.3539**	.8513**	.0901	-.3770**	- .4098**
MANPROGN	-.0290	.1748*	.0391	.3372**	.0670	.0685
MAXDEPTH	-.1130	-.0795	-.0873	-.0310	-.1104	-.2153**
MAXPROGN	- .2146**	.2463**	.1695*	.2929**	.0371	-.1845*
MIDFCLTH	-.6278**	.3798**	-.2927**	.3535**	.0561	-.0757
MLSHLINE	.0377	-.1208	- .4207**	-.0942	.6198**	.6885**
MLSULCUS	-.3401**	.0985	-.1934*	.0779	-.0963	-.0967
MNARCLTH	-.0715	-.0343	-.0930	-.1463	-.3223**	-.2877**
MOLRRELN	-.1164	.3621**	.2376**	.3374**	-.0720	.0769
MXARCLTH	-.1539	.1066	-.0306	- .0731	- .2023*	-.1892*
MXHEIGHT	-.1186	.2781**	.4659**	.2671**	-.0037	- .0969
MXMNDIFF	-.3809**	.6940**	.3627**	.6558**	-.1041	.0032
NASLEANG	- .0171	.0457	.0956	-.0628	.3831**	.1693*
NASOFACL	-.2363**	.0697	-.0817	.0468	-.1394	-.3104**
NASOFNTL	.1178	-.0409	.1541	-.0927	.1287	.1902*
NASOMNTL	-.2676**	.0216	-.0749	.0220	-.0346	-.3200**
NOSELGTH	-.5262**	.4684**	.1982*	.4547**	.0949	-.1626*
NOSEPROM	-.1943*	.1387	-.0269	.1553	.2590**	.1650*
NSCHNLTH	-.7306**	.8279**	.4243**	.6561**	-.2745**	-.4029**
NSTNASON	-.1610*	.1249	-.1541	.1853*	.1588	.2142**
OCCLPLAN	.1859*	-.0490	.3384**	-.1954*	-.0792	- .1366
OCCLPLXI	.1638*	-.2858**	-.2854**	-.3418**	.2463**	.1908*
OPGOGN	-.3349**	.4635**	.6867**	.3106**	-.3993**	-.3830**
OPINCLIN	-.4041**	.5130**	.6148**	.3917**	-.4036**	- .4095**
PALPLANE	-.0222	-.0830	-.0037	.0844	.0174	-.0369
PFH_AFH	-.1490	-.0649	-.6438**	.0817	.2140**	.2394**
PNSANS	-.5920**	.4536**	-.0963	.3845**	.0269	-.1146
POGNPERP	.0147	.1430	-.0233	.3119**	.0535	.0654
POGONNB	.0560	-.1326	.3340**	-.1874*	-.4312**	- .3920**
POGSTPOG	-.3458**	.1692*	-.0553	.1950*	.1173	.1891*

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

* . * is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	LOANDNHT	LOANFCHT	LOGONIAL	LOLIPLTH	LOLIPTHK	LOLPHLIN
PORIONLC	-.3797**	.2554**	-.1705*	.2013*	.1204	.0940
POSCRNBS	-.5624**	.4740**	-.1327	.4064**	.0979	.0018
POSFACHT	-.6926**	.6114**	-.1438	.5968**	.0766	-.0009
RAMPOSTN	.1036	-.0883	-.0749	-.0542	-.0117	-.0799
RAMUSHGT	-.5656**	.5079**	-.1715*	.5395**	.0736	.0602
SADANGLE	-.0238	-.0538	-.1061	.0198	.1086	.0392
SE	-.3419**	.2383**	-.1554	.2530**	.1532	.0423
SL	-.1246	.0445	-.4888**	.1711*	.1278	.2321**

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SNFH	.1409	-.0919	.0773*	-.1653	.0741	.0225
SNLOWERPL	.2038*	-.1181	.2102**	.1419	.3529**	.4275**
SNMANDPL	-.1683	.2736**	.3611**	.2831	-.3015**	-.3618**
SNOCCPLN	.2587**	-.1122	.4094**	-.2227**	-.0256	-.1274

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

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- - Correlation Coefficients - -

	LOPSDNHT	LOSTFCHT	LOW1APO_	LOW1OCPL	LOWER1NB	LOWFHAGL
ABPLANE	-.1073	-.1611*	.4718**	.2201**	.2175*	-.0450
ACIB	-.1061	-.1313	.3159**	.2564**	.2933**	.0798
ANGOFCON	-.0588	-.1233	.2019*	.2411**	.3315**	.0998
ANSNOSTP	-.5103**	.3098**	-.1403	.1807*	.0526	-.0070
ANTCRBSE	-.4768**	.3050**	.0120	.1445	.0032	-.1364
ANTFACHT	-.7090**	.5296**	-.2591**	.1886*	.1566	.4748**
APONTSTA	-.4445**	.4559**	-.2726**	.2384**	.1344	-.0100
APTNPERP	-.0914	.2464**	.1030	-.0257	.0829	-.2714*
ARTANGLE	-.0113	.1685*	-.0010	-.0415	.0802	.3922**
BASNASON	-.4997**	.3956**	-.0294	.2488**	.0276	-.0975
BOLFACPL	-.1493	.1515	-.2057*	-.0005	-.0050	-.4915**
BPONTSTB	-.4063**	.3334**	-.3506**	.2791**	.2599**	.3492**
CANINREL	-.1735*	.2879**	-.1997*	.0506	.1084	.0946
CORPLGTH	-.5284**	.5785**	-.2707**	.0305	.0411	-.0451
CRANDEFL	.0383	.1414	.1343	-.0684	-.0599	.3075**
CRBASAGL	.0792	-.1113	-.0687	.1500	.0218	-.1211
FACAXAGL	-.1433	.2973**	.0005	.1085	.1403	.6987**
FACDEPTH	-.0450	.1349	-.1133	-.1012	-.0608	-.3766**
FACLCNVX	-.0450	.1349	-.1133	-.1012	-.0608	-.3766**
FACLDPTH	-.8054**	.5916**	-.0568	.3060**	.1415	.0907
FACLLGTH	-.6963**	.7613**	-.2754**	.1365	.1127	.2076*
FACTAPER	-.1029	-.3769**	.3491**	.1779*	-.0397	-.5583**
FCCONAGL	-.1320	-.0734	.2153**	.1914*	.2077*	.0779
FMIA	.2676**	-.0967	.4720**	-.8252**	-.8883**	-.2842**
GONANGLE	.2897**	.0389	-.1856*	-.1913*	-.0664	.3613**
HANGLE	-.0521	-.1739*	.0872	.3207**	.3305**	.1122
HLINE	-.0500	.2153**	-.1825*	-.2423**	-.2259**	-.2296**
ILSDISTN	.1721*	.1566	-.2561**	-.2369**	-.1444	-.1133
INCISROB	-.1446	-.1681*	.4957**	-.1143	-.2081*	-.2877**
INCISROJ	-.0071	-.0455	.4474**	.0311	-.1051	-.0636
INTERINC	.1233	-.0918	.6213**	-.7803**	-.7590**	-.0787
INTLABGP	.1607*	.0949	-.0291	-.0235	-.0139	.2175**
LIPEMBOP	-.0803	-.0776	-.0216	.2569**	.1251	-.2670**
LLDISTAN	.0649	.2672**	-.3642**	-.0569	.0197	-.0467
LO1FACPL	.2493**	-.2411**	.7704**	-.6629**	-.7887**	-.3592**
LO1PALPL	.2107**	-.1099	.4544**	-.5050**	-.5361**	-.3661**
LOANDNHT	.8342**	-.7432**	.2986**	-.3743**	-.2938**	-.3473**
LOANFCHT	-.6757**	.9077**	-.3395**	.1765*	.1682*	.6193**
LOGONIAL	-.0441	.4361**	-.3180**	-.0430	.1077	.7796**
LOLIPLTH	-.5769**	.7635**	-.2567**	.0988	.0721	.2690**
LOLIPTHK	.0839	-.2105**	.5443**	-.3441**	-.4431**	-.3450**
LOLPHLIN	.1751*	-.2289**	.4076**	-.3723**	-.4669**	-.3495**

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	LOPSDNHT	LOSTFCHT	LOW1APO_	LOW1OCPL	LOWER1NB	LOWFHAGL
LOPSDNHT	1.0000	-.6548**	.1920*	-.3061**	-.3069**	-.1872*
LOSTFCHT	-.6548**	1.0000	-.3125**	.1733*	.1737*	.4440**
LOW1APO_	.1920*	-.3125**	1.0000	-.5539**	-.6405**	-.2975**
LOW1OCPL	-.3061**	.1733*	-.5539**	1.0000	.8815**	.1118
LOWER1NB	-.3069**	.1737*	-.6405**	.8815**	1.0000	.1529
LOWFHAGL	-.1872*	.4440**	-.2975**	.1118	.1529	1.0000

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LOWRLIPE	-.1146	-.0661	.1475**	-.1478**	-.1341**	-.1317**
MANDARC	.2192**	-.1140	-.1408	-.1314	-.1019	.1822**
MANDLGTH	-.6745**	.6991**	-.2832**	.1469	.1021	.1477
MANFLAGL	.1133	.2307**	-.2226**	-.1873	.1697	.6935**
MANPROGN	-.1551	.3302**	-.2169	-.1640*	-.1178	-.2314**
MAXDEPTH	-.1105	.1340	.1621	.1290	.2443**	-.2107**
MAXPROGN	-.1918*	.3415**	.1704	-.2130	.1390	-.1172
MEDFOLTH	-.6832**	.4012**	.2178	.2786**	.1979*	-.2697**
MLSHLINE	-.1935	-.2150	.3683**	-.2603	-.2290**	-.3233**
MLSVLOUS	-.3249**	.1791*	.1025	.2388**	.1632*	-.1166
MNARCLTH	.1878	-.2108	-.2899**	.2400**	.3218**	-.2396
MOLRPELN	-.1664*	.3472**	-.3695**	-.1229	-.2269	.1372
MXAPCLTH	.2100	.1152	-.1368	.1712*	.1952*	.2205
MXHEIGHT	-.0725	.2129**	.0297	-.0528	-.2407	.3450**
MXMNDIFF	-.3395**	.6380**	-.4249**	-.2444	-.2372	.3499**
NASLBANG	-.0674	-.2314	.2311**	-.1812*	-.1610*	.2244
NASOFACL	-.1687*	.2858	.2060	.1842*	.1656*	-.2531
NASOFNTL	.2845	-.2915	.1542	-.1206	-.1296	.1405
NASOMNTL	-.2071*	-.2225	.1199	.2035*	.1593	-.1936
NOSELGTH	-.4937**	.3857**	-.2570	.1495	.2948	-.1123
NOSEPROM	-.2492**	-.2374	.2412	.2560	-.2222	.2611
NSCHNLTH	-.6240**	.7910**	-.3036**	.3008**	.3226**	.4651**
NSTNASON	-.3015**	.1938*	.1742*	-.2377	-.2230	-.1306
OCCLPLAN	.2669	-.1297	.1404	-.3026**	.2057	.2891**
OCCLPLXI	-.1692*	-.2847**	.3279**	-.1841*	-.2198	-.1454
OPGOGN	.2984	.3929**	-.4138**	.1941*	.2860	.5719**
OPINCLIN	-.2428	.4294**	-.3914**	.3080**	.1548	.6456**
PALPLANE	-.1219	-.2334	-.2137	-.2073	.2571	-.1916*
PFH_AFH	-.3945**	.2152	.2739	.1979*	.2697	-.4483**
PNSANS	-.5525**	.4523**	.2109	.2246**	.1320	-.1266
POGNPERP	-.2343	.2987**	.2057	-.1944*	-.1322	-.2944**
POGONNB	.1800*	-.2924	-.3608**	.2152	.2186**	.1455
POGSTPOG	-.3547**	.2556**	-.1640*	.1996*	.1200	.2525

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- - Correlation Coefficients - -

	LOPSDNHT	LOSTFCHT	LOW1APO_	LOW1OCPL	LOWER1NB	LOWFHAGL
PORIONLC	-.4062**	.2624**	-.1239	.1363	.1004	-.2889
POSCRNBS	-.6269**	.4578**	.0331	.1566	.2470	.2046
POSFACHT	-.8253**	.6065**	-.0988	.2984**	.1793*	.2232
RAMPOSTN	.1138	-.2880	.2155**	.2252	-.2173	-.1331
RAMUSHGT	-.7101**	.5224**	-.1966*	.2770**	.1455	-.2595
SADANGLE	-.2754	-.2665	.2094	.1505	.2129	-.1217
SE	-.4263**	.2171**	.2301	.2024*	.2370	-.2709
SL	-.2102**	.1344	-.2666	-.2496	-.2546	-.4895**
SLSDISTC	.1136	.2930	-.2034*	.1274	.1597	.2435
SNA	-.2084*	.2969	.2026	.1148	.2419**	-.2855**
SNB	-.1363	.1752*	-.2346**	-.2712	.2334	-.3602**
SNFH	.1750*	-.2951	.2749	-.2042	-.2408	.1224
SNLOWER1	.1928*	-.2572	.4305**	-.8012**	-.8484**	-.3227**
SNMANDPL	.1840*	.1635*	-.1642*	-.2804	.2432	.6794**
SNOCCPLN	.1684*	-.1786*	.1764*	-.2820**	-.2197	.3424**

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- - Correlation Coefficients - -

	LOWR1APO	LOWR1MPL	LOWR1NB_	LOWRLIPE	MANDARC	MANDLGTH
ABPLANE	-.2511**	.3217**	-.1967*	-.1636*	.2146	-.3165**
ANB	-.2428**	.2879**	-.3210**	-.3254**	.2820	-.3554**
ANGOFCON	-.2553**	.2392**	-.3580**	-.4172**	.1235	-.4106**
ANSNOSTP	.2950**	.1474	-.1156	.2984**	-.2026*	.6673**

[illegible]	.3758*	.3777*	- .[illegible]	-.4834**	- .523	.[illegible]**
[illegible]	.2784**	- .800	- .[illegible]**	.1155	- .[illegible]4	-.[illegible]**
[illegible]	.3602**	.3601	- .2755*	.0381	- .2099	.[illegible]**
APTHPERP	- .1669*	- .1227	- .1912	- .1617	- .1491	- .732
ARTANGLE	- .0239	- .1401	- .1254	- .2234**	.1019	- .1443
BASNASCN	.1931*	.2148**	- .1664	.2244**	- .1570	.6181**
BCLFACPL	.2447**	.1406	.0687	.2235**	- .2492**	.5224**
BPOINTSB	.3726**	.2284	- .4656**	- .2003*	- .0532	.3518**
CANDIREL	.1019	- .1807	- .1658	- .1301	.1103	.2426**
CORPLGTH	.3315**	- .1909	- .0982	.1732*	- .1869*	.3118**
CRANDEFL	- .1096	- .1837	.1747	- .0358	.1112	- .1484
CFBASAGL	.1225	.0629	- .0319	.0904	- .0636	- .0424
FACAXAGL	- .0715	- .1907	- .2601**	- .3074**	.1956*	- .1679*
FACDEPTH	.1681*	- .0765	.1551	.2337**	- .1930*	.4069**
FACLCNVX	.1681*	- .0765	.1551	.2337**	- .1930*	.4069**
FACLDPTH	.2963**	.3206**	- .1840*	.1912*	- .3551**	.7884**
FACLLGTH	.3383**	- .0133	- .2238**	.1200	-.1596	.3927**
FACTAPER	-.0076	.3504**	.2219**	.2746**	- .4099**	- .1526
FCCONAGL	- .1583	.1932*	-.2631**	-.2256**	.0257	- .1787*
FMIA	-.6661**	-.7406**	.7897**	.4526**	- .0429	.0605
GONANGLE	- .1404	- .4677**	- .0748	-.1979*	.5365**	- .1704*
HANGLE	- .0734	.3094**	-.3503**	- .5176**	.2340	- .2778**
HLINE	.1616*	- .2020*	.2602**	.4452**	- .2158**	.4638**
ILSDISTN	.0381	- .2859**	.1434	.0506	-.0947	.0461
INCISROB	- .3393**	.2930	.1941*	.1368	- .1609*	- .0605
INCISROJ	- .3342**	.0337	.0831	-.0068	.0516	-.1588
INTERINC	-.7192**	- .6080**	.6753**	.3480**	-.0234	-.0785
INTLABGP	-.0606	- .1447	- .0535	- .1821*	.1238	-.0698
LIPEMBGP	.0219	.2157**	- .0971	-.0573	- .0526	-.0428
LLDISTAN	.1499	-.1703*	- .0492	-.1972*	- .0940	.1235
LO1FACPL	- .4867**	- .3990**	.9276**	.6464**	-.1231	-.0269
LO1PALPL	-.6223**	-.6967**	.7498**	.4867**	-.0668	.1151
LOANDNHT	- .2414**	- .1416	.5008**	.1730*	.0983	-.6668**
LOANFCHT	.2665**	- .1097	-.3698**	-.0990	-.0415	.7239**
LOGONIAL	-.0022	-.4475**	-.3204**	-.3320**	.3911**	.0619
LOLIPLTH	.2426**	-.0788	-.2021*	.1127	- .1456	.6806**
LOLIPTHK	-.2799**	-.1017	.5731**	.8959**	- .1427	-.0358
LOLPHLIN	-.1949*	-.1372	.6145**	.8233**	-.1337	- .0460

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- - Correlation Coefficients - -

	LOWR1APO	LOWR1MPL	LOWR1NB_	LOWRLIPE	MANDARC	MANDLGTH
LOPSDNHT	-.3041**	-.3277**	.3766**	- .0046	.2190**	- .5745**
LOSTFCHT	.2614**	-.0725	-.3272**	-.0660	-.1040	.5991**
LOW1APO_	-.7236**	- .3838**	.7576**	.4175**	-.0408	- .2832**
LOW1OCPL	.7753**	.8281**	-.7862**	-.3478**	-.1304	.1469
LOWER1NB	.8204**	.7772**	- .8451**	-.4541**	-.0209	.1021
LOWFHAGL	.0899	-.2203**	-.3623**	-.3397**	.3822**	.0677
LOWR1APO	1.0000	.6849**	-.6455**	-.1828*	-.1122	.3702**
LOWR1MPL	.6849**	1.0000	-.5393**	-.1607*	-.2801**	.0269
LOWR1NB_	-.6455**	-.5393**	1.0000	.5521**	-.0441	- .1875*
LOWRLIPE	-.1828*	-.1607*	.5521**	1.0000	-.2151**	.1852*
MANDARC	-.1122	-.2801**	-.0441	-.2151**	1.0000	-.2318**
MANDLGTH	.3702**	.0269	-.1875*	.1852*	-.2318**	1.0000
MANFLAGL	-.0938	-.4464**	-.2789**	-.3712**	.4584**	- .1193
MANPROGR	-.0501	-.1736*	.1175	.2134**	-.2516**	.1381
MAXDEPTH	-.0699	.1384	-.1883*	-.1708*	-.0549	.0142
MAXPROGR	-.0966	- .0478	-.0833	.0605	-.2113**	.0987
MIDFCLTH	.1854*	.3341**	-.2043*	.1336	-.2415**	.7271**
MLSHLINE	-.0366	.1181	.3551**	.5593**	-.1885*	.1398
MLSULCUS	.1542	.3234**	-.1395	-.1496	-.0829	.2310**
MNARCLTH	.1981*	.2586**	-.3136**	-.3959**	.0514	-.0939
MOLRRELN	.2707**	-.2259**	-.0182	.1237	-.0057	.4813**
MXARCLTH	.1072	.1185	-.2180**	-.2634**	.0713	.0716
MXHEIGHT	.0019	-.1930*	-.0163	.0483	.0306	.1119
MXMNDIFF	.3618**	-.2727**	-.0807	.1430	-.1097	.7693**
NASLBANG	-.1825*	-.0945	.1555	.1760*	-.0990	-.0111
NASOFACL	-.0517	.1819*	-.2434**	-.2133**	-.0090	.0499

[illegible]	- [illegible]	- [illegible]	[illegible]	[illegible]	- [illegible]	- [illegible]
[illegible]	- 9[illegible]	[illegible]**	- .[illegible]**	- .[illegible]	- .[illegible]	.[illegible]
MSELGTH	-.[illegible]*	[illegible]	- .[illegible]*	[illegible]*	- .[illegible]*	[illegible]**
MSEPPOM	.[illegible]	.[illegible]	- [illegible]	.1959**	- .1949	[illegible]**
MSCHNLTH	.[illegible]**	.[illegible]62	- 4574**	- .1611	- .1283	[illegible]**
MSTMASON	- .1093	.1968	.1911	.2338**	- .2461**	[illegible]**
OCCLPLAN	- .1887*	- .1819	- .[illegible]	- .[illegible]*	.2926**	- .3811**
OCCLPLKI	-.[illegible]*	.[illegible]**	.1487	.[illegible]	- .1366	- .1497**
OPGOGN	.[illegible]	- .[illegible]**	- .3430**	- .2919**	.[illegible]**	.1948*
OPINCLIN	.1609*	- .[illegible]*	- .[illegible]**	- .[illegible]**	.[illegible]**	.[illegible]**
PALPLANE	.1881	.1461	- .1357	.1054	- .0519	.[illegible]
PFH_AFH	.1908*	.[illegible]**	.[illegible]	.[illegible]**	- .[illegible]**	.[illegible]
PNSANS	.1169	.1829*	- .1946*	.0913	- .2566**	.[illegible]**
POGNPERP	- .0395	- .[illegible]*	.[illegible]*	.[illegible]*	- .[illegible]**	.1479
POGONNB	- .1309	- .1324	- .2396**	- .4793**	.[illegible]**	- .[illegible]**
POGSTPOG	.1124	.1817	- .1795*	.1261	- .0971	.[illegible]**

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	LOWR1APO	LOWR1MPL	LOWR1NB_	LOWRLIPE	MANDARC	MANDLGTH
PORIONLC	.2411**	.1563	- .1134	.1887*	- .1471	.5070**
POSCRNBS	.1425	.2101**	- .0713	.1701*	-.2581**	.5718**
POSFACHT	.3354**	.3508**	-.1972*	.2024*	-.4180**	.7683**
RAMPOSTN	-.1303	.0900	.0316	-.0486	-.0831	-.2292**
RAMUSHGT	.3607**	.3305**	-.1589	.2196**	-.4481**	.7688**
SADANGLE	.0378	.1512	- .0083	.1217	-.1508	-.0113
SE	.1096	.2387**	-.0450	.2028*	-.2727**	.3205**
SL	.1830*	.0922	.1289	.2431**	-.2227**	.5309**
SLSDISTC	.0759	.0170	-.1707*	-.3318**	.1362	-.1228
SNA	- .2095	.1856*	- .2096*	-.1650*	-.1319	.1815*
SNB	.1717*	-.0207	.0212	.0709	-.1988*	.4544**
SNFH	- .0735	-.0950	.0661	.0217	.1213	-.2445**
SNLOWER1	-.6194**	-.6841**	.7429**	.4312**	-.0882	.1527
SNMANDPL	-.1191	-.4446**	-.2189**	- .3217**	.4679**	-.2219**
SNOCCPLN	-.2201**	-.1996*	.0398	-.1452	.3455**	- .4733**

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	MANPLAGL	MANPROGN	MAXDEPTH	MAXPROGN	MIDFCLTH	MLSHLINE
ABPLANE	.0344	-.1771*	.4016**	.2156**	.2202**	.0304
ANB	.1451	-.1608*	.5022**	.2313**	.1644*	-.1389
ANGOFCON	.2224**	-.1401	.5314**	.2330**	.0917	- .2519**
ANSNOSTP	-.1582	-.1170	-.2099**	-.0219	.5349**	.2336**
ANTCRBSE	-.2935**	-.0697	-.1062	-.0464	.6894**	.3839**
ANTFACHT	.2880**	.1034	-.1388	.2397**	.4941**	- .0154
APONTSTA	-.1489	.1900*	-.0751	.2510**	.4220**	.2380**
APTNPERP	.0303	.8216**	.4584**	.8570**	.0894	-.2079*
ARTANGLE	.3921**	-.0292	.0078	.0565	- .2442**	- .1929*
BASNASON	-.2420**	-.0549	-.1676*	.0082	.6903**	.3332**
BOLFACPL	-.5001**	.2389**	.3119**	-.0242	.4119**	.2004*
BPONTSTB	.1530	-.1316	-.0145	-.0693	.1821*	-.3544**
CANINREL	.1295	.1877*	.0752	.1595	.1345	-.0328
CORPLGTH	-.0748	.3395**	.0376	.2343**	.6062**	.0698
CRANDEPL	.0249	.1135	.2667**	.2025*	-.2468**	-.0323
CRBASAGL	-.0376	- .0660	-.0958	-.0503	.0290	.0306
FACAXAGL	.6330**	-.0441	-.2088*	.2162**	-.2563**	-.2645**
FACDEPTH	-.5539**	.3036**	.5688**	.0722	.2430**	.1390
FACLCNVX	-.5539**	.3036**	.5688**	.0722	.2430**	.1390
FACLDPTH	-.2366**	-.0384	-.1446	.0853	.7239**	.2772**
FACLLGTH	-.0053	.1081	.0058	.1130	.6598**	.1050
FACTAPER	-.7972**	-.1230	-.0530	-.1238	.2495**	.4285**
FCCONAGL	.1718*	-.1494	.2591**	.4292**	.1805*	- .1897*
FMIA	-.2706**	.2481**	.0757	.0067	-.0927	.2051*

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
-ANGLE	.[illegible]	-.[illegible]**	.[illegible]**	[illegible]	[illegible]	-.[illegible]**
-LINE	-.1198**	.1198**	-.1457*	-.[illegible]	.960	-.[illegible]**
LLSDISTN	-.0036	.[illegible]**	-.[illegible]	.2683**	-.[illegible]**	-.[illegible]**
LNCISROB	-.2420**	-.1940*	.[illegible]	.[illegible]	.[illegible]**	-.[illegible]**
LNCISROJ	-.1599	-.[illegible]	.[illegible]**	.[illegible]	.[illegible]*	-.[illegible]*
LNTERINC	.0260	.0966	-.[illegible]	.[illegible]	-.[illegible]	.1494
LNTLABGP	.[illegible]**	-.[illegible]	.[illegible]	-.[illegible]	-.[illegible]	-.[illegible]
LOPEMBOP	-.1940*	.[illegible]	.1930*	.[illegible]	.[illegible]**	.[illegible]**
LLDISTAN	.0385	.[illegible]**	.[illegible]	.[illegible]**	-.[illegible]*	-.[illegible]**
LOLFACPL	-.[illegible]**	.[illegible]	-.[illegible]**	-.[illegible]	-.[illegible]	.[illegible]**
LOLPALPL	-.1819*	.[illegible]**	-.[illegible]	.[illegible]	-.[illegible]	.[illegible]*
LOANDNHT	-.1513	-.[illegible]	-.[illegible]	-.[illegible]**	-.[illegible]**	.[illegible]
LOANFCHT	.3539**	.[illegible]*	-.[illegible]	.[illegible]**	.[illegible]**	-.[illegible]
LOGONIAL	.3513**	.[illegible]	-.[illegible]	.[illegible]*	-.[illegible]**	-.[illegible]**
LOLIPLTH	.[illegible]	.[illegible]**	-.[illegible]	.[illegible]**	.[illegible]**	-.[illegible]
LOLIPTHK	-.[illegible]**	.[illegible]	-.[illegible]	.[illegible]	.[illegible]	.[illegible]**
LOLPHLIN	-.4098**	.[illegible]	-.[illegible]**	-.[illegible]*	-.[illegible]	.[illegible]**

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	MANPLAGL	MANPROGN	MAXDEPTH	MAXPROGN	MIDFCLTH	MLSHLINE
LOPSDNHT	.1133	-.0551	-.1005	-.1908*	-.6832**	-.0935
LOSTFCHT	.2127**	.3302**	.0340	.3415**	.4012**	-.0250
LOW1APO_	-.2226**	-.0169	.0620	.0704	.0178	.3683**
LOW1OCPL	-.0873	-.1640*	.1290	-.0130	.2756**	-.0603
LOWER1NB	.0697	-.1178	.2443**	.0390	.1979*	-.2290**
LOWFHAGL	.6935**	-.2304**	-.2307**	-.1072	-.2697**	-.3238**
LOWR1APO	-.0939	-.0501	-.0699	-.0966	.1854*	-.0366
LOWR1MPL	-.4464**	-.1736*	.1384	-.0478	.3341**	.1181
LOWR1NB_	-.2799**	.1175	-.1383*	-.0833	-.2043*	.3551**
LOWRLIPE	-.3712**	.2134**	-.1708*	.0605	.1336	.5593**
MANDARC	.4584**	-.2516**	-.0549	-.2113**	-.2415**	-.1885*
MANDLGTH	-.1193	.1381	.0142	.0987	.7271**	.1398
MANPLAGL	1.0000	-.0799	-.2996**	.0612	-.3556**	-.4432**
MANPROGN	-.0799	1.0000	.1539	.8209**	.0132	-.0107
MAXDEPTH	-.2996**	.1539	1.0000	.2721**	.3043**	-.1104
MAXPROGN	.0612	.8209**	.2721**	1.0000	.1590	-.1249
MIDFCLTH	-.3556**	.0132	.3043**	.1590	1.0000	.2341**
MLSHLINE	-.4432**	-.0107	-.1104	-.1249	.2341**	1.0000
MLSULCUS	-.2278**	-.0955	.1078	.0180	.4155**	.5822**
MNARCLTH	-.0315	-.1312	.1808*	-.0990	.0814	-.2702**
MOLRRELN	.0953	.2107**	-.1666*	-.0196	.0151	.0384
MXARCLTH	-.0142	-.0541	.2507**	-.0204	.1842*	-.0752
MXHEIGHT	.4099**	-.0083	-.3344**	.1200	-.1150	-.0639
MXMNDIFF	.1592	.1865*	-.2628**	-.0052	.1207	-.0158
NASLBANG	.0038	-.0557	-.0493	.2148**	.0177	.0748
NASOFACL	-.0747	-.0211	.3431**	.2171**	.3124**	-.1442
NASOFNTL	.1647*	-.0077	-.2341**	.0299	-.2066*	.0769
NASOMNTL	-.0422	-.0627	.2966**	.3259**	.3821**	-.1133
NOSELGTH	.1272	.0227	-.1280	.2548**	.4720**	.0635
NOSEPROM	-.0226	-.4430**	-.2462**	-.2788**	.3140**	.1614*
NSCHNLTH	.2672**	.1038	.0876	.3051**	.5054**	-.1743*
NSTNASON	-.2205**	.1705*	.1262	.1386	.2518**	.2956**
OCCLPLAN	.6043**	-.1395	-.3462**	.0107	-.3108**	-.2444**
OCCLPLXI	-.2178**	-.1061	.0815	-.0173	.0032	.1295
OPGOGN	.6149**	.0441	-.0252	.0605	-.1432	-.3177**
OPINCLIN	.5122**	-.0418	-.0921	.0149	-.0911	-.2759**
PALPLANE	.1733*	.1278	-.2750**	.1652*	.1112	-.0049
PFH_AFH	-.7752**	-.0246	.1344	-.0891	.4774**	.3532**
PNSANS	-.1860*	.0779	.2493**	.2480**	.7443**	.1462
POGNPERP	-.1327	.9736**	.1665*	.7710**	.0270	-.0526
POGONNB	.3430**	.0392	.3083**	.0598	-.2566**	-.5119**
POGSTPOG	-.1340	-.0194	.0914	-.1074	.2484**	.4742**

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	MANPLAGL	MANPPION	MANDEPTH	MAXPPION	MIDFOLTH	[illegible]
POPCONLC	- .1826	- .1149	- .1882	- .0042	.4564**	.2028**
POSCRNBS	- .2127**	.0221	- .1646	.1321	.6346**	.1914*
POSFACHT	- .3413**	.1981	.0115	.1824*	.5965**	.2471**
RAMPOSTN	.1957*	.1892*	- .3384**	.2715**	- .0394	- .0381
RAMUSHGT	- .4444**	.0871	.1014	.0589	.6385**	.3627**
SACANGLE	- .1143	- .0723	- .2727*	- .0284	.1057	.0726
SE	- .2045*	.1332	- .1477*	.1606	.4482**	.1679*
SL	- .5432**	.1735*	.2813**	- .0454	.5109**	.2615**
SLSDISTC	.0891	.3132**	.1827*	.0507	- .1105	- .2053*
SNA	- .2416**	.1220	.7367**	.1845*	.4359**	-.0973
SNB	-.3629**	.2183**	.3950**	.0185	.3319**	.0029
SNFH	- .0295	.0207	.2002*	.0798	- .2478**	- .0003
SNLOWER1	- .0526**	.2339**	- .0023	- .0231	.0048	.1999*
SNMANDPL	.8834**	-.0630	- .1756*	.0911	- .4351**	- .3970**
SNOCCPLN	.5409**	- .1173	-.1979*	.0579	- .4381**	- .2245**

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- - Correlation Coefficients - -

	MLSULCUS	MNARCLTH	MOLRRELN	MXARCLTH	MXHEIGHT	MXMNDIFF
ABPLANE	.2873**	.0354	-.5743**	.0960	.0125	-.6616**
ANB	.1990*	.1448	-.5638**	.1699*	-.0762	-.6660**
ANGOFCON	.1371	.1918*	-.5354**	.1654*	-.0747	-.6784**
ANSNOSTP	.2913**	-.1732*	.2232**	-.0871	.1971*	.4679**
ANTCRBSE	.4312**	.0511	.1294	.1574	- .1983*	.2223**
ANTFACHT	.1761*	-.1515	.3502**	-.0285	.4957**	.6877**
APONTSTA	.4156**	.0167	.2465**	.1404	.0630	.4440**
APTNPERP	-.0622	.0403	-.0999	.0851	-.0911	-.1895*
ARTANGLE	-.0402	-.0141	.0520	.0018	.2468**	.1639*
BASNASON	.3836**	.0113	.0466	.0801	-.0545	.2470**
BOLFACPL	.0893	.0711	.3601**	.1757*	-.4529**	.3707**
BPONTSTB	-.0537	.0765	.1043	.0501	.1139	.3403**
CANINREL	.0035	.0635	.2931**	.0666	.0209	.2254**
CORPLGTH	.1618*	-.0373	.5238**	.1132	.0680	.3542**
CRANDEFL	-.0104	-.0829	-.0541	- .0647	.3403**	.0161
CRBASAGL	- .0898	-.1246	-.1843*	-.2080*	.0940	-.0893
FACAXAGL	-.0335	-.0489	-.1309	-.0848	.6470**	- .0031
FACDEPTH	.0175	-.0030	.3370**	.0960	-.2735**	.3614**
FACLCNVX	.0175	-.0030	.3370**	.0960	- .2735**	.3614**
FACLDPTH	.3624**	-.0934	.1393	-.0332	.2730**	.4235**
FACLLGTH	.2507**	-.0675	.4878**	.1068	.1621*	.7639**
FACTAPER	.2596**	.0405	-.3593**	-.0534	- .2924**	- .4832**
FCCONAGL	.1594	.0375	-.4363**	.0398	.1544	-.4205**
FMIA	-.1780*	-.2548**	.1715*	-.1182	-.0994	.1739*
GONANGLE	-.1896*	.0448	.1179	.1063	.0102	.0106
HANGLE	.2642**	.3075**	-.5114**	.2560**	-.0615	- .5448**
HLINE	-.0947	-.1514	.5710**	-.0489	-.2228**	.5801**
ILSDISTN	-.4381**	.0056	.3530**	-.0428	-.1157	.3165**
INCISROB	.3832**	-.0515	-.3732**	-.0242	-.0925	- .3727**
INCISROJ	.2566**	.1234	-.3873**	.5130**	-.1973*	-.4147**
INTERINC	-.1247	-.3665**	.0024	-.4410**	.1623*	-.0125
INTLABGP	-.0064	.0489	.0802	.1770*	.0110	.0042
LIPEMBOP	.2823**	.1399	-.1040	.1991*	-.3215**	-.2772**
LLDISTAN	-.1557	.0620	.3550**	.0328	-.1088	.3314**
LO1FACPL	.0014	-.3705**	.0139	-.2230**	.0448	.0304
LO1PALPL	-.1521	-.3383**	.2480**	-.2053*	.0166	.2002*
LOANDNHT	-.3401**	-.0715	-.1164	-.1539	-.1186	-.3809**
LOANFCHT	.0985	-.0343	.3621**	.1066	.2781**	.6940**
LOGONIAL	-.1934*	-.0930	.2376**	-.0306	.4659**	.3627**
LOLIPLTH	.0779	-.1463	.3374**	-.0731	.2671**	.6558**
LOLIPTHK	-.0963	-.3223**	-.0720	-.2023*	-.0037	-.1041
LOLPHLIN	-.0967	-.2877**	.0769	-.1892*	-.0969	.0032

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

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- - Correlation Coefficients - -

	MLSULCUS	MNARCLTH	MOLRRELN	MXARCLTH	MXHEIGHT	MXMNDIFF
LOPSDNHT	- .3249**	.0878	- .1664*	.0100	- .0725	- .3395**
LOSTPCHT	- .1791*	- .0108	.3470**	.1152	.2129**	.4380**
LOWLAPO_	.1025	- .2889**	- .3695**	- .1368	.0097	- .4249**
LOWLOCPL	.2888**	.2410**	- .1029	.1712*	- .0528	- .0444
LOWERLNB	.1682*	.1216**	- .1259	.1952*	- .1407	- .1372
LOWFHAGL	- .1166	- .0386	.1372	.1215	.3450**	.3499**
LOWRIAPO	.1542	.1981*	.2707**	.1072	.0019	.3618**
LOWRIMPL	.3234**	.2586**	-.2259**	.1135	- .1930*	- .2727**
LOWRLNB_	-.1395	- .3136**	- .0192	- .2180**	- .0163	- .0807
LOWRLIPE	- .1496	- .3959**	.1237	-.0634**	.0483	.1430
MANDARC	- .0829	.0514	-.0057	.0713	.0306	- .1097
MANDLGTH	.2310**	-.0939	.4813**	.0716	.1118	.7693**
MANPLAGL	- .2278**	- .0315	.0953	- .0142	.4099**	.1992
MANPROGN	- .0955	- .1312	.2107**	- .0541	- .0083	.1865*
MAXDEPTH	.1078	.1808*	-.1666*	.2507**	- .3344**	- .2628**
MAXPROGN	.0180	-.0990	-.0196	-.0204	.1200	- .0052
MIDFCLTH	.4155**	.0814	.0151	.1842*	- .1150	.1207
MLSHLINE	.5822**	- .2702**	.0384	- .0752	-.0639	-.0158
MLSULCUS	1.0000	-.0192	-.0359	.1538	- .0875	- .0516
MNARCLTH	-.0192	1.0000	-.1822*	.7152**	- .2827**	-.2119**
MOLRRELN	- .0359	- .1822*	1.0000	.1107	.0885	.6808**
MXARCLTH	.1538	.7152**	.1107	1.0000	- .3311**	-.0679
MXHEIGHT	- .0875	- .2827**	.0885	-.3311**	1.0000	.2692**
MXMNDIFF	-.0516	-.2119**	.6808**	- .0679	.2692**	1.0000
NASLBANG	-.0575	-.1523	-.0956	-.1929*	.2300**	-.0326
NASOFACL	.1652*	.1914*	-.3309**	.1818*	-.2268**	-.2182**
NASOFNTL	-.1456	- .2292**	.0803	-.2051*	.2965**	-.0174
NASOMNTL	.1990*	.0537	-.3841**	.0577	-.0605	-.2878**
NOSELGTH	.2165**	-.2139**	.2132**	-.1321	.4608**	.3786**
NOSEPROM	.0205	-.2526**	.0635	-.2666**	.2365**	.2119**
NSCHNLTH	.1702*	.0299	.1775*	.1045	.2595**	.4876**
NSTNASON	.1714*	-.0438	.1134	.0238	-.0359	.0876
OCCLPLAN	-.1909*	.0232	-.0795	-.0922	.2571**	-.2167**
OCCLPLXI	.0369	.1104	-.2848**	-.0075	-.2448**	- .3081**
OPGOGN	-.0917	-.0581	.1997*	.0828	.2223**	.4155**
OPINCLIN	- .0015	-.0947	.1798*	.0396	.3150**	.4570**
PALPLANE	.0396	-.1926*	.1767*	-.1970*	.2434**	.0710
PFH_AFH	.3036**	.0864	.0373	.0857	-.3304**	.0082
PNSANS	.3282**	.0171	.1100	.1787*	-.0806	.2121**
POGNPERP	-.1335	- .0790	.2194**	-.0174	-.0593	.1877*
POGONNB	-.3198**	.2763**	-.0709	.0986	-.1359	- .2530**
POGSTPOG	.4219**	-.0658	.0994	.0279	-.0728	.1357

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

. . * is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	MLSULCUS	MNARCLTH	MOLRRELN	MXARCLTH	MXHEIGHT	MXMNDIFF
PORIGNLC	.2286**	-.0499	.1940*	.0040	-.2317**	.3087**
POSCRNBS	.2707**	.0186	.0765	.0790	.1924*	.2369**
POSFACHT	.3227**	-.0925	.2016*	-.0344	.1995*	.4630**
RAMPOSTN	.0105	.0694	-.3067**	-.0125	.2844**	-.2950**
RAMUSHGT	.2998**	-.0837	.3209**	.0024	-.0155	.5173**
SADANGLE	-.0378	-.1377	-.1737*	-.2217**	.2218**	-.1156
SE	.1150	-.0942	-.0899	-.1210	.2860**	.0460
SL	.2116**	.1326	.3298**	.2515**	-.5258**	.2911**
SLSDISTC	-.0494	.2244**	-.0018	.2371**	-.2401**	-.0752
SNA	.1626*	.2645**	-.0244	.3560**	-.4774**	-.1432
SNB	.0210	.1696*	.3965**	.2460**	-.4426**	.3475**
SNFH	-.0989	-.1563	-.1749*	-.1987*	.2679**	-.1231
SNLOWER1	-.1345	-.1893*	.2340**	-.0388	-.1998*	.2165**
SNMANDPL	-.2511**	-.1003	.0038	-.1054	.4933**	.0847
SNOCCPLN	-.2360**	-.0727	-.1798*	-.2058*	.4017**	-.2764**

[illegible] - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

. is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	NASLBANG	NASOFACL	NASOFNTL	NASOMNTL	NOSELGTH	NOSEPROM
ABPLANE	.1202	.3702**	.0396	.5238**	.0588	.0049
ANB	.0467	.4011**	-.0215	.5112**	-.0011	-.1014
ANGOFCON	.0389	.3897**	-.0336	.4781**	-.0748	-.1566
ANSNOSTP	.0303	.1196	-.0475	.2966**	.6570**	.6370**
ANTCRBSE	.0415	.0494	-.1241	.0930	.3496**	.3213**
ANTFACHT	.1171	-.0042	.0397	.0701	.2970**	.2872**
APONTSTA	-.1110	.2086*	-.2196**	.2145**	.4103**	-.0058
APTIPERP	-.0338	.2563*	-.0813	.1912*	-.0407	-.5131**
ARTANGLE	.0175	-.0968	.1330	-.0630	.0405	-.0547
BASNASON	.0403	.0817	-.1430	.1400	.4575**	.3536**
BOLFACPL	-.2105**	.0604	-.2573**	-.0749	-.0299	-.0325
BPONTSTB	-.1127	.1230	-.0990	.1377	.2554**	.1774*
CANINREL	-.0762	-.0291	.0146	-.0798	.1399	-.1021
CORPLGTH	-.0761	-.0020	-.1473	-.0322	.4912**	.1791*
CRANDEFL	.1671*	-.1375	.1551	-.1109	.0332	-.1605*
CRBASAGL	-.0071	.0790	-.0802	.1028	.0734	.1218
FACAXAGL	.1303	-.0449	.2485**	.0524	.2389**	-.0305
FACDEPTH	-.0679	-.0126	-.2118**	-.1371	-.0590	-.1024
FACLCNVX	-.0679	-.0126	-.2118**	-.1371	-.0590	-.1024
FACLDPTH	.1152	.0426	.0060	.1460	.6532**	.4286**
FACLLGTH	.0205	.0079	-.0854	.0166	.5904**	.3301**
FACTAPER	.0459	.0984	-.0431	.1503	-.1096	.1004
FCCONAGL	.4694**	.4336**	.0353	.6940**	.3085**	.1745*
FMIA	.0986	-.1404	.0082	-.2034*	-.1397	-.0621
GONANGLE	.0161	-.0265	.0235	-.0792	-.1166	-.1397
HANGLE	-.0122	.4858**	-.2714**	.5843**	.0528	-.1987*
HLINE	-.1068	-.2858**	-.0497	-.4452**	-.0739	.0865
ILSDISTN	-.3642**	-.2322**	-.0375	-.4306**	-.2825**	-.4721**
INCISROB	.2144**	.2284**	-.0148	.3606**	.1243	.2019*
INCISROJ	-.0200	.2564**	-.0434	.2752**	-.0517	-.1792*
INTERINC	.2977**	-.1278	.1690*	-.0470	.0525	.1262
INTLABGP	.1053	-.1140	.1722*	-.1679*	-.0707	-.1821*
LIPEMBOP	-.1589	.1250	-.2086*	.0799	-.0535	-.1704*
LLDISTAN	-.4885**	-.1509	-.0986	-.3543**	-.2082*	-.5220**
LO1FACPL	.1739*	-.2484**	.1493	-.2111**	-.0410	.1175
LO1PALPL	.0983	-.1943*	.0631	-.1749*	.0118	.0208
LOANDNHT	-.0171	-.2363**	.1178	-.2676**	-.5262**	-.1943*
LOANFCHT	.0457	.0697	-.0409	.0216	.4684**	.1387
LOGONIAL	.0956	-.0817	.1541	-.0749	.1982*	-.0269
LOLIPLTH	-.0628	.0468	-.0927	.0220	.4547**	.1553
LOLIPTHK	.3831**	-.1394	.1287	-.0346	.0549	.2890**
LOLPHLIN	.1693*	-.3104**	.1802*	-.3200**	-.1626*	.1650*

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

. . * is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	NASLBANG	NASOFACL	NASOFNTL	NASOMNTL	NOSELGTH	NOSEPROM
LOPSDNHT	-.0674	-.1687*	.0845	-.2071*	-.4937**	-.2492**
LOSTFCHT	-.0314	.0858	-.0915	-.0225	.3857**	-.0374
LOW1APO_	.2311**	.0060	.1542	.1199	-.0570	.0412
LOW1OCPL	-.1812*	.1842*	-.1206	.2035*	.1495	.0560
LOWER1NB	-.1610*	.1656*	-.1296	.1593	.0948	-.0222
LOWFHAGL	.0244	-.0531	.1405	-.1036	.1023	.0611
LOWR1APO	-.1825*	-.0517	-.1086	-.0988	.1673*	.0936
LOWR1MPL	-.0945	.1819*	-.1217	.2183**	.0421	.0736
LOWR1NB_	.1555	-.2434**	.1354	-.2475**	-.1869*	-.0107
LOWRLIPE	.1760*	-.2133**	.1514	-.0962	.2023*	.3959**
MANDARC	-.0990	-.0090	-.0396	-.0708	-.1875*	-.0969
MANDLGTH	-.0111	.0499	-.1447	.0464	.5651**	.3486**
MANPLAGL	.0038	-.0747	.1647*	-.0422	.1272	-.0226

[illegible]	- [illegible]	- [illegible]	- [illegible]	[illegible]	[illegible]	[illegible]
[illegible]	- [illegible]	[illegible]**	- [illegible]**	[illegible]**	- [illegible]	[illegible]**
[illegible]	.2449**	[illegible]**	.0239	.3259**	[illegible]**	- [illegible]**
[illegible]	[illegible]	.3124**	- .2166*	.3821**	[illegible]**	[illegible]
MLSHLINE	.1748	- .1442	.1769	- .2133	.3635	.2544*
MLSULCUS	- .1575	.1882*	- .1456	.1990*	.2165**	.2015
MNARCLTH	- .1823	.1914*	- .2292**	.1827	- .2139**	- .2826**
MOLRRELN	- .0956	- .3109**	.0803	- .3841**	.2132**	.1635
MXARCLTH	- .1929*	.1821*	- .2051*	.1877	- .1321	- .2666**
MXHEIGHT	.2322**	- .2268**	.2965**	- .1615	.4628**	.2365**
MXSNDIFF	- .1326	- .2182**	- .2174	- .2878**	.3736**	.2119**
NASLBANG	.1 [illegible]	- .1148	.1196	.1400	.1780*	.3229**
NASOFACL	- .1225	- .2702	- .4838**	.9925**	- .1553	.2221
NASOFNTL	.1196	- .4838**	1.0000	- .2865**	.3698	.1487
NASOMNTL	.1400	.9835**	- .2865**	1.0000	.1596	.2704**
NOSELGTH	.1780*	-.1553	.3699	.1596	1.0000	.5187**
NOSEPROM	.3229**	.2021	.1487	.2704**	.5187**	1.0000
NSCHNLTH	.0444	.2824**	-.0702	.2585**	.4559**	.2179**
NSTNASON	.0235	-.0872	.4958**	-.0400	.0426	.0812
OCCLPLAN	.1395	-.0761	.1904*	-.0028	- .0165	.0102
OCCLPLXI	.2011*	.0520	.0496	.0754	- .1399*	- .0370
OPGOGN	-.1539	- .0183	.0034	- .0552	.1493	- .0487
OPINCLIN	- .1702*	.0041	.0064	-.0117	.2272**	.0417
PALPLANE	.0047	- .1222	.1145	.0493	.3173**	.1797*
PFH_AFH	.0146	.0914	-.0962	.0772	.0421	.1481
PNSANS	.1453	.2814**	-.1877*	.3542**	.4614**	.3060**
POGNPERP	- .0583	- .0224	-.0668	- .0885	- .0143	-.4596**
POGONNB	- .1060	.1021	- .0841	.0003	- .2918**	- .3181**
POGSTPOG	-.1277	.0433	-.1440	-.0041	.0931	.0596

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	NASLBANG	NASOFACL	NASOFNTL	NASOMNTL	NOSELGTH	NOSEPROM
PORIONLC	.0246	.0964	-.1735*	.1077	.3212**	.3224**
POSCRNBS	.0871	.0477	.0241	.1320	.5173**	.2947**
POSFACHT	.1099	.0882	-.0561	.1421	.5442**	.3412**
RAMPOSTN	-.0440	.1131	.0190	.1723*	.0195	- .1485
RAMUSHGT	.0680	.0604	-.1021	.0636	.4239**	.3058**
SADANGLE	.0287	.0369	.0114	.0940	.1741*	.1461
SE	.0710	.0511	.0335	.1441	.4349**	.3802**
SL	-.1228	.0569	-.2649**	-.0455	- .0128	.0366
SLSDISTC	-.7915**	.0576	-.1340	-.1702*	- .3716**	- .6527**
SNA	-.1296	.3450**	-.2582**	.2840**	-.0916	- .1637*
SNB	-.1736*	.0624	-.2538**	-.0855	-.0823	- .0965
SNFH	.1259	-.0671	.0752	-.0374	-.0278	- .0765
SNLOWER1	.0489	-.1111	- .0212	-.1837*	- .1257	- .0316
SNMANDPL	.0622	-.0979	.1833*	-.0551	.1007	-.0554
SNOCCPLN	.2062*	-.1110	.2233**	-.0248	- .0326	- .0363

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	NSCHNLTH	NSTNASON	OCCLPLAN	OCCLPLXI	OPGOGN	OPINCLIN
ABPLANE	.0418	.1039	.2534**	.3355**	-.2130**	-.1421
ANB	.0939	.0542	.2713**	.3108**	-.0962	-.0463
ANGOFCON	.0709	.0097	.3068**	.2891**	-.0426	-.0222
ANSNOSTP	.4290**	.1907*	-.2393**	-.2008*	.0332	.1386
ANTCRBSE	.3339**	.1459	-.2588**	.0064	-.0887	-.0612
ANTFACHT	.8102**	.1382	-.0915	-.3259**	.3797**	.4757**
APONTSTA	.4155**	.1448	-.3193**	-.2454**	.1331	.2018*
APTNPERP	.1538	.1772*	.0419	.0819	-.0028	-.0772
ARTANGLE	.1518	.0257	.3123**	-.1909*	.1878*	.3084**
BASNASON	.4118**	.1090	-.3395**	-.0997	.0351	.0571
BOLFACPL	.0297	.2154**	-.5571**	-.2166**	-.0606	-.1447

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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
FACAXAGL	.1246**	-.0614	.4519**	-.0126	.1111**	.4239**
FACDEPTH	.0094	-.1067	-.6673**	-.1837*	-.1786	-.2026
FACLCNTX	.0094	-.1067	-.6673**	-.1837*	-.1096	-.2026
FACLDPTH	.6106**	.2566**	-.2069**	-.0910	-.1755	.1254
FACLLGTH	.7136**	.2172**	-.2516**	-.1425**	.2493**	.3293**
FACTAPER	-.3277**	.1654*	-.2404**	.3946**	-.7308**	-.5397**
FCCONAGL	.2122**	-.0638	.2418**	.1875*	-.0470	.0033
FMIA	-.2808**	.0616	-.2885**	-.0691	-.0498	-.1649*
GONANGLE	.0412	-.2540**	.2166**	-.0509	.4965**	.2450**
HANGLE	.0252	-.2304**	.1364	.1631*	-.0232	.0218
HLINE	-.1266	.1731*	-.3595**	-.2289**	-.0293	-.2660
ILSDISTN	-.2045	.0269	-.1216	-.2010*	.1338	.0259
INCISROB	-.0298	.1072	.0545	.2609**	-.3646**	-.3130**
INCISROJ	-.0172	.0482	-.0677	.1554	-.0154	-.0356
INTERINC	-.1473	.1131	.2637**	.1240	-.2238**	-.2208**
INTLABGP	.1113	-.0230	.0560	-.0458	.1850*	.1092
LIPEMBOP	-.0407	-.0246	-.2920**	.0999	.0195	-.0767
LLDISTAN	.0226	.0367	-.1634*	-.2787**	.2319**	.1545
LO1FACPL	-.3601**	.1428	-.0616	.1257	-.3793**	-.3751**
LO1PALPL	-.2703**	.1114	-.1308	-.0790	-.0990	-.1884*
LOANDNHT	-.7306**	-.2610*	.2859*	.1638*	-.3349**	-.4041**
LOANFCHT	.8279**	.1249	-.0490	-.2858**	.4635**	.5130**
LOGONIAL	.4243**	-.1541	.3384**	-.2854**	.6367**	.6148**
LOLIPLTH	.6561**	.2853*	-.1954*	-.3418**	.3106**	.3917**
LOLIPTHK	-.2745**	.1588	-.0792	.2463**	-.3993**	-.4036**
LOLPHLIN	-.4029**	.2142**	-.1366	.1908*	-.3830**	-.4095**

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	NSCHNLTH	NSTNASON	OCCLPLAN	OCCLPLXI	OPGOGN	OPINCLIN
LOPSDNHT	-.6240**	-.3015**	.0668	-.1692*	.0984	-.0428
LOSTFCHT	.7910**	.1938*	-.1297	-.2847**	.3929**	.4294**
LOW1APO_	-.3036**	.1742*	.1404	.3278**	-.4138**	-.3914**
LOW1OCPL	.3008**	-.0377	-.3026**	-.1841*	.1941*	.3080**
LOWER1NB	.3226**	-.0230	.0057	-.0198	.0860	.1548
LOWFHAGL	.4651**	-.1306	.2891**	-.1454	.5719**	.6456**
LOWR1APO	.3022**	-.0083	-.1887*	-.1785*	.0877	.2609*
LOWR1MPL	.0762	.0968	-.1538	.2161**	-.3828**	-.2042*
LOWR1NB_	-.4574**	.0911	-.0007	.1487	-.3430**	-.3891**
LOWRLIPE	-.1501	.2338**	-.1726*	.0821	-.2909**	-.2896**
MANDARC	-.0283	-.2460**	.2926**	-.0366	.3015**	.2785**
MANDLGTH	.6616**	.2227**	-.3501**	-.3487**	.1948*	.2566**
MANPLAGL	.2672**	-.2205**	.6043**	-.2178**	.6149**	.5122**
MANPROGN	.1038	.1705*	-.1395	-.1061	.0441	-.0418
MAXDEPTH	.0876	.1262	-.3462**	.0815	-.0252	-.0921
MAXPROGN	.3051**	.1386	.0107	-.0173	.0605	.0149
MIDFCLTH	.5054**	.2518**	-.3108**	.0032	-.1432	-.0911
MLSHLINE	-.1743*	.2956**	-.2444**	.1295	-.3177**	-.2759**
MLSULCUS	.1702*	.1714*	-.1909*	.0369	-.0917	-.0015
MNARCLTH	.0299	-.0438	.0232	.1104	-.0581	-.0947
MOLRRELN	.1775*	.1134	-.0795	-.2848**	.1997*	.1798*
MXARCLTH	.1045	.0238	-.0922	-.0075	.0828	.0396
MXMEIGHT	.2595**	-.0359	.2571**	-.2448**	.2223**	.3150**
MXMNDIFF	.4876**	.0876	-.2167**	-.5081**	.4155**	.4570**
NASLBANG	.0444	.0235	.1395	.2011*	-.1539	-.1702*
NASOFACL	.2824**	-.0872	-.0761	.0520	-.0183	.0041
NASOFNTL	-.0702	.4958**	.1904*	.0496	.0034	.0064
NASOMNTL	.2585**	-.0400	-.0028	.0754	-.0552	-.0117
NOSELGTH	.4559**	.0426	-.0165	-.1999*	.1493	.2272**
NOSEPROM	.2179**	.0812	.0102	-.0370	-.0487	.0417
NSCHNLTH	1.0000	.1541	-.0334	-.2564**	.3505**	.4388**
NSTNASON	.1541	1.0000	-.0393	.1371	-.2357**	-.1736*
OCCLPLAN	-.0334	-.0393	1.0000	.4295**	-.2457**	-.2455**

[illegible]	- 1364**	[illegible]	[illegible]	- .[illegible]	- [illegible]***	[illegible]
PCION	1[illegible]**	- 0[illegible]**	- 1[illegible]**	- 0[illegible]**	[illegible]	[illegible]
OPINCLIN	4[illegible]**	- 2[illegible]*	- 2[illegible]**	- [illegible]**	[illegible]**	[illegible]
PALPLANE	0[illegible]	[illegible]	0[illegible]**	- 0[illegible]	- [illegible]	- [illegible]
PFH_AFH	- 0[illegible]	0[illegible]**	- 0997**	[illegible]*	- 8[illegible]**	- .[illegible]**
PNSANS	5[illegible]**	[illegible]	- 0[illegible]**	- [illegible]	[illegible]	[illegible]
POGNPERP	[illegible]	[illegible]*	- [illegible]	- [illegible]	- [illegible]	- [illegible]
POGONNB	- [illegible]	- [illegible]*	[illegible]*	- [illegible]	[illegible]**	[illegible]
POGSTPOG	[illegible]	[illegible]**	- [illegible]**	- [illegible]	[illegible]	[illegible]

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	NSCHNLTH	NSTNASON	OCCLPLAN	OCCLPLXI	OPGOGN	OPINCLIN
PORIONLC	2803**	.0462	- 1400	-.0544	- 0514	- 0073
POSCRNBS	.4574**	1883*	- 1542	0129	- 1336	0073
PCSFACHT	5906**	3163**	- 3012**	- 0784	- 1409	0803
RAMPOSTN	- 0340	0136	3678**	-.0100	- 1275	- 0692
RAMUSHGT	4806**	3197**	-.4323**	- 1208	- 1339	0515
SADANGLE	- 0093	- 0645	- 1121	.0858	- 0438	- 0783
SE	.2613**	.0719	- 1688*	.0899	- 1205	-.0676
SL	0415	.2158**	-.4421**	-.0796	2164**	- 2471**
SLSDISTC	- 0126	- 0442	- 0724	- 1372	.1973*	.1619*
SNA	1353	2054*	- 1626*	.0489	- 1324	-.1380
SNB	0693	1756*	- 3750**	-.1827*	- 0666	-.1099
SNFH	-.0840	- 1404	- 2022*	0317	.1604*	0835
SNLOWER1	-.2425**	1130	-.2037*	-.0786	-.1097	-.1927*
SNMANDPL	.1999*	-.2630**	.4478**	-.1804*	.6262**	.4986**
SNOCCPLN	-.0816	- 1206	.8010**	.4165**	- 1895	-.1751*

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	PALPLANE	PFH_AFH	PNSANS	POGNPERP	POGONNB	POGSTPOG
ABPLANE	.0469	-.0025	.1856*	- 2003*	-.0667	- 0253
ANB	- 0216	- 0807	.1568	-.1937*	1819*	.0021
ANGOFCON	-.0054	-.1498	.0872	-.1790*	4199**	.0125
ANSNOSTP	.2173**	.2691**	.3321**	-.1375	- 4335**	2867**
ANTCRBSE	.0304	.3433**	.5395**	-.0594	-.4310**	.1948*
ANTFACHT	.1222	-.0145	.5014**	.0604	-.2307**	1921*
APONTSTA	.0468	.2263**	.3568**	.1518	-.3034**	.4154**
APTNPERP	.0919	-.0896	.1427	.8211**	.2491**	- 1327
ARTANGLE	.0303	-.2317**	-.1050	-.0577	.0543	-.0527
BASNASON	.0509	.3167**	.5884**	-.0628	-.3645**	2493**
BOLFACPL	-.0012	.4388**	.2854**	.3048**	- 1157	1604*
BPONTSTB	.0683	.0468	.1777*	-.1918*	-.1010	4173**
CANINREL	.1453	- 0450	1652*	.1594	.1285	.1610*
CORPLGTH	.1039	.2041*	.5574**	.3642**	-.2868**	1358
CRANDEFL	-.4168**	-.2135**	-.1209	.0721	0195	- 0674
CRBASAGL	.0048	-.2753**	- 0040	-.0800	.0490	0630
FACAXAGL	-.0050	-.4256**	-.1056	-.1231	.1196	-.0548
FACDEPTH	-.2753**	.2989**	.1820*	.3562**	-.0795	0833
FACLCNVX	-.2753**	.2989**	.1820*	.3562**	-.0795	.0833
FACLDPTH	.1074	.4621**	.6050**	-.0606	-.4584**	.2909**
FACLLGTH	.1066	.3007**	.6142**	.1058	-.3070**	.2520**
FACTAPER	-.0079	.7126**	.0910	-.0980	-.3537**	0990
FCCONAGL	.0727	-.1102	.2301**	-.1915*	.0628	-.1734*
FMIA	-.1789*	.0377	-.0574	.2807**	-.1149	-.0627
GONANGLE	-.0942	-.5830**	-.1792*	.0220	.3701**	-.1951
HANGLE	-.0268	-.0655	.0808	-.2945**	.2230**	-.0040
HLINE	.0232	.3690**	.1001	.3504**	-.1715*	1951*
ILSDISTN	.0295	-.0989	-.2278**	.7445**	.2124**	-.1239
INCISROB	.0541	.2723**	.2557**	-.2086*	-.2446**	0938
INCISROJ	-.1767*	.0225	.1853*	-.0785	-.0976	.0483
INTERINC	.1043	- 0384	-.0585	.0968	-.1276	-.1116

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LOLFACPL	- .1159	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LOLPALPL	.1961**	.1443	- .1456	.0289**	- .1263	- .019
LOANDNHT	- .0200	- .1491	- .5921**	.0147	.0592	- .1458**
LOANFCHT	- .0831	- .049	.4536**	.1430	- .1026	.1692*
LOGONIAL	- .0037	- .6408**	- .0963	- .0233	.3140**	- .0553
LOLIPLTH	.1844	[illegible]	.3945**	.3119**	- .1874*	.1951*
LOLIPTHK	.1174	.0140**	.0269	.0535	- .4312**	.1173
LOLPHLIN	- .0369	.2394**	- .1146	.0654	- .0920**	.1891*

* - Signif LE .05 ** - Signif LE .01 (2-tailed)

is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	PALPLANE	PFH_AFH	PNSANS	POGNPERP	POGONNB	POGSTPOG
LOPSONHT	- .1019	- .3945**	- .5525**	- .0343	.1800*	- .3547**
LOSTFCHT	- .0334	.0152	.4528**	.2987**	-.0924	.2556**
LOW1APO_	- .0107	.0739	.0109	.0057	- .3608**	-.1640*
LOW1OCPL	- .0073	.1979*	.2246**	- .1944*	.0152	.1996*
LOWER1NB	.0571	.0697	.1310	- .1322	.2186**	.1200
LOWFHAGL	-.1916*	- .4483**	- .1066	-.2944**	.1455	.0525
LOWR1APO	.0551	.1908*	.1169	-.0395	-.1309	.1124
LOWR1MPL	.0461	.5057**	.1829*	-.1673*	-.1324	.1517
LOWR1NB_	- .0357	.0671	- .1946*	.1611*	- .2396**	- .1795*
LOWRLIPE	.1054	.2324**	.0913	.2023*	- .4783**	.1261
MANDARC	-.0519	- .4766**	-.2566**	-.2523**	.2206**	- .0971
MANDLGTH	.1211	.3131**	.6258**	.1479	- .3396**	.2534**
MANPLAGL	.1733*	- .7752**	- .1860*	- .1327	.3430**	- .1340
MANPROGN	.1278	- .0246	.0779	.9736**	.0392	-.0194
MAXDEPTH	- .2750**	.1344	.2493**	.1665*	.3083**	.0914
MAXPROGN	.1652*	-.0891	.2480**	.7710**	.0598	-.1074
MIDFCLTH	.1112	.4774**	.7443**	.0270	- .2566**	.2484**
MLSHLINE	- .0049	.3532**	.1462	-.0526	-.5119**	.4742**
MLSULCUS	.0396	.3036**	.3282**	-.1335	-.3198**	.4219**
MNARCLTH	-.1926*	.0864	.0171	-.0790	.2763**	-.0658
MOLRRELN	.1767*	.0373	.1100	.2194**	- .0709	.0994
MXARCLTH	- .1970*	.0857	.1787*	- .0174	.0996	.0279
MXHEIGHT	.2434**	-.3304**	-.0806	-.0593	-.1359	- .0728
MXMNDIFF	.0710	.0092	.2121**	.1877*	-.2530**	.1357
NASLBANG	.0047	.0146	.1453	-.0583	- .1060	- .1277
NASOFACL	-.1222	.0914	.2814**	-.0224	.1021	.0433
NASOFNTL	.1145	-.0962	- .1877*	-.0668	-.0841	- .1440
NASOMNTL	.0493	.0772	.3542**	- .0885	.0003	-.0041
NOSELGTH	.3178**	.0421	.4614**	- .0143	-.2918**	.0931
NOSEPROM	.1797*	.1481	.3060**	-.4596**	-.3181**	.0596
NSCHNLTH	.0080	-.0045	.5213**	.0770	-.0604	.0916
NSTNASON	.1045	.3060**	.1800*	.1865*	-.1772*	.2115**
OCCLPLAN	.3153**	-.3997**	-.2942**	-.1426	.1688*	- .2324**
OCCLPLXI	-.0317	.1702*	-.1109	-.0765	-.0068	-.0472
OPGOGN	-.1036	-.5610**	.0501	-.0142	.2353**	.0526
OPINCLIN	-.0562	-.3548**	.0802	-.1109	.1248	.1283
PALPLANE	1.0000	.0149	.0228	.1141	-.0307	.0205
PFH_AFH	.0149	1.0000	.3363**	.0119	- .3042**	.2302**
PNSANS	.0228	.3363**	1.0000	.0813	-.2270**	.1805*
POGNPERP	.1141	.0119	.0813	1.0000	.0067	- .1571
POGONNB	-.0307	-.3042**	-.2270**	.0067	1.0000	.0412
POGSTPOG	.0205	.2302**	.1805*	-.1571	.0412	1.0000

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

* . * is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	PALPLANE	PFH_AFH	PNSANS	POGNPERP	POGONNB	POGSTPOG
PORIONLC	.1362	.2858**	.3582**	-.1126	-.2416**	.2497**
POSCRNBS	.0454	.5327**	.5125**	.0169	-.3304**	.1530

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
RAMPOSTN	.1117**	- .[illegible]	- .[illegible]	.[illegible]*	- .[illegible]	.[illegible]
RAMUSHGT	.0969	-.1445**	.5487**	.[illegible]	- .[illegible]**	.[illegible]**
SADANGLE	.[illegible]	- .[illegible]	.[illegible]	- .[illegible]	- .[illegible]	.[illegible]
SE	.0821	.1095*	.1085**	- .[illegible]**	- .[illegible]**	.[illegible]
SL	.0185	.[illegible]**	.3902**	.2443**	- .[illegible]**	.[illegible]
SLSDISTC	- .1407	- .1006	- .[illegible]*	.[illegible]**	.[illegible]**	.[illegible]
SNA	.[illegible]	.[illegible]**	.[illegible]**	.[illegible]	.[illegible]**	.[illegible]
SNB	.0264	.[illegible]**	.[illegible]**	.[illegible]**	.[illegible]	.[illegible]
SNPH	- .[illegible]**	- .[illegible]**	- .[illegible]*	- .[illegible]	.[illegible]	- .[illegible]
SNLOWER1	- .[illegible]	.[illegible]**	.[illegible]	.[illegible]**	-.[illegible]	- .[illegible]
SNMANDPL	- .[illegible]	- .[illegible]**	- .[illegible]**	- .[illegible]	.[illegible]**	- .[illegible]
SNOCCPLN	.[illegible]	- .[illegible]**	- .[illegible]**	- .[illegible]	.[illegible]*	- .[illegible]**

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	PORIONLC	POSCRNBS	POSFACHT	RAMPOSTN	RAMUSHGT	SADANGLE
ABPLANE	- .1096	.0379	- .0153	.3100**	-.1915*	.0271
ANB	- .1608*	- .0213	- .0942	.2592**	- .2524**	- .0347
ANGOFCON	- .2028*	- .0991	- .1855*	.2225**	- .3133**	- .0380
ANSNOSTP	.4272**	.4746**	.6120**	-.1125	.5949**	.2035*
ANTCRBSE	.4110**	.3919**	.5011**	-.0945	.5259**	- .1304
ANTFACHT	.3317**	.5938**	.7171**	-.0702	.5766**	.0775
APONTSTA	.2952**	.3919**	.5164**	-.0344	.5153**	.0982
APTNPERP	- .2082*	- .0290	- .0087	.2865**	- .0827	- .1056
ARTANGLE	-.0178	-.1059	-.2150	.0197	-.2430**	-.6820**
BASNASON	.4364**	.5064**	.5603**	-.0027	.5799**	.2142**
BOLFACPL	.3066**	.0891	.2720**	- .3206**	.4401**	-.1057
BPONTSTB	.1790*	.1756*	.3420**	-.0721	.3148**	.0299
CANINREL	.1182	.0579	.1540	-.1251	.1591	- .0690
CORPLGTH	.4053**	.4807**	.6269**	- .1004	.6109**	- .0871
CRANDEFL	-.3022**	.0300	-.0299	-.1833*	-.1766*	- .0910
CRBASAGL	.0044	- .2433**	- .0816	.0825	.0073	.8624**
FACAXAGL	- .3345**	.1175	.0526	.3550**	-.2138**	- .0018
FACDEPTH	.1358	.0202	.1803*	-.5482**	.3164**	-.1425
FACLCNVX	.1358	.0202	.1803*	- .5482**	.3164**	- .1425
FACLDPTH	.4422**	.7810**	.9170**	-.0073	.7812**	.0561*
FACLLGTH	.4889**	.6415**	.7632**	-.2595**	.7259**	- .1887*
FACTAPER	.0933	.2403**	.2780**	.1638*	.3031**	.2279**
FCCONAGL	-.0503	.1056	.0267	.2026*	- .1265	.0649
FMIA	-.0533	-.0660	-.1213	- .2441**	-.0218	- .0838
GONANGLE	-.2586**	-.2925**	-.5078**	-.0850	-.3692**	- .0289
HANGLE	-.0819	-.0096	-.1031	.1361*	- .2126**	.0300
HLINE	.2637**	.1348	.2221**	- .3483**	.3949**	-.2765**
ILSDISTN	- .1736*	-.2037*	- .1411	.0228	-.0444	- .1191
INCISROB	.2056*	.2198**	.1699*	.0631	.0639	-.0125
INCISROJ	-.0609	.1152	- .0599	.1455	- .1339	-.0084
INTERINC	-.0337	.0128	-.0267	.0656	- .0781	- .0828
INTLABGP	-.0082	- .0407	-.1538	-.1269	-.1469	- .0889
LIPEMBOP	.0702	.0636	-.0087	.0438	.0304	.1135
LLDISTAN	-.1458	- .1546	-.0632	.0324	.0216	- .1209
LO1FACPL	-.0030	.0675	-.0028	.0569	.0001	.0227
LO1PALPL	.0113	-.0419	-.0708	-.1342	.0245	-.0617
LOANDNHT	-.3797**	- .5624**	-.6926**	.1036	- .5656**	-.0238
LOANFCHT	.2554**	.4740**	.6114**	-.0883	.5079**	- .0938
LOGONIAL	-.1705*	-.1327	-.1438	-.0749	-.1715*	-.1061
LOLIPLTH	.2013*	.4064**	.5968**	-.0542	.5395**	.0198
LOLIPTHK	.1204	.0979	.0766	-.0117	.0736	.1086
LOLPHLIN	.0940	.0018	-.0009	-.0799	.0602	.0392

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	PORIONLC	POSCRNBS	POSFACHT	RAMPOSTN	RAMUSHGT	SADANGLE

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
LOWERLNB	.1014	.0772	.0793*	-.0273	.1455	.0229
LOWFHAGL	-.0899	-.0746	.0030	-.0331	-.0595	-.0014
LOWFLAPO	.2412**	.0426	.0854**	-.0303	.0607**	.0179
LOWRLMPL	.0563	.2401**	.0518**	.0900	.3305**	.0812
LOWRLNB_	-.1134	-.0713	-.0970*	.0316	-.0589	-.0383
LOWRLIPE	.1687*	.0701*	.2024*	-.0486	.2196**	.0217
MANDARC	-.1471	-.0581**	-.0180**	-.0331	-.0481**	-.0808
MANDLGTH	.0170**	.0718**	.0693**	-.0292**	.0688**	.0213
MANPLAGL	-.0526	-.0127**	-.0413**	.0957*	-.0444**	-.0043
MANPROGN	-.0049	.0220	.0950	.0892*	.0870	-.0703
MAXDEPTH	-.0582	-.0646	.0025	-.0084**	.0104	-.0727*
MAXPROGN	-.1042	.1321	.1624*	.2715**	.0589	-.0284
MIDFCLTH	.4564**	.6346**	.5965**	-.0394	.6385**	.1057
MLSHLINE	.2229**	.1914*	.2471**	-.0381	.2627**	.0726
MLSULCUS	.2286**	.2707**	.3227**	.0105	.2998**	-.0379
MNARCLTH	-.0499	.0186	-.0925	.0694	-.0837	-.1377
MOLRRELN	.1840*	.0765	.2015*	-.0067**	.1209**	-.0737*
MXARCLTH	.0040	.0790	-.0344	-.0125	.0024	-.2217**
MXHEIGHT	-.2317**	.1924*	.1995*	.2844**	-.0155	.2218**
MXMNDIFF	.3087**	.2369**	.4630**	-.2950**	.5173**	-.1186
NASLBANG	.0246	.0871	.1099	-.0440	.0680	.0287
NASOFACL	.0964	.0477	.0882	.1131	.0604	.0369
NASOFNTL	-.1735*	.0241	-.0561	.0190	-.1021	.0114
NASOMNTL	.1077	.1320	.1421	.1723*	.0636	.0940
NOSELGTH	.3212**	.5173**	.5442**	.0195	.4239**	.1741*
NOSEPROM	.3224**	.2947**	.3410**	-.1485	.3058**	.1461
NSCHNLTH	.2503**	.4574**	.5906**	-.0340	.4806**	-.0093
NSTNASON	.0462	.1883*	.3163**	.0186	.3197**	-.0645
OCCLPLAN	-.1400	-.1542	-.3012**	.3678**	-.4323**	-.1121
OCCLPLKI	-.0544	.0129	-.0784	-.0100	-.1208	.0858
OPGOGN	-.0514	-.1336	-.1409	-.1275	-.1339	-.0438
OPINCLIN	-.0073	.0073	.0803	-.0692	.0515	-.0783
PALPLANE	.1362	.0454	.0990	.2137**	.0969	.0398
PFH_AFH	.2858**	.5327**	.5946**	-.1411	.6945**	-.1222
PNSANS	.3582**	.5125**	.5834**	-.0586	.5457**	.0234
POGNPERP	-.1126	.0169	.0848	.1826*	.0898	-.0868
POGONNB	-.2416**	-.3304**	-.4248**	-.0784	-.3493**	-.0702
POGSTPOG	.2497**	.1530	.3109**	-.1588	.3479**	.0564

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

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- - Correlation Coefficients - -

	PORIONLC	POSCRNBS	POSFACHT	RAMPOSTN	RAMUSHGT	SADANGLE
PORIONLC	1.0000	.3005**	.3921**	-.3706**	.4392**	-.0266
POSCRNBS	.3005**	1.0000	.7409**	.0639	.5384**	.0350
POSFACHT	.3921**	.7409**	1.0000	-.0670	.8552**	.0868
RAMPOSTN	-.3706**	.0639	-.0670	1.0000	-.2453**	.1773*
RAMUSHGT	.4392**	.5384**	.8552**	-.2453**	1.0000	.1104
SADANGLE	-.0266	.0350	.0868	.1773*	.1104	1.0000
SE	.1447	.6061**	.4972**	.1804*	.4014**	.8113**
SL	.3906**	.2691**	.3295**	-.3133**	.4771**	-.4439**
SLSDISTC	-.2135**	-.1848*	-.2037*	.1386	-.1798*	-.0992
SNA	.1648*	.1825*	.1438	-.1727*	.1729*	-.4870**
SNB	.2896**	.2062*	.2199**	-.3728**	.3691**	-.4829**
SNFH	-.3095**	-.3472**	-.2071*	-.1433	-.2376**	.4854**
SNLOWER1	.0665	.0687	-.0384	-.1832*	.0699	-.2675**
SNMANDPL	-.2827**	-.3541**	-.4034**	.1094	-.5102**	.1345
SNOCCPLN	-.3194**	-.3547**	-.4043**	.2533**	-.5442**	.1926*

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" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	SE	SL	SLSDISTC	SNA	SNB	SNFH
ABPLANE	.4149**	-.2102**	[illegible]	[illegible]3296**	[illegible]2467**	[illegible]
ANB	-.0386	-.0386**	.1847	.4136**	-.[illegible]**	[illegible]
ANGOFCON	-.1833	-.0793**	.0832	.4337**	-.2693**	.0141
ANSNOSTP	.4369**	.2561**	-.3317**	-.[illegible]	.1892	.0733
ANTCFBSE	.2183	.3668**	-.1681*	.2468	.2662*	-.1744
ANTFACHT	.4175**	-.0113	-.2836*	-.0955	-.0194	-.2142*
APONTSTA	.3031**	.1904**	.0748	-.1122	.2842*	-.0363
APTNPERP	-.0919	-.[illegible]	.3655**	.3597**	.0850	.0763
ARTANGLE	-.6112**	-.1062	.0445	.1317	-.0060	.1181
BASNASON	.4489**	.3421**	-.1824*	-.1672	.0391	-.1442*
BCLFACPL	-.0350	.4[illegible]**	.1147	[illegible]	[illegible]	[illegible]
BPONTSTB	.2240	-.0080	.0435	.4685**	.3061**	-.2928**
CANTIPEL	-.0200	.0724	.1397	.0710	.0283	-.[illegible]
COPPLGTH	.2089*	.3714**	-.0014	.0824	.[illegible]	-.0260
CRANDEFL	-.0547	-.3511**	-.0352	.1976*	.5216**	-.2371**
CFBASAGL	.5380**	-.3802**	-.0633	-.2041*	-.2854**	.6352**
FACAXAGL	.0684	-.7325**	-.0138	-.4564**	-.4239**	.5382**
FACDEPTH	-.0987	.6424**	.0569	-.3356**	-.6240**	.2212**
FACLCNVX	-.0987	.6424**	.0569	.3766**	.6893**	-.[illegible]*
FACLDPTH	.6140**	.2032*	-.2585**	.3766**	.6893**	-.[illegible]*
FACLLGTH	.2205**	.5070**	-.1308	-.0290	.0266	-.1423
FACTAPER	.3165**	.1912*	-.1487	.2336**	.4589**	-.3301**
FCCONAGL	.1133	-.3568**	-.4021**	.0166	-.0648	-.0939
FMIA	-.1026	.3120**	-.0851	.1430	-.3666**	.1216
GONANGLE	-.1865*	-.2312**	.1064	-.0191	.2944**	.1244
HANGLE	.0139	-.2515**	.0886	-.1650*	-.1425	.2093*
HLINE	-.1409	.6964**	.0222	.2784**	-.2376**	.0519
ILSDISTN	-.2081*	.2121**	.5407**	.2022*	.7230**	-.3502**
INCISROB	.1083	.0973	-.2598**	.0213	.3723**	-.0509
INCISROJ	.0652	-.0474	.0920	.1570	-.0929	-.1365
INTERINC	-.0587	-.0429	-.2639**	.2198**	-.1632*	.0074
INTLABGP	-.0905	-.1147	.0429	-.1154	-.0729	-.0231
LIPEMBOP	.1286	.1427	.1565	-.0236	-.0680	.0355
LLDISTAN	-.1874*	.2056*	.6469**	.1924*	.0736	-.0367
LO1FACPL	.0583	.1928*	-.2497**	.0829	.3631**	-.0633
LO1PALPL	-.0736	.3110**	-.1473	-.2660**	-.0237	.0327
LOANDNHT	-.3419**	-.1246	.0259	-.0131	.2972**	-.0539
LOANFCHT	.2383**	.0445	.0110	-.1972*	-.0944	.1429
LOGONIAL	-.1554	-.4888**	.0344	-.0049	.0700	-.0919
LOLIPLTH	.2530**	.1711*	.0207	-.2184**	-.2629**	.2073*
LOLIPTHK	.1532	.1278	-.4512**	.0195	.1970*	-.0683
LOLPHLIN	.0423	.2321**	-.2427**	-.1497	-.0594	.0761
				-.1985*	.0626	.0132

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

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- - Correlation Coefficients - -

	SE	SL	SLSDISTC	SNA	SNB	SNFH
LOPSDNHT	-.4263**	-.2102**	.1136	-.2084*	-.1363	.1750*
LOSTFCHT	.2171**	.1344	.0930	.0969	.1752*	-.0951
LOW1APO_	.0301	-.0666	-.2034*	.0026	-.2346**	.0749
LOW1OCPL	.2024*	-.0496	.1274	.1148	-.0712	-.0042
LOWER1NB	.0370	-.0546	.1597	.2419**	.0334	-.0408
LOWFHAGL	-.0709	-.4895**	.0435	-.2855**	-.3602**	.1224
LOWR1APO	.1096	.1830*	.0759	-.0095	.1717*	-.0735
LOWR1MPL	.2387**	.0922	.0170	.1856*	-.0207	-.0950
LOWR1NB_	-.0450	.1289	-.1707*	-.2096*	.0212	.0661
LOWRLIPE	.2028*	.2431**	-.3318**	-.1650*	.0709	.0217
MANDARC	-.2727**	-.2227**	.1362	-.1319	-.1988*	.1213
MANDLGTH	.3205**	.5305**	-.1228	.1815*	.4544**	-.2445**
MANPLAGL	-.2045*	-.5482**	.0891	-.2416**	-.3629**	-.0286
MANPROGN	-.0382	.1735*	.3132**	.1220	.2483**	.0207
MAXDEPTH	-.1677*	.2513**	.1827*	.7367**	.3950**	.2002*
MAXPROGN	.0606	-.0454	.0507	.1845*	.0185	.0798
MIDFCLTH	.4482**	.5109**	-.1105	.4359**	.3319**	-.2478**
MLSHLINE	.1679*	.2615**	-.2053*	-.0973	.0029	-.0003
MLSULCUS	.1150	.2116**	-.0494	.1626*	.0210	-.0989
MNARCLTH	-.0942	.1326	.2244**	.2645**	.1696*	-.1543

[illegible]	- .899	.1098**	- .[illegible]	- .144	.1485**	-.[illegible]
[illegible]	- .2211	.0548**	.217[illegible]	.186**	.1481**	- .1[illegible]
[illegible]	.1961**	- .3188**	- .241[illegible]	- .477[illegible]**	- .4426**	.[illegible]**
[illegible]	.1460	.0911**	- .1752	- .1432	.1478**	- .2211
MASLBANG	.1711	- .1008	- .7915**	- .1296	- .1736*	.1289
MASOFACL	.1511	.369	.1876	.3451**	.1604	- .671
MASOFNTL	.0335	- .2649**	- .1043	- .2582**	- .2838**	.1762
MASOMITL	.1441	- .455	- .1732*	.2842**	- .1855	- .0374
MOSELGTH	.4349**	- .1108	- .3716**	- .1916	- .1823	- .1278
MOSEPROM	.2822**	.1366	- .6827**	- .1637*	- .1966	- .0769
MSCHNLTH	.2613**	.1415	- .1126	.1383	.0693	- .0840
MSTNASON	.0719	.1188**	- .1442	.2084*	.1756*	- .1404
OCCLPLAN	-.1608*	- .4421**	- .0724	.1626*	- .3790**	- .2222*
OCCLPLKI	.0899	- .0796	- .1272	.0489	- .1827*	.0317
OPGOGN	- .1205	- .2164**	.1973*	- .1324	- .0666	.1604*
OPINCLIN	- .0676	- .2471**	.1619*	-.1393	- .1099	.0835
PALPLANE	.0521	.0185	- .1407	.0111	.0264	-.3647**
PFH_AFH	.2095*	.5178**	-.1326	.4304**	.5115**	- .4549**
PNSANS	.3055**	.3822**	- .1819*	.3571**	.2551**	- .2030*
POGNPERP	- .0527	.2443**	.3111**	.1572	.3098**	- .0140
POGONNB	- .2433**	- .2303**	.2653**	.2272**	.1026	.0605
POGSTPOG	.1327	.1422	.0470	.1192	.1240	- .0596

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	SE	SL	SLSDISTC	SNA	SNB	SNFH
PORIONLC	.1447	.3906**	-.2135**	.1648*	.2896**	- .3095**
POSCRNBS	.6061**	.2691**	- .1848*	.1825*	.2062*	-.3472**
POSFACHT	.4972**	.3295**	-.2037*	.1438	.2199**	-.2071*
RAMPOSTN	.1804*	- .3133**	.1386	-.1727*	- .3729**	-.1433
RAMUSHGT	.4014**	.4771**	-.1798*	.1729*	.3691**	-.2376**
SADANGLE	.3113**	-.4439**	-.0992	- .4870**	-.4829**	.4854**
SE	1.0000	- .2002*	-.1817*	-.2782**	- .2642**	.1890*
SL	-.2002*	1.0000	.0390	.5945**	.5757**	- .5425**
SLSDISTC	-.1817*	.0390	1.0000	.1987*	.1472	-.0563
SNA	-.2782**	.5945**	.1987*	1.0000	.7326**	- .5150**
SNB	-.2642**	.5757**	.1472	.7326**	1.0000	-.5595**
SNFH	.1890*	-.5425**	- .0563	-.5150**	-.5595**	1.0000
SNLOWER1	-.1722*	.5115**	-.0616	.1795*	.5007**	-.2609**
SNMANDPL	-.0947	-.7465**	.0531	-.4587**	-.5886**	.4431**
SNOCCPLN	-.0406	-.7407**	-.1016	- .4652**	-.6897**	.4242**

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- - Correlation Coefficients - -

	SNLOWER1	SNMANDPL	SNOCCPLN
ABPLANE	-.3739**	.0451	.2539**
ANB	-.4189**	.1436	.2693**
ANGOFCON	-.4301**	.2202**	.3112**
ANSNOSTP	.0015	-.1906*	-.2840**
ANTCRBSE	.0860	-.3588**	-.3631**
ANTFACHT	-.1403	.2408**	-.0699
APONTSTA	-.0191	-.1701*	-.3422**
APTNPERP	-.0054	.0348	.0492
ARTANGLE	-.0726	.2685**	.1805*
BASNASON	-.0030	- .2719**	-.3846**
BOLFACPL	.4311**	-.5820**	-.6890**
BPONTSTB	-.2101**	.0800	-.1002
CANINREL	-.0301	.1043	-.0302
CORPLGTH	.2409**	-.1789*	-.4326**
CRANDEFL	-.0988	.3197**	.2653**
CRBASAGL	-.2442**	.2187**	.1553
FACAXAGL	-.4521**	.6717**	.5540**
FACDEPTH	.4180**	-.4148**	-.5104**

[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	- [illegible]	- [illegible]	- [illegible]
FACLLGTH	.1443	- [illegible]	- .4418**
FACTAPER	- [illegible]	- [illegible]	- .1784**
FCCONAGL	- .1703**	.1036**	.2981**
FMIA	.9264**	- .1847*	- .1912*
GONANGLE	- .0175	.0209**	.0381**
HANGLE	- .4126**	.1088	.0578
HLINE	.5749**	- .4513**	- .5469**
ILSDISTN	.0000**	- .0277	- .1449
INCISPCB	.1310	- .1807**	- .0316
INCISROT	.0048	- .0503	- .0577
INTERINC	.6187**	.0217	.2312**
INTLABGP	- .0237	.0139**	.0736
LIPEMBCP	- .0692	- .1917*	- .2918**
LLDISTAN	.1748*	.0242	- .1909*
LOLFACPL	.6706**	- .3105**	- .0370
LOLPALPL	.8815**	- .1870*	-.1523
LOANDNHT	.2038*	- .0683	.2587**
LOANFCHT	- .1080	.2736**	- .1022
LOGONIAL	- .2321**	.8601**	.4394**
LOLIPLTH	.0419	.0501	- .2207**
LOLIPTHK	.3529**	- .3015**	- .0256
LOLPHLIN	.4377**	- .3606**	- .1174

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	SNLOWER1	SNMANDPL	SNOCCPLN
LOPSDNHT	.1928*	.1840*	.1684*
LOSTFCHT	- .0572	.1635*	-.1786*
LOW1APO_	.4305**	- .1642*	.1764*
LOW1OCPL	- .8012**	-.0804	-.2820**
LOWER1NB	-.8484**	.0432	-.0197
LOWFHAGL	- .3227**	.6794**	.3424**
LOWR1APO	- .6194**	- .1191	- .2201**
LOWR1MPL	-.6841**	-.4446**	- .1996*
LOWR1NB_	.7429**	-.2139**	.0398
LOWRLIPE	.4312**	- .3217**	-.1452
MANDARC	- .0882	.4675**	.3455**
MANDLGTH	.1527	-.2218**	- .4733**
MANPLAGL	-.2526**	.8834**	.5409**
MANPROGN	.2339**	-.0630	-.1173
MAXDEPTH	-.0023	-.1756*	- .1979*
MAXPROGN	-.0231	.0911	.0579
MIDFCLTH	.0048	-.4351**	- .4381**
MLSHLINE	.1999*	-.3970**	-.2245**
MLSULCUS	-.1345	-.2511**	-.2360**
MNARCLTH	-.1893*	-.1003	-.0727
MOLRRELN	.2340**	.0038	-.1798*
MXARCLTH	-.0388	- .1054	- .2058*
MXHEIGHT	-.1998*	.4933**	.4017**
MXMNDIFF	.2165**	.0847	-.2764**
NASLBANG	.0489	.0622	.2062*
NASOFACL	-.1111	-.0979	-.1110
NASOFNTL	-.0212	.1833*	.2233**
NASOMNTL	-.1837*	-.0551	-.0248
NOSELGTH	-.1257	.1007	-.0326
NOSEPROM	-.0316	-.0554	- .0363
NSCHNLTH	-.2425**	.1999*	-.0816
NSTNASON	.1130	-.2630**	-.1206
OCCLPLAN	-.2037*	.4478**	.8010**
OCCLPLXI	-.0786	-.1804*	.4165**
OPGOGN	-.1097	.6262**	-.1295
OPINCLIN	-.1927*	.4986**	-.1751*
PALPLANE	-.0358	-.0150	.0693
PFH_AFH	.2108**	-.9086**	-.6464**
PNSANS	.0222	-.2624**	-.3873**
POGNPERP	.2788**	-.1266	-.1417

[illegible]	- .[illegible]	.[illegible]**	- .[illegible]*
[illegible]	- .[illegible]	.[illegible]	- .[illegible]**

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

. is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	SNLOWER1	SNMANDPL	SNOCCPLN
PORIONLC	.0665	- .2827**	- .3194**
POSCRNBS	.0687	- .3541**	- .3547**
POSFACHT	- .0384	- .4004**	- .4043**
RAMPOSTN	- .1832*	.1094	.2533**
RAMUSHGT	.0699	- .5102**	- .5442**
SADANGLE	- .2675**	.1345	.1926*
SE	- .1722*	- .0947	- .0406
SL	.5115**	- .7465**	- .7407**
SLSDISTC	- .0616	.0531	- .1016
SNA	.1785*	- .4587**	- .4652**
SNB	.5007**	- .5836**	- .6897**
SNFH	-.2609**	.4431**	.4242**
SNLOWER1	1.0000	- .3491**	- .3482**
SNMANDPL	- .3491**	1.0000	.6845**
SNOCCPLN	- .3482**	.6845**	1.0000

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

. * is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	SNPALPLN	SPDISTNC	STCONVEX	STFACAGL	STOINLTH	U1FACPLN
SNPALPLN	1.0000	- .0095	.0916	- .4119**	.1402	-.1343
SPDISTNC	- .0095	1.0000	.4941**	- .4133**	.0432	.3930**
STCONVEX	.0916	.4941**	1.0000	-.1330	.0522	.4116**
STFACAGL	- .4119**	- .4133**	-.1330	1.0000	.1810*	- .1809*
STOINLTH	.1402	.0432	.0522	.1810*	1.0000	- .4822**
U1FACPLN	- .1343	.3930**	.4116**	-.1809*	- .4822**	1.0000
UFH	.4198**	.2148**	.1593	-.1231	.3259**	- .1223
UFH_LFH	.4908**	.2203**	.1582	-.1015	.3127**	- .2263**
UFH_LFH1	.2817**	.3906**	.1944*	- .1692*	.2340**	-.1934*
ULDISTAN	-.1014	- .5570**	- .2767**	.2150**	-.0638	.1365
UPANDNHT	.2760**	-.2831**	- .0953	.1268	- .0100	- .1844*
UPERLIPE	.1625*	-.3778**	- .1130	.1980*	.1066	- .5412**
UPGONIAL	-.0839	-.1333	-.0253	.1280	-.1779*	- .0210
UPLIPLTH	-.2856**	.3101**	.0370	-.1019	-.1156	.2907**
UPLIPTHK	.1743*	-.1279	- .0415	.0122	.0281	- .4994**
UPLPCURL	-.0744	.3917**	.1678*	-.2454**	-.1998*	.0527
UPLPLGTH	-.2074*	.0275	.0872	.1385	.1297	.2130**
UPPER1AV	-.1184	- .4718**	-.0553	.2411**	-.4612**	.4216**
UPPER1FH	-.1685*	-.2293**	-.1210	.3348**	-.4559**	.3539**
UPPR1APO	-.1097	.1236	.1554	-.0472	- .5912**	.7697**
UPPR1NA	-.1262	-.2435**	-.2409**	.1939*	-.4314**	.1949*
UPPR1NA_	.1902*	.1710*	.1725*	-.2096*	.3866**	-.2876**
UPPR6PTV	.1051	- .4127**	.1796*	.2453**	.0277	.0977
UPPSDNHT	-.1290	.0260	-.0203	-.1499	-.0447	-.0409
UPR1APO_	.2039*	- .2332**	-.2474**	.0430	.5425**	- .9088**
UPSTFCHT	.2512**	.2702**	.1080	-.0741	.2929**	- .1265
VERLPCHN	-.2522**	.2219**	.1187	.0174	-.0950	.3211**
WITSANAL	.1034	-.2166**	-.1008	.1824*	-.0091	- .0565
YAXIS	.1106	.3331**	.1176	-.5019**	-.0154	.2271**
YAXISSN	.3954**	.3325**	.0884	-.8272**	-.0864	.2220**
ZANGLE	-.0804	-.6745**	-.5222**	.5693**	.0208	-.5316**

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

. * is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
SNPALPLN	4.88**	.4978**	28.7**	- .0114	.4741**	.0028*
SPDISTNC	.1448**	.0001**	.0946**	- .8871**	- .2831**	- .1771**
STCONVEX	.1893	.1882	.1844*	- .2767**	- .0953	- .0[illegible]
STFACAGL	- .1231	- .0015	- .1692*	.2150**	.1268	.0911*
STOINLTH	.3259**	.0127**	.2340**	- .1638	- .0200	.1246
U1FACPLN	- .0000	- .0263**	- .1934*	.1865	- .1844*	- .5412**
UFH	- .0000	.0911**	.2934**	- .2049**	- .3408**	.3291**
UFH_LFH	.1911**	- .0000	.7029**	- .3134**	.5172**	.1885
UFH_LFH1	.1934**	.7029**	1.0000	- .4376**	.2560**	.1641*
ULDISTAN	- .2049**	- .3134**	- .4376**	- .0000	.1257	- .3390**
UPANDNHT	- .3408**	.5172**	.2560**	.1257	- .0000	- .0216
UPERLIPE	.3281**	.1885	.1641*	- .3390**	- .0216	1.0000
UPGONIAL	- .4814**	.1982	.1503	.1192	.4685**	- .0531
UPLIPLTH	.2625**	- .3143**	- .2846**	- .2329	- .7978**	- .1306
UPLIPTHK	.1345	.1939*	.2511**	- .7226**	.0961	.7721**
UPLPCURL	- .1271	.1075	.2839**	- .6408**	.0197	.0977
UPLPLGTH	.1943*	- .3919**	- .5332**	.1014	- .4821**	- .2033*
UPPER1AV	- .1041	- .3871**	- .4546**	.4678**	- .0056	.0537
UPPER1FH	- .2062*	- .1510	- .1913*	.2898**	.2751**	- .0294
UPPR1APO	- .2665**	- .1257	- .1278	.2342**	.1997*	- .3746**
UPPR1NA	- .1365	- .1296	- .1043	.2258**	.2256**	.1049
UPPR1NA_	.0264	.2493**	.1734*	- .1980*	.0826	- .1323
UPPR6PTV	.2615**	- .1451	- .2801**	.2196**	- .1079	.2931**
UPPSDNHT	- .5525**	.2987**	.1895*	.0064	.5969**	- .3483**
UPR1APO_	.1081	.2934**	.2346**	- .2138**	.1941*	.3776**
UPSTFCHT	.8037**	.2486**	.5589**	- .2870**	- .3743**	.3609**
VERLPCHN	- .1800*	- .1414	- .2887**	.0021	- .1347	- .5155**
WITSANAL	.1645*	- .1530	- .0674	.1124	- .0474	.2086*
YAXIS	.3689**	- .1621*	.0059	- .0848	- .5051**	- .0964
YAXISSN	.3746**	- .0580	.0272	- .1234	- .3602**	- .1258
ZANGLE	- .0275	- .1253	- .1943*	.0550	.1366	.6668**

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

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- - Correlation Coefficients - -

	UPGONIAL	UPLIPLTH	UPLIPTHK	UPLPCURL	UPLPLGTH	UPPER1AV
SNPALPLN	- .0839	- .2856**	.1743*	- .0744	- .2074*	- .1134
SPDISTNC	- .1333	.3101**	- .1279	.3917**	.0275	- .4728**
STCONVEX	- .0253	.0370	- .0415	.1678*	.0872	- .0553
STFACAGL	.1280	- .1019	.0122	- .2454**	.1385	.2411**
STOINLTH	- .1779*	- .1156	.0281	- .1998*	.1297	- .4612**
U1FACPLN	- .0210	.2907**	- .4994**	.0527	.2130**	.4216**
UFH	- .4814**	.2625**	.1345	- .1271	.1943*	- .1041
UFH_LFH	.0982	- .5448**	.1939*	.1075	- .3919**	- .3871**
UFH_LFH1	.0503	- .2846**	.2511**	.2839**	- .5332**	- .4546**
ULDISTAN	.0192	- .0329	- .7226**	- .6408**	.1014	.4678**
UPANDNHT	.4685**	- .7978**	.0961	.0197	- .4821**	- .0056
UPERLIPE	- .0531	- .1306	.7721**	.0977	- .2033*	.0537
UPGONIAL	1.0000	- .3259**	.0634	.1144	- .2657**	.1222
UPLIPLTH	- .3259**	1.0000	- .2265**	.0241	.6172**	.0618
UPLIPTHK	.0634	- .2265**	1.0000	.3869**	- .2510**	- .1616*
UPLPCURL	.1144	.0241	.3869**	1.0000	- .0947	- .3857**
UPLPLGTH	- .2657**	.6172**	- .2510**	- .0947	1.0000	.1631*
UPPER1AV	.1222	.0618	- .1616*	- .3857**	.1631*	1.0000
UPPER1FH	.2863**	- .0805	- .1758*	- .1608*	- .0231	.7204**
UPPR1APO	.2173**	.0154	- .3836**	.0182	.0003	.5759**
UPPR1NA	.2644**	- .0536	- .0742	- .1437	- .0867	.5956**
UPPR1NA_	- .1319	- .1609*	.0897	.2086*	- .0538	- .7865**
UPPR6PTV	- .0546	.0541	.0877	- .2734**	.2361**	.4927**
UPPSDNHT	.4538**	- .5402**	- .0416	.1956*	- .3576**	- .2698**
UPR1APO_	- .0430	- .3061**	.4384**	.0545	- .2001*	- .6711**
UPSTFCHT	- .4094**	.3167**	.1727*	- .0196	.0213	- .1657*
VERLPCHN	.0606	.4253**	- .3013**	.1135	.6945**	- .0221
WITSANAL	- .0545	.0763	.0610	- .2410**	.0546	.1727*
YAXIS	- .3585**	.4531**	- .1261	.0859	.2260**	- .1583
YAXISSN	- .4798**	.3344**	- .0629	.1129	.1196	- .1566
ZANGLE	.1150	- .1616*	.4670**	- .1131	- .0601	.2399**

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

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- - Correlation Coefficients - -

	UPPER1FH	UPPR1APO	UPPR1NA	UPPR1NA_	UPPR6PTV	UPPSDNHT
SNPALPLN	- .1685*	- .0197	- .1262	.0912*	.1051	- .1090
SPDISTNC	- .2093**	.2036	- .2435**	.2711*	- .4227**	.2261
STCONVEX	- .1211	.1554	- .2409**	.2125*	.1796*	- .2013
STFACAGL	.0348**	- .0472	.0039*	- .0296*	.0483**	- .0499
STOINLTH	- .4559**	- .5912**	- .4314**	.3866**	.3277	- .3447
U1FACPLN	.0539**	.0697**	.0943*	- .2876**	.0977	- .0409
UFH	- .0062*	- .0465**	- .1365	.0064	.2615**	- .5835**
UFH_LFH	- .1810	- .1257	- .1236	.2493**	- .1451	.2997**
UFH_LFH1	- .1913*	- .1278	- .1243	.1734*	- .2801**	.1895*
ULDISTAN	.2898**	.2342**	.2258**	- .1980*	.2196**	.0364
UPANDNHT	.2751**	.1997*	.2256**	.0826	- .1079	.5969**
UPERLIPE	- .0294	- .3746**	.1049	- .1323	.2931**	- .3483**
UPGONIAL	.2863**	.2173**	.2644**	- .1319	- .0546	.4533**
UPLIPLTH	- .0805	.0154	- .0536	- .1609*	.0541	- .5402**
UPLIPTHK	- .1758*	- .3836**	- .0742	.0897	.0877	- .0416
UPLPCURL	- .1608*	.0182	- .1437	.2086*	- .2734**	.1956*
UPLPLGTH	- .0231	.0003	- .0867	- .0538	.2361**	- .3576**
UPPER1AV	.7204**	.5759**	.6956**	- .7865**	.4927**	- .2698**
UPPER1FH	1.0000	.7835**	.9141**	- .7729**	.1052	- .0654
UPPR1APO	.7835**	1.0000	.6897**	- .5393**	- .0035	.1052
UPPR1NA	.9141**	.6897**	1.0000	- .8788**	.0157	- .1041
UPPR1NA_	- .7729**	- .5393**	- .8788**	1.0000	- .1257	.3319**
UPPR6PTV	.1052	- .0035	.0157	- .1257	1.0000	- .4223**
UPPSDNHT	- .0654	.1052	- .1041	.3319**	- .4223**	1.0000
UPR1APO_	- .6068**	- .8304**	- .5262**	.6576**	- .1305	.1727*
UPSTFCHT	- .1909*	- .2373**	- .0927	- .0254	.1479	- .5198**
VERLPCHN	- .0041	.1850*	- .0926	.0725	- .1096	.1410
WITSANAL	.1164	- .0230	.0921	- .1169	.1503	- .2469**
YAXIS	- .4653**	- .0754	- .2888**	.1566	- .0766	- .2676**
YAXISSN	- .3304**	- .0066	- .2265**	.1612*	- .1179	- .1716*
ZANGLE	.3356**	- .2287**	.3259**	- .2973**	.2130**	- .2359**

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

" . " is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	UPR1APO_	UPSTFCHT	VERLPCHN	WITSANAL	YAXIS	YAXISSN
SNPALPLN	.2039*	.2512**	- .2522**	.1034	.1106	.3954**
SPDISTNC	- .2332**	.2702**	.2213**	- .2166**	.3331**	.3325**
STCONVEX	- .2474**	.1080	.1187	- .1008	.1176	.0884
STFACAGL	.0430	- .0741	.0174	.1824*	- .5019**	- .8272**
STOINLTH	.5425**	.2929**	- .0950	- .0091	- .0154	- .0864
U1FACPLN	- .9088**	- .1265	.3211**	- .0565	.2271**	.2220**
UFH	.1081	.8037**	- .1800*	.1645*	.3689**	.3746**
UFH_LFH	.2934**	.2486**	- .1414	- .1530	- .1621*	- .0580
UFH_LFH1	.2346**	.5559**	- .2887**	- .0674	.0059	.0272
ULDISTAN	- .2138**	- .2870**	.0021	.1124	- .0848	- .1234
UPANDNHT	.1941*	- .3743**	- .1347	- .0474	- .5051**	- .3602**
UPERLIPE	.3776**	.3609**	- .5156**	.2086*	- .0964	- .1258
UPGONIAL	- .0430	- .4094**	.0606	- .0545	- .5585**	- .4798**
UPLIPLTH	- .3061**	.3167**	.4253**	.0763	.4531**	.3344**
UPLIPTHK	.4384**	.1727*	- .3013**	.0610	- .1261	- .0629
UPLPCURL	.0545	- .0196	.1135	- .2410**	.0859	.1129
UPLPLGTH	- .2001*	.0213	.6945**	.0546	.2260**	.1196
UPPER1AV	- .6711**	- .1657*	- .0221	.1727*	- .1583	- .1566
UPPER1FH	- .6068**	- .1909*	- .0041	.1164	- .4653**	- .3304**
UPPR1APO	- .8304**	- .2373**	.1850*	- .0230	- .0754	- .0066
UPPR1NA	- .5262**	- .0927	- .0926	.0921	- .2888**	- .2265**
UPPR1NA_	.6576**	- .0254	.0725	- .1169	.1566	.1612*
UPPR6PTV	- .1305	.1479	- .1096	.1503	- .0766	- .1179
UPPSDNHT	.1727*	- .5198**	.1410	- .2469**	- .2676**	- .1716*

[illegible]

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

. is printed if a coefficient cannot be computed

- - Correlation Coefficients - -

	ZANGLE
SNPALPLN	- 0804
SPDISTNC	-.6745**
STCONVEX	- 5222**
STFACAGL	5693**
STOINLTH	0208
ULFACPLN	- 5316**
UFH	- 0275
UFH_LFH	-.1253
UFH_LFH1	- 1943*
ULDISTAN	.0550
UPANDNHT	1366
UPERLIPE	6668**
UPGONIAL	.1150
UPLIPLTH	- 1616*
UPLIPTHK	4670**
UPLPCURL	-.1131
UPLPLGTH	-.0601
UPPER1AV	2399**
UPPER1FH	3356**
UPPR1APO	-.2287**
UPPR1NA	.3259**
UPPR1NA_	-.2973**
UPPR6PTV	2130**
UPPSDNHT	-.2359**
UPR1APO_	.2903**
UPSTFCHT	- 0284
VERLPCHN	-.3026**
WITSANAL	.2497**
YAXIS	-.5324**
YAXISSN	-.4356**
ZANGLE	1.0000

* - Signif. LE .05 ** - Signif. LE .01 (2-tailed)

. is printed if a coefficient cannot be computed

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
APTNPERP	.98417	*	8	4.37694	3.4	71.0
ARTANGLE	.94623	*	9	3.65713	2.8	73.9
BASMASON	.97331	*	10	3.42445	2.6	76.5
BCLFACPL	.91144	*	11	3.08598	2.4	78.9
BPONTSTB	.73630	*	12	2.74265	2.1	81.1
CANINREL	.89928	*	13	2.65254	2.1	83.2
CORPLGTH	.95634	*	14	2.29666	1.8	85.0
CRANDEFL	.90953	*	15	2.06468	1.6	86.6
CFBASAGL	.94763	*	16	1.87901	1.5	88.1
FACAXAGL	.95468	*	17	1.84810	1.4	89.5
FACDEPTH	.99280	*	18	1.33048	1.0	90.5
FACLCNVX	.99280	*	19	1.23848	1.0	91.5
FACLDPTH	.98713	*	20	1.11196	.9	92.4
FACLLGTH	.98870	*	21	1.07754	.8	93.2
FACTAPER	.98050	*	22	1.02105	.8	94.0
FCCONAGL	.95757	*				
FMIA	.98767	*				
GONANGLE	.93065	*				
HANGLE	.95814	*				
HLINE	.98032	*				
ILSDISTN	.97901	*				
INCISROB	.74305	*				
INCISROJ	.90172	*				
INTERINC	.97524	*				
INTLABGP	.87173	*				
LIPEMBOP	.76160	*				
LLDISTAN	.95079	*				
LOLFACPL	.94884	*				
LOLPALPL	.95214	*				
LOANDNHT	.90574	*				
LOANFCHT	.98214	*				
LOGONIAL	.95237	*				
LOLIPLTH	.89327	*				
LOLIPTHK	.90887	*				
LOLPHLIN	.92737	*				
LOPSDNHT	.90625	*				
LOSTFCHT	.93379	*				
LOW1APO_	.94211	*				
LOW1OCPL	.97729	*				
LOWER1NB	.98066	*				
LOWFHAGL	.95131	*				
LOWR1APO	.97316	*				
LOWR1MPL	.99265	*				
LOWR1NB_	.91887	*				
LOWRLIPE	.89893	*				
MANDARC	.69817	*				
MANDLGTH	.96742	*				

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Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
MANPLAGL	.98886	*				
MANPROGN	.98076	*				
MAXDEPTH	.99102	*				

[illegible]	[illegible]	*
[illegible]	[illegible]	*
MLSHLINE	[illegible]	*
MLSULCUS	[illegible]	*
MNARCLTH	76184	*
MOLRPELN	77918	*
MXARCLTH	87116	*
MXHEIGHT	87746	*
MXDDIFF	86188	*
NASLBANG	93746	*
NASOFACL	86148	*
NASOFNTL	83966	*
NASOMNTL	91937	*
NOSELGTH	83435	*
NOSEPROM	92346	*
NSCHNLTH	85685	*
NSTNASON	80732	*
OCCLPLAN	97917	*
OCCLPLXI	91146	*
OPGOGN	96020	*
OPINCLIN	94790	*
PALPLANE	86915	*
PFH_AFH	95598	*
PNSANS	70953	*
POGNPERP	98598	*
POGONNB	79135	*
POGSTPOG	85513	*
PORIONLC	69937	*
POSCRNBS	91122	*
POSFACHT	94264	*
RAMPOSTN	64878	*
RAMUSHGT	88641	*
SADANGLE	.96467	*
SE	95247	*
SL	98818	*
SLSDISTC	93704	*
SNA	.98782	*
SNB	98709	*
SNFH	.98442	*
SNLOWER1	.99173	*
SNMANDPL	99338	*
SNOCCPLN	97620	*
SNPALPLN	.87124	*
SPDISTNC	97280	*

------------ F A C T O R   A N A L Y S I S ------------

Variable	Communality	*	Factor	Eigenvalue	Pct of Var	Cum Pct
STCONVEX	.89240	*				
STFACAGL	.98381	*				
STOINLTH	.84212	*				
U1FACPLN	97636	*				
UFH	.94732	*				
UFH_LFH	.91244	*				
UFH_LFH1	.89015	*				
ULDISTAN	.96389	*				
UPANDNHT	89297	*				
UPERLIPE	.90542	*				
UPGONIAL	.95729	*				
UPLIPLTH	.92551	*				
UPLIPTHK	.95670	*				
UPLPCURL	.78698	*				
UPLPLGTH	.90823	*				
UPPER1AV	.97816	*				
UPPER1FH	.95205	*				
UPPR1APO	.93149	*				
UPPR1NA	.94282	*				
UPPR1NA_	.97011	*				
UPPR6PTV	.94609	*				
UPPSDNHT	.86399	*				

APPENDIX E

FACTOR ANALYSIS

VARIMAX rotation 1 for extraction 1 in analysis 1 - Kaiser Normalization.

VARIMAX converged in 24 iterations

Rotated Factor Matrix:

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
ANTFACHT	93790	-.17932			19259
FACLLGTH	.91535	26790	-.15635		
FACLDPTH	89259				- 37336
MANDLGTH	.87857	.34913	-.17941		

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	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
LOANFCHT	.86113	-.14421	-.10458		.26631
POSFACHT	84161			-.10659	-.42500
LOANDNHT	-.83753		-.20288	.13394	
LOPSDNHT	-.81421		-.12088	.20387	16353
LOSTFCHT	.80831		-.12268		19780
NSCHNLTH	.80729		.15890	-.21192	23480
UPPSDNHT	-.77043		.16473	.18715	
CORPLGTH	76532	.39822	-.24603		12570
POSCRNBS	.73094				- 33787
LOLIPLTH	.72571		-.17238		11083
UPANDNHT	-.71940	.26170			- 14360
RAMUSHGT	71640	26797	-.13799	-.10860	- 40574
UFH	.71552	-.16548			
MIDFCLTH	.69897	.37388	.33096		- 22071
NOSELGTH	.68733	-.13106			
PNSANS	.65303	.27012	.30246		-.11131
UPSTFCHT	.64540	-.13359			
ANSNOSTP	.64421	.11004			
UPLIPLTH	.63957	-.19296		-.21472	22978
BASNASON	.63150				- 21259
MXMNDIFF	.62072	.15588	-.56607		23179
PORIONLC	.45109	.27324			
FACDEPTH	.10159	.84489	- 21330		
FACLCNVX	.10159	.84489	-.21330		
BOLFACPL	.17209	.83925	-.21527		-.13104
SNB	.16015	.83840	-.17648		
STFACAGL	.15272	.82319	-.17941		-.19376
SL	.23149	.79846	-.15615		- 25427
FACAXAGL	.19771	-.79252	.15683	-.10042	24401
YAXISSN	.18799	-.78550	.10792	-.12525	32988
YAXIS	.34792	-.73599	.10174	-.12516	21856
SNA		.65431	.44352		
MAXDEPTH		.60741	.52525		
SNOCCPLN	-.25563	-.58932			41749
MXHEIGHT	.28908	-.53309	-.11546		19849
LOWFHAGL	.29784	-.51282		-.14089	48508
RAMPOSTN	-.10417	-.50723	.18567		- 14861
ANB		-.20448	.85484	-.16974	
ABPLANE		-.22340	.84626	-.10716	- 11400

[illegible]	[illegible]		[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]
FOOTMAGL		[illegible]	[illegible]	[illegible]
HANGLE		[illegible]	[illegible]	[illegible]
DANGLE		[illegible]	[illegible]	[illegible]

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	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
NASOFACL		.17016	.67882		
HLINE	.16265	.57861	- .64815	.18166	
ULFACPLN		- .11835	.58123	- .38330	.11645
MOLPRELN	.31021	.26059	- .56679		.25057
UPERLIPE	.27929	.15515	- .46449	.10187	
INCISROB	.10436		.45947	.29434	- .31573
LOWER1NB	.10509		.14552	- .94609	
FMIA		.34971	- .21749	.86234	
LOW1OCPL	.13752		.16238	- .85364	- .20209
LOWR1APO	.25654	.14119	- .30182	- .84936	
SNLOWER1		.40358	- .21970	.84605	
LO1PALPL		.28114	-.21862	.80952	
LOWR1NB_	- .26122		- .20564	.79240	- .13193
LOWR1MPL			.19167	- .77712	- .54932
INTERINC		- .10352		.71785	
LO1FACPL			- .20893	.71177	- .23919
LOW1APO_	-.16737	- .12123	.35992	.66084	- .24279
FACTAPER	- .13273		.13798		- .90353
GONANGLE	-.18327				.79435
LOGONIAL	.21203	-.36261			.78827
SNMANDPL		- .54678			.78281
PFH_AFH	.24100	.39678			-.77375
MANPLAGL		- .51607			.77086
MANDARC	- .20270	- .14254			.66388
MANPROGN		.10341	-.14157	.11608	
POGNPERP		.17034	- .16107	.13318	
APTNPERP			.31606		
MAXPROGN	.18078		.31012		
SPDISTNC		-.23623	.54947	- .16668	
UPPR6PTV	.43032	.21940		- .11989	
ILSDISTN	-.14495	.17397	- .54334		
LLDISTAN		.17777	-.46194		.10496
NOSEPROM	.36611				
UPPR1APO	-.19076		.23844	-.34551	
UPPR1NA		.17474	-.39841	-.17399	
UPR1APO_	-.10209		-.29457	.38728	
UPPER1FH		.42152	- .17505	- .21036	
UPPR1NA_	-.17226	-.12772	.37738	.21095	
UPPER1AV	.19500	.15388	-.15116	- .19518	
MXARCLTH		.18157	.15472		
INCISROJ		-.11172	.55303	.26882	- .10449
STOINLTH	.20481			.18118	- .23092

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	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
SADANGLE		-.24999			- .10464
CRBASAGL		-.11725			.13179
ARTANGLE		-.22451			- .27381
SE	.47386	-.21022			
SLSDISTC	-.16221			-.11706	

[illegible]		[illegible]	[illegible]	[illegible]	
[illegible]			[illegible]		
[illegible]			[illegible]	[illegible]	
UPH_LPH	[illegible]		[illegible]		[illegible]
UPH_LPH1	[illegible]				[illegible]
SUPALPLN		[illegible]			[illegible]
PALPLANE		[illegible]			
LOWPLIPE		[illegible]	[illegible]	[illegible]	[illegible]
LOLIPTHK				[illegible]	[illegible]
LOLPHLIN	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
POGONTB	[illegible]			[illegible]	[illegible]
TDIAPCLTH		[illegible]		[illegible]	
DRANDEFL		[illegible]			[illegible]
SNFH	[illegible]	[illegible]			[illegible]
DCCLPLXI	[illegible]		[illegible]		[illegible]
DPINCLIN	[illegible]	[illegible]		[illegible]	[illegible]
DPGOGN	[illegible]	[illegible]			[illegible]
DCCLPLAN	[illegible]	[illegible]			[illegible]
VERLPCHN			[illegible]	[illegible]	
LIPEMBOP		[illegible]	[illegible]		[illegible]
UPLPLGTH	[illegible]			[illegible]	
ANTCRBSE	[illegible]	[illegible]			[illegible]
UPGONIAL	[illegible]	[illegible]		[illegible]	[illegible]
MLSULCUS	[illegible]		[illegible]	[illegible]	[illegible]
MLSHLINE		[illegible]	[illegible]	[illegible]	[illegible]
UPLPCURL	[illegible]		[illegible]		[illegible]
APONTSTA	[illegible]	[illegible]			
INTLABGP					[illegible]
BPONTSTB	[illegible]			[illegible]	
POGSTPOG	[illegible]	[illegible]			
NASOFNTL		[illegible]	[illegible]		

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	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
NSTNASON	20490	.15633			[illegible]
CANINREL	20533				[illegible]
WITSANAL	24304	13368	-.16625	.13746	[illegible]

	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10
ANTFACHT					
FACLLGTH			-.19000		
FACLDPTH					
MANDLGTH					
LOANFCHT	.12527				[illegible]
POSFACHT					
LOANDNHT					
LOPSDNHT					[illegible]
LOSTFCHT	.28443				[illegible]
NSCHNLTH	.11112				
UPPSDNHT					
CORPLGTH	21666				[illegible]
POSCRNBS					
LOLIPLTH	.27632				[illegible]
UPANDNHT	.15554		.15648		
RAMUSHGT			.12161	10816	

[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
[illegible]			[illegible]		
[illegible]				[illegible]	[illegible]
[illegible]				[illegible]	[illegible]
UPSTFCNT	- 14693			[illegible]	[illegible]
ANSNOSTP	- 19124		.18370		[illegible]
UPLIPLTH	- 21749				[illegible]
BASNASON		.13270	.23507		- [illegible]
[illegible]			- [illegible]		
FORIONLC	- .16454				
FACDEPTH	.15689				
FACLCNTX	.15689				
BCLFACPL	.11843	.10112	.10119		
SNB	.13188		- .29711		
STFACAGL			- .27826		
SL			- .26914		
FACAXAGL			- .20716		
YAXISSN			.23346		
YAXIS			- .13179		
SNA	.13351		- .35495	- .12241	
MAXDEPTH	.[illegible]785				

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	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10
SNOCCPLN		- .25456			
MXHEIGHT		- .16442		.13598	.10671
LOWFHAGL	- .22820		-.19547		- .17495
RAMPOSTN	.29504			- .13748	
ANB					
ABPLANE					
NASOMNTL			.12440	.14972	
ANGOFCON					
STCONVEX				.23455	
FCCONAGL				.39929	.10045
HANGLE	-.13158			- .15199	.14055
ZANGLE	.15963				
NASOFACL			.14506		- .24253
HLINE	.13609		-.13096		- .11539
U1FACPLN		.57867			- .12364
MOLRRELN			-.14007		
UPERLIPE	.15016	- .12040	.11726	.36807	.13643
INCISROB	-.15122	-.18296			
LOWER1NB		.10320			
FMIA					
LOW1OCPL		.22821			
LOWR1APO		.12749			
SNLOWER1			-.12653		
LO1PALPL	.16254	-.14977			.23814
LOWR1NB_		-.18887			
LOWR1MPL					
INTERINC		-.64733		.12738	
LO1FACPL		- .16704			
LOW1APO_		- .20670			
FACTAPER			.15922		
GONANGLE		.13082	.12173		-.13308
LOGONIAL			-.11283		
SNMANDPL					
PFH_AFH			-.11030		
MANPLAGL			-.15928		
MANDARC	-.25986		-.15185	-.19658	
MANPROGN	.95576				
POGNPERP	.94263				
APTNPERP	.89666			-.11437	
MAXPROGN	.87475			.16727	

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	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10
LLDISTAN	67435			- 42257	
NOSEPRCM	- 46872	- 16613	10149	45524	00091
UPPPLAPO		80762			
UPPPLNA		78487		- 15958	
UPPLAPO_		- 78420	13831		
UPPERLFH		77941			15495
UPPPLNA_		- 77139	12266	- 12460	
UPPERLAV	52198	72832			
MXARCLTH		66775			- 12312
INCISROJ		59999	- 13835	- 10636	- 15263
STCINLTH		- 57742		- 12755	
SADANGLE					.19415
CRBASAGL			92148		
ARTANGLE			90389		.10826
SE		- 14971	- 78804		
			68953		
SLSDISTC	28073	13147			.16049
NASLBANG		-.11695		- 85436	- 17322
ULDISTAN	40670	.15879		.84106	
UPLIPTHK		- 16481		-.78945	
				.74316	
UFH_LFH	- 19251	- 17143	.16662	.11667	
UFH_LFH1	- 44760	-.11912	11962	.16149	.78641
SNPALPLN	20011	- 17673	34500	.11684	.61499
PALPLANE	17338	-.19350			60864
					58489
LOWRLIPE					
LOLIPTHK			.10361	21390	.13835
LOLPHLIN				.34612	
POGONNB	11631			16256	
MNARCLTH	- 10238	.34416	-.10257		
					- 15994
CRANDEFL	10109		- 17977		
SNFH			47549		
OCCLPLXI		- 10333			
OPINCLIN		.17842	- 11877	.10656	- 12640
OPGOGN		.25853		- 12746	
OCCLPLAN		- 27984	- 22865		
VERLPCHN					
LIPEMBOP					- 33642
UPLPLGTH	14015	19206	.18151	- 14193	
					- 29059
ANTCRBSE	-.11731				

- - - - - - - - - - - - F A C T O R A N A L Y S I S - - - - - - - - - - - -

	Factor 6	Factor 7	Factor 8	Factor 9	Factor 10
UPGONIAL		.19808	29529		
MLSULCUS					
MLSHLINE	-.11821				
UPLPCURL	-.37886	-.11336		.24624	
APONTSTA	.10123	.17667		-.13879	
INTLABGP		.20356			-.10903

[illegible]	[illegible]	[illegible]		[illegible]	
[illegible]	[illegible]	[illegible]		[illegible]	
VASOFNTL		- .11709			
NSTNASON	.13106	- .10199			.10147
SANINFEL	.10791			- .13086	
VITSANAL	.11913	.10149			

	Factor 10	Factor 11	Factor 12	Factor 13	Factor 14	Factor 15
ANTFACHT						
FACLLGTH						
FACLDPTH						
MANDLGTH						
LOANFCHT						
POSFACHT						
LOANDNHT	.19293					
LOPSDNHT				.26469		
LOSTFCHT						- .10380
NSCHNLTH						
UPPSDNHT				- .36176	.10972	
CORPLGTH						.10148
POSCRNBS				-.10642	.13279	
LOLIPLTH				.10970	- .25920	
UPANDNHT						
RAMUSHGT						
UFH						
MIDFCLTH			-.11627			.10235
NOSELGTH						
PNSANS						.20603
UPSTFCHT						
ANSNOSTP	.16259		-.11124		- .13140	
UPLIPLTH					.40738	
BASNASON					.11364	.53392
MXMNDIFF				.20621	- .16452	-.15700

- - - - - - - - - - - F A C T O R A N A L Y S I S - - - - - - - - - - -

	Factor 11	Factor 12	Factor 13	Factor 14	Factor 15
PORIONLC	.11880	-.26556	-.10726		.10161
FACDEPTH		.40679			
FACLCNVX		.40679			
BOLFACPL		-.17386			
SNB	-.13562	-.22479			- .13165
STFACAGL		-.22194			- .10333
SL		-.22133			.22951
FACAXAGL		.24573			- .19911
YAXISSN		.24165			- .22941
YAXIS	-.14663	-.31829			-.2[illegible]63
SNA	-.14612	-.18887		.11859	-.16259
MAXDEPTH	-.10563	.39199			- .16236
SNOCCPLN		.15519	- .47140		
MXHEIGHT		.21058	.13876	-.10995	- .32389
LOWFHAGL		.15281			-.15891
RAMPOSTN		-.32539		.10494	
ANB					
ABPLANE	.10310		-.11148		
NASOMNTL		-.13632		-.10019	
ANGOFCON	-.14468			.13556	- .10351
STCONVEX		-.12186		-.11440	
FCCONAGL	-.11038				
HANGLE	-.31564			.21677	
ZANGLE	.25898	.14655		-.12479	
NASOFACL		-.13702			
HLINE	.21109	-.17987			

[illegible]	- [illegible]			[illegible]	
[illegible]					
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]			[illegible]		[illegible]
LOWERINB	- .10115				
FMIA		.17913			
LOWLOCPL			.24857		
LOWR1APO					
SNLOWER1		- .10114			
LOLPALPL				- .10144	
LOWPLNB_	.25595				
LOWR1MPL			- .11779		
INTERINC					
LOLFACPL	.39532			- .11935	.11999
LOW1APO_	.32513	.10887	- .13082		
FACTAPER	.14622		- .12697		[illegible]
GONANGLE	- .11990				.23538

- - - - - - - - - - - F A C T O R A N A L Y S I S - - - - - - - - - - -

	Factor 11	Factor 12	Factor 13	Factor 14	Factor 15
LOGONIAL	- .17576	.12978	.11574		- .17092
SNMANDPL		.16299			
PFH_AFH		- .10908			
MANPLAGL	- .13987	- .22093			
MANDARC					.22858
MANPROGN					
POGNPERP					
APTNPERP					
MAXPROGN					
SPDISTNC	- .12050				
UPPR6PTV					.18428
ILSDISTN	- .11590			- .14429	
LLDISTAN	-.28899		.10643	- .14471	
NOSEPROM	.31939	-.15774		- .21261	.10579
UPPR1APO					
UPPR1NA			.11359		
UPR1APO_	.14458		-.10891		
UPPER1FH		.17705			
UPPR1NA_			- .16617		
UPPER1AV			.12146		
MXARCLTH	-.22445		-.15014	.17582	
INCISROJ	.15164				
STOINLTH	-.12517				
SADANGLE					
CRBASAGL			.12057		
ARTANGLE			.15922		- .19061
SE			-.11370		-.10612
SLSDISTC	-.10579				
NASLBANG		.11783	-.10703		
ULDISTAN	-.25169				
UPLIPTHK	.39796			- .15086	
UFH_LFH					
UFH_LFH1				-.12059	
SNPALPLN				-.19978	
PALPLANE		-.55271		-.14524	
LOWRLIPE	.72877				
LOLIPTHK	.72763		-.14161		
LOLPHLIN	.69877		-.11875	.10110	
POGONNB	-.46987			.28099	-.18864
MNARCLTH	-.44765		-.19085	.25105	.13204

- - - - - - - - - - - F A C T O R A N A L Y S I S - - - - - - - - - - -

	Factor 11	Factor 12	Factor 13	Factor 14	Factor 15
CRANDEFL		88370			
SNFH		[illegible]			
OCCLPLXI			- 82499		
OPINCLIN	- 10516		[illegible]		
OPGOGN	- 14114		82775		
OCCLPLAN		- 84239	- 83146		
VERLPCHN			- 16144	.79450	
LIPEMBOP				85260	17894
UPLPLGTH				.83286	
ANTCRBSE	.12724				.89616
UPGONIAL		- 11918	- 20546		80032
MLSULCUS				10952	18485
MLSHLINE	.57404			19293	11040
UPLPCURL	.84188			10061	.12505
APONTSTA				15970	
INTLABGP					
BPONTSTB	-.16560			-.18990	-.16860
POGSTPOG	.18425			25268	-.17020
NASOFNTL					
NSTNASON	.13707		-.12419		
CANINREL				13007	
WITSANAL	- 10652				

	Factor 16	Factor 17	Factor 18	Factor 19	Factor 20
ANTFACHT					
FACLLGTH					
FACLDPTH					
MANDLGTH					
LOANFCHT					
POSFACHT					
LOANDNHT			- 12283		
LOPSDNHT			-.13210		
LOSTFCHT	.12264				
NSCHNLTH					
UPPSDNHT					-.13309
CORPLGTH		.11410			

- - - - - - - - - - - F A C T O R A N A L Y S I S - - - - - - - - - - -

	Factor 16	Factor 17	Factor 18	Factor 19	Factor 20
POSCRNBS					-.13513
LOLIPLTH			.36864		
UPANDNHT					.11607
RAMUSHGT	.12160				.17250
UFH					
MIDFCLTH		-.10339			
NOSELGTH					
PNSANS		-.14865			
UPSTFCHT		.11291		.31553	
ANSNOSTP		.41675	.22163		
UPLIPLTH			-.16166		
BASNASON	.12546				

APPENDIX F

DISCRIMINANT ANALYSIS: 12 YEAR OLD

Data written to the working file.
21 variables and 60 cases written.

Variable: B_NO	Type: String	Format: A9
Variable: GROUP	Type: Number	Format: F8.2
Variable: SADANGLE	Type: Number	Format: F8.2
Variable: SNA	Type: Number	Format: F8.2
Variable: SNB	Type: Number	Format: F8.2
Variable: POSFACHT	Type: Number	Format: F8.2
Variable: FACLCNVX	Type: Number	Format: F8.2
Variable: LOWRLIPE	Type: Number	Format: F8.2
Variable: LOW1APO_	Type: Number	Format: F8.2
Variable: UPLPLGTH	Type: Number	Format: F8.2
Variable: MANPLAGL	Type: Number	Format: F8.2
Variable: PALPLANE	Type: Number	Format: F8.2
Variable: OCCLPLAN	Type: Number	Format: F8.2
Variable: LOWR1MPL	Type: Number	Format: F8.2
Variable: UPPER1FH	Type: Number	Format: F8.2
Variable: APTNPERP	Type: Number	Format: F8.2
Variable: MANDLGTH	Type: Number	Format: F8.2
Variable: NASLBANG	Type: Number	Format: F8.2
Variable: MANPROGN	Type: Number	Format: F8.2
Variable: MLSULCUS	Type: Number	Format: F8.2
Variable: UFH_LFH	Type: Number	Format: F8.2

- - - - - - - - D I S C R I M I N A N T A N A L Y S I S - - - - - - - -

On groups defined by GROUP

60 (Unweighted) cases were processed.
0 of these were excluded from the analysis.
60 (Unweighted) cases will be used in the analysis.

Number of cases by group

GROUP	Number of cases Unweighted	Weighted	Label
0	30	30.0	
1	30	30.0	
Total	60	60.0	

Group means

GROUP	APTNPERP	FACLCNVX	LOW1APO_	LOWR1MPL
0	-3.95000	86.48000	-.84333	90.40000
1	-2.46667	86.98667	-1.45333	93.40000
Total	-3.20833	86.73333	-1.14833	91.90000

GROUP	LOWRLIPE	MANDLGTH	MANPLAGL	MANPROGN
0	2.25000	110.50333	26.21667	-9.34333
1	-.31667	113.02000	25.59000	-7.04667
Total	.96667	111.76167	25.90333	-8.19500

GROUP	MLSULCUS	NASLBANG	OCCLPLAN	PALPLANE

	[illegible]	[illegible]	[illegible]	[illegible]
	[illegible]	[illegible]	[illegible]	[illegible]
Total	[illegible]	[illegible]	[illegible]	[illegible]

GROUP	POSFACHT	SADANGLE	SNA	SNB
0	71.33000	122.42667	81.79667	78.99333
1	75.55000	122.17333	80.89333	77.29667
Total	73.44000	122.30000	81.34500	78.14500

GROUP	UFH_LFH	UPLPLGTH	UPPER1FH
0	86.84333	22.39000	107.56333
1	82.02667	20.38667	110.80667
Total	84.43500	21.38833	109.18500

Group standard deviations

GROUP	APTNPERP	FACLCNVX	LOW1APO_	LOWR1MPL
0	2.64141	2.48171	1.22494	4.89905
1	4.81910	2.97063	2.29914	7.05075
Total	3.92477	2.72581	1.85212	6.20648

GROUP	LOWRLIPE	MANDLGTH	MANPLAGL	MANPROGN
0	2.07027	3.76128	3.02872	4.95376
1	2.86285	5.18655	4.98469	9.10368
Total	2.79465	4.66756	4.10142	7.36097

GROUP	MLSULCUS	NASLBANG	OCCLPLAN	PALPLANE
0	1.51878	11.21331	2.90786	3.09457
1	1.48109	11.12668	4.12793	3.24897
Total	1.55110	11.45163	3.59988	3.89145

GROUP	POSFACHT	SADANGLE	SNA	SNB
0	4.19664	3.30808	2.50620	2.32497
1	4.80278	5.11576	3.72974	3.22067
Total	4.95198	4.27305	3.18313	2.91329

GROUP	UFH_LFH	UPLPLGTH	UPPER1FH
0	6.80678	2.04001	3.79350
1	9.15675	2.35836	7.99469
Total	8.35969	2.40615	6.41589

- - - - - - - - D I S C R I M I N A N T A N A L Y S I S - - - - - - - -

On groups defined by GROUP

Analysis number 1

Direct method: all variables passing the tolerance test are entered.

Minimum tolerance level..... .00100

Canonical Discriminant Functions

Maximum number of functions
Minimum cumulative percent of variance .. 100.00
Maximum significance of Wilks Lambda .. 1.0000

Prior probability for each group is .50000

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr	After Fcn	Wilks Lambda	Chi-square	df	Sig
1*	4.7664	100.00	100.00	.9092	0	.173418	84.974	19	.0000

* Marks the 1 canonical discriminant functions remaining in the analysis

Standardized canonical discriminant function coefficients

	Func 1
APTNPERP	.79093
FACLCNVX	.31131
LOW1APO_	.29226
LOWR1MPL	.74567
LOWRLIPE	-.26865
MANDLGTH	-.17653
MANPLAGL	.74198
MANPROGN	.11625
MLSULCUS	.00308
NASLBANG	-.13017
OCCLPLAN	.46079
PALPLANE	-.91148
POSFACHT	.96211
SADANGLE	-.02332
SNA	-.86090
SNB	-.31527
UFH_LFH	.23644
UPLPLGTH	-1.02067
UPPER1FH	.84939

Structure matrix:

Pooled within-groups correlations between discriminating variables and canonical discriminant functions
(Variables ordered by size of correlation within function)

	Func 1
PALPLANE	-.33356
LOWRLIPE	-.23932
POSFACHT	.21796
UPLPLGTH	-.21058
SNB	-.14071
UFH_LFH	-.13907
MLSULCUS	.13562
MANDLGTH	.12940
UPPER1FH	.12074
NASLBANG	-.12046
LOWR1MPL	.11511
APTNPERP	.08892
OCCLPLAN	-.08460
LOW1APO_	-.07714
MANPROGN	.07297

[illegible]	[illegible]
FACLCNVX	.1011
MANPLAGL	-.3819
SADANGLE	-.0077

Unstandardized canonical discriminant function coefficients

	Func 1
APTNPERP	.0036385
FACLCNVX	.1137352
LOWLAPO_	.1886580
LOWRIMPL	.1229246
LOWRLIPE	-.0274782
MANDLGTH	-.0389655
MANPLAGL	.1799038
MANPROGN	.0188559
MLSULCUS	2.05384235E-03
NASLBANG	-.0116537
OCCLPLAN	.1290578
PALPLANE	-.2872866
POSFACHT	.2133329
SADANGLE	-5.41397244E-03
SNA	-.2709430
SNB	-.1122442
UFH_LFH	.0293064
UPLPLGTH	-.4629024
UPPER1FH	.1357450
(Constant)	-11.9063782

Canonical discriminant functions evaluated at group means (group centroids)

Group	Func 1
0	-2.14652
1	2.14652

Case Number	Mis Val	Sel	Actual Group	Highest Group	Probability P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
1			0	0	.5166	.9984	1	.0016	-1.4979
2			0	0	.1893	.9729	1	.0271	-.8338
3			0	0	.2201	.9811	1	.0189	-.9203
4			0	0	.3280	.9934	1	.0066	-1.1683
5			0	0	.8420	1.0000	1	.0000	-2.3459
6			0	0	.7096	.9995	1	.0005	-1.7741
7			0	0	.5376	.9986	1	.0014	-1.5301
8			0	0	.7280	1.0000	1	.0000	-2.4943
9			0	0	.1481	.9528	1	.0472	-.7002
10			0	0	.5213	1.0000	1	.0000	-2.7378
11			0	0	.7930	1.0000	1	.0000	-2.4090
12			0	0	.0460	1.0000	1	.0000	-4.1417
13			0	0	.4588	.9976	1	.0024	-1.4057
14			0	0	.9052	.9998	1	.0002	-2.0274
15			0	0	.5922	1.0000	1	.0000	-2.6822
16			0	0	.2636	1.0000	1	.0000	-3.2645
17			0	0	.7037	1.0000	1	.0000	-2.5269
18			0	0	.6360	.9992	1	.0008	-1.6732
19			0	0	.9898	.9999	1	.0001	-2.1337
20			0	0	.2687	1.0000	1	.0000	-3.2527
21			0	0	.7550	1.0000	1	.0000	-2.4586
22			0	0	.2146	.9799	1	.0201	-.9056
23			0	0	.1653	1.0000	1	.0000	-3.5341
24			0	0	.6166	1.0000	1	.0000	-2.6471
25			0	0	.8357	1.0000	1	.0000	-2.3539

42		1	**	0	.0683	.8003	1	.2397	- .3234
43		1		1	.1668	.9637	0	.0363	.7640
44		1		1	.5647	1.0000	0	.0000	2.7224
45		1		1	.2650	1.0000	0	.0000	3.2612
46		1		1	.2013	1.0000	0	.0000	3.4242
47		1		1	.9599	.9999	0	.0001	2.0962
48		1		1	.0375	1.0000	0	.0000	4.2267

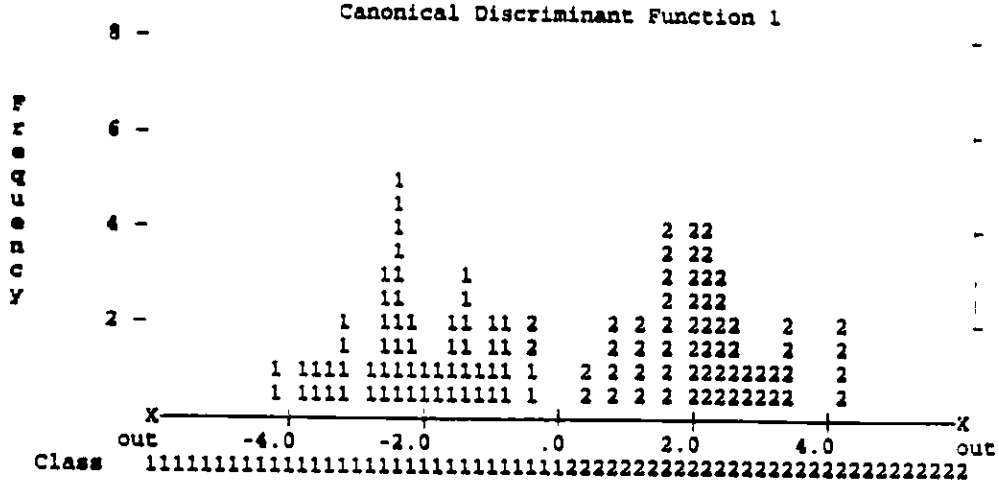
Case Number	Mis Val	Sel	Actual Group	Highest Group	Probability P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
49			1	1	.7279	1.0000	0	.0000	2.4944
50			1	1	.3660	1.0000	0	.0000	3.0506
51			1	1	.8168	1.0000	0	.0000	2.3792
52			1	1	.9385	.9999	0	.0001	2.0693
53			1	1	.9569	.9999	0	.0001	2.2006
54			1	1	.8247	.9997	0	.0003	1.9250
55			1	1	.6104	.9991	0	.0009	1.6370
56			1	1	.6334	.9992	0	.0008	1.6696
57			1	1	.8238	1.0000	0	.0000	2.3692
58			1	1	.0673	.7958	0	.2042	.3169
59			1	1	.9237	.9999	0	.0001	2.2423
60			1	1	.3916	.9961	0	.0039	1.2898

Symbols used in plots

Symbol	Group	Label
1	0	
2	1	

All-groups Stacked Histogram

Canonical Discriminant Function 1



Territories

Classification results -

Actual Group	No. of Cases	Predicted Group Membership 0	1
Group 0	30	30 100.0%	0 .0%
Group 1	30	1 3.3%	29 96.7%

Percent of "grouped" cases correctly classified: 98.33%

Classification processing summary

60 (Unweighted) cases were processed.
0 cases were excluded for missing or out-of-range group codes.
0 cases had at least one missing discriminating variable.
60 (Unweighted) cases were used for printed output.

- - - - - - - - D I S C R I M I N A N T A N A L Y S I S - - - - - - - -

On groups defined by GROUP

60 (Unweighted) cases were processed.
0 of these were excluded from the analysis.
60 (Unweighted) cases will be used in the analysis.

Number of cases by group

GROUP	Number of cases Unweighted	Weighted	Label
0	30	30.0	
1	30	30.0	
Total	60	60.0	

- - - - - - - - D I S C R I M I N A N T A N A L Y S I S - - - - - - - -

On groups defined by GROUP

Analysis number 1

Stepwise variable selection
Selection rule: minimize Wilks' Lambda
Maximum number of steps..... 38
Minimum tolerance level..... .00100
Minimum F to enter..... 3.84000
Maximum F to remove..... 2.71000

Canonical Discriminant Functions

Maximum number of functions..... 1
Minimum cumulative percent of variance... 100.00
Maximum significance of Wilks' Lambda.... 1.0000

Prior probability for each group is .50000

---------- Variables not in the Analysis after Step ----------

Variable	Tolerance	Minimum Tolerance	F to Enter	Wilks Lambda
APTNPERP	1.0000000	1.0000000	2.1956523	.9436848
FACLCNVX	1.0000000	1.0000000	.5139962	.9912160
LOWLAPO_	1.0000000	1.0000000	1.6448946	.9724220
LOWRIMPL	1.0000000	1.0000000	3.6603152	.9435993
LOWRLIPE	1.0000000	1.0000000	15.8339252	.7855510
MANDLGTH	1.0000000	1.0000000	4.6289861	.9261888
MANPLAGL	1.0000000	1.0000000	.3463031	.9940647
MANPROGN	1.0000000	1.0000000	1.4718953	.9752506
MLSULCUS	1.0000000	1.0000000	5.0844031	.9194032
NASLBANG	1.0000000	1.0000000	4.0117446	.9353067
OCCLPLAN	1.0000000	1.0000000	1.9784045	.9670147
PALPLANE	1.0000000	1.0000000	30.7595034	.6534512
POSFACHT	1.0000000	1.0000000	13.1335059	.8153682
SADANGLE	1.0000000	1.0000000	.0518757	.9991064
SNA	1.0000000	1.0000000	1.2123771	.9795249
SNB	1.0000000	1.0000000	5.4733894	.9137688
UFH_LFH	1.0000000	1.0000000	5.3465749	.9155980
UPLPLGTH	1.0000000	1.0000000	12.2590467	.8255165
UPPER1FH	1.0000000	1.0000000	4.0300503	.9350307

. . . . . .

At step 1, PALPLANE was included in the analysis.

		Degrees of Freedom		Signif.	Between Groups
Wilks' Lambda	.65345	1	58.0		
Equivalent F	30.75950	1	58.0	.0000	

---------- Variables in the Analysis after Step 1 ----------

Variable	Tolerance	F to Remove	Wilks' Lambda
PALPLANE	1.0000000	30.7595	

---------- Variables not in the Analysis after Step 1 ----------

Variable	Tolerance	Minimum Tolerance	F to Enter	Wilks' Lambda
APTNPERP	.9930061	.9930061	.6656955	.6459077
FACLCNVX	.7149826	.7149826	4.5227604	.6054136
LOWLAPO_	.9890286	.9890286	.3196212	.6498074
LOWRIMPL	.9999389	.9999389	2.2470147	.6286682
LOWRLIPE	.9979314	.9979314	8.9382501	.5648727
MANDLGTH	.9963972	.9963972	2.1316041	.6298952
MANPLAGL	.9358957	.9358957	.4565986	.6482583
MANPROGN	.9908853	.9908853	.3029682	.6499963
MLSULCUS	.9980064	.9980064	2.5925051	.6250235
NASLBANG	.9660523	.9660523	.6398166	.6461977
OCCLPLAN	.7293766	.7293766	1.9249541	.6321043
POSFACHT	.9972935	.9972935	9.8572791	.5571079
SADANGLE	.9978137	.9978137	.0006411	.6534438
SNA	.9913521	.9913521	1.6934189	.6345978
SNB	.9785267	.9785267	6.5211880	.5863668
UFH_LFH	.7107818	.7107818	.4060434	.6488292
UPLPLGTH	.9053528	.9053528	19.2357151	.4885730
UPPER1FH	.9262071	.9262071	.1739634	.6514629

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At step 2 UPLPLGTH was included in the analysis

		Degrees of Freedom		Signif	Between Groups
Wilks Lambda	.43857	2	1	58.0	
Equivalent F	39.83014		2	57.0	.0000

---------- Variables in the Analysis after Step 2 ----------

Variable	Tolerance	F to Remove	Wilks' Lambda
PALPLANE	.9053528	39.3099	.8255165
UPLPLGTH	.9053528	19.2357	.6534512

---------- Variables not in the Analysis after Step 2 ----------

Variable	Tolerance	Minimum Tolerance	F to Enter	Wilks' Lambda
APTNPERP	.9460475	.8625393	2.4146012	.4683776
FACLCNVX	.6645599	.6031339	8.5615087	.4237833
LOW1APO_	.9383797	.8589890	1.8789557	.4727122
LOWR1MPL	.9970968	.9027795	2.2119565	.4700081
LOWRLIPE	.9870117	.8954461	3.8320725	.4220147
MANDLGTH	.9662216	.8779345	3.7442224	.4579538
MANPLAGL	.9229462	.8363640	1.0576899	.4795163
MANPROGN	.9011742	.8233855	2.8246971	.4651123
MLSULCUS	.9978777	.9039753	2.0242622	.4715285
NASLBANG	.9613270	.8835098	.9039820	.4808115
OCCLPLAN	.7228082	.6589279	2.4113214	.4684039
POSFACHT	.8113864	.7365846	22.8728438	.3468886
SADANGLE	.9846991	.8934535	.1697107	.4870969
SNA	.9650711	.8813517	3.0649839	.4632202
SNB	.9628825	.8765391	7.2119292	.4328311
UFH_LFH	.9510103	.8510103	1.9707933	.4719634
UPPER1FH	.9178717	.8310068	.0000008	.4885730

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At step 3, POSFACHT was included in the analysis.

		Degrees of Freedom		Signif.	Between Groups
Wilks' Lambda	.34689	3	1	58.0	
Equivalent F	35.14504		3	56.0	.0000

---------- Variables in the Analysis after Step 3 ----------

Variable	Tolerance	F to Remove	Wilks' Lambda
PALPLANE	.8697863	37.7145	.5805088
POSFACHT	.8113864	22.8728	.4885730
UPLPLGTH	.7365846	33.9368	.5571079

---------- Variables not in the Analysis after Step 3 ----------

Variable	Tolerance	Minimum Tolerance	F to Enter	Wilks' Lambda
APTNPERP	.9080120	.7266783	.2571638	.3452742
FACLCNVX	.6592460	.5758705	7.9060722	.3032914
LOW1APO_	.9347582	.6974635	1.9472976	.3350268
LOWR1MPL	.9758239	.7364173	.4432277	.3441155
LOWRLIPE	.9691597	.7194463	9.2810398	.2968041

MANDLGTH	[illegible]	[illegible]	[illegible]	[illegible]
MANPLAGL	[illegible]	[illegible]	[illegible]	[illegible]
MANPROGN	[illegible]	[illegible]	[illegible]	[illegible]
MLSULCUS	9956603	7156102	-.4400199	24599951
NASLBANG	9588192	7341887	-.9445177	33501432
OCCLPLAN	7371928	6136016	3.5267630	30254294
SADANGLE	9483041	7252445	.1964892	34571264
SNA	8996480	6863283	6.7143076	30914483
SNB	8751839	6913887	-3.0787730	28122470
UFH_LFH	4830874	4830874	.0612795	34655088
UPPER1FH	9151775	7337142	.0472782	34659907

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At step 4, SNB was included in the analysis.

		Degrees of Freedom		Signif.	Between Groups
Wilks' Lambda	.28025	4	1	58.0	
Equivalent F	35.31386		4	55.0	.0000

---------- Variables in the Analysis after Step 4 ----------

Variable	Tolerance	F to Remove	Wilks' Lambda
PALPLANE	.8139521	42.2775	.4956676
POSFACHT	.7374859	29.9455	.4328311
SNB	.8751839	13.0788	.3468886
UPLPLGTH	.6908587	38.9592	.4787595

---------- Variables not in the Analysis after Step 4 ----------

Variable	Tolerance	Minimum Tolerance	F to Enter	Wilks' Lambda
APTNPERP	.7417894	.6523245	4.0980851	.2604791
FACLCNVX	.3393519	.3393519	.1319005	.2795642
LOW1APO_	.8834460	.6352118	4.2215385	.2599268
LOWR1MPL	.9729435	.6903109	.1751938	.2793407
LOWRLIPE	.9612231	.6798161	5.3134282	.2525868
MANDLGTH	.6315594	.5502930	.0110769	.2801895
MANPLAGL	.8301368	.6674448	1.6505639	.2719351
MANPROGN	.6640012	.6257382	4.1464062	.2602627
MLSULCUS	.9411483	.6903375	.2548456	.2789306
NASLBANG	.8960057	.6751250	3.1767051	.2646767
OCCLPLAN	.5798659	.5798659	.1323462	.2795619
SADANGLE	.7681933	.6768685	1.2820198	.2737479
SNA	.3614253	.3515990	.0838071	.2798128
UFH_LFH	.4476552	.4476552	.4610425	.2778746
UPPER1FH	.6615393	.6326298	4.9378377	.2567678

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At step 5, LOWRLIPE was included in the analysis.

		Degrees of Freedom		Signif.	Between Groups
Wilks' Lambda	.25259	5	1	58.0	
Equivalent F	31.95758		5	54.0	.0000

---------- Variables in the Analysis after Step 5 ----------

Variable	Tolerance	F to Remove	Wilks' Lambda

LOWRLIPE	.9611011	5 .9134	26.0471
PALPLANE	.8189177	14 .0974	4134819
POSFACHT	.7298179	29 .2517	3894221
SNB	.8681148	9 .4531	.2968341
UPLPLGTH	.6798161	38 .7025	.4336190

---------- Variables not in the Analysis after Step 5 ----------

Variable	Tolerance	Minimum Tolerance	F to Enter	Wilks Lambda
APTNPERP	.7407776	.6417807	3 .3132013	.2377173
FACLCNVX	.2998286	.2998286	.2180838	.2515517
LOW1APO_	.7413867	.6351584	1 .2283873	.2468651
LOWR1MPL	.9693300	.6739499	.0649027	.2522778
MANDLGTH	.6286597	.5486615	.0647945	.2522783
MANPLAGL	.7700363	.6633428	.3790239	.2507932
MANPROGN	.6413415	.6058614	5 .6579304	.2282232
MLSULCUS	.9407934	.6792149	.1947693	.2517093
NASLBANG	.8749948	.6678860	1.8007979	.2442866
OCCLPLAN	.5619300	.5619300	.0037256	.2525690
SADANGLE	.7301766	.6705689	.3253886	.2510455
SNA	.3483950	.3369852	.0272238	.2524571
UFH_LFH	.4459174	.4459174	.2470968	.2514146
UPPER1FH	.6214258	.6050592	2.4815599	.2412892

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At step 6, MANPROGN was included in the analysis.

		Degrees of Freedom		Signif.	Between Groups
Wilks' Lambda	.22822	6	1	58.0	
Equivalent F	29.97147		6	53.0	.0000

---------- Variables in the Analysis after Step 6 ----------

Variable	Tolerance	F to Remove	Wilks' Lambda
LOWRLIPE	.9284203	7.4405	.2602627
MANPROGN	.6413415	5.6579	.2525868
PALPLANE	.8151857	31.8314	.3652921
POSFACHT	.7201014	20.0461	.3145436
SNB	.6917131	14.8221	.2920486
UPLPLGTH	.6058614	46.1518	.4269573

---------- Variables not in the Analysis after Step 6 ----------

Variable	Tolerance	Minimum Tolerance	F to Enter	Wilks' Lambda
APTNPERP	.2931232	.2537767	.0017959	.2282153
FACLCNVX	.2946102	.2946102	.0211720	.2281303
LOW1APO_	.7048154	.5457551	2.4977132	.2177634
LOWR1MPL	.9197179	.6047951	.5873798	.2256740
MANDLGTH	.6286014	.5436592	.0475703	.2280146
MANPLAGL	.7697022	.5938978	.2842263	.2269825
MLSULCUS	.9133559	.6014481	.0005132	.2282209
NASLBANG	.8133747	.5961761	.4816982	.2261284
OCCLPLAN	.5360913	.5360913	.1873525	.2274038
SADANGLE	.7171168	.5422718	.7126424	.2251377
SNA	.3475590	.3130384	.0704230	.2279145
UFH_LFH	.4452901	.4452901	.1476857	.2275768
UPPER1FH	.5793201	.4508122	4.5793327	.2097516

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At step 7 UPPER1FH was entered in the analysis

		Degrees of Freedom		Signif	Between Groups
Wilks Lambda	.20975	7	59.0		
Equivalent F	27.98747	7	52.1	.0000	

---------- Variables in the Analysis after Step 7 ----------

Variable	Tolerance	F to Remove	Wilks Lambda
LOWRLIPE	.8896317	4.1253	.2263918
MANPROGN	.5978364	7.8186	.2412892
PALPLANE	.7936681	20.6591	.2930839
POSFACHT	.6913827	22.4244	.3002047
SNB	.4508122	20.2905	.2915566
UPLPLGTH	.5941366	46.5498	.3975186
UPPER1FH	.5793201	4.5793	.2282232

---------- Variables not in the Analysis after Step 7 ----------

Variable	Tolerance	Minimum Tolerance	F to Enter	Wilks' Lambda
APTNPERP	.2371641	.2371641	.3876623	.2061633
FACLCNVX	.2757986	.2757986	.1504121	.2091348
LOW1APO_	.5496637	.4503291	.3840026	.2081841
LOWR1MPL	.9195602	.4500666	.4915300	.2077493
MANDLGTH	.5823066	.4508043	.1279574	.2092266
MANPLAGL	.7443928	.4507760	.7908877	.2065485
MLSULCUS	.8968749	.4092692	.0643677	.2094872
NASLBANG	.7499267	.4493103	.0090797	.2097142
OCCLPLAN	.3875778	.3875778	3.0309518	.1979852
SADANGLE	.6845713	.3424766	1.5959226	.2033871
SNA	.2913475	.1795737	.3809679	.2081964
UFH_LFH	.4430065	.4407626	.0483696	.2095528

F level or tolerance or VIN insufficient for further computation.

Summary Table

Step	Action Entered	Removed	Vars in	Wilks' Lambda	Sig.	Label
1	PALPLANE		1	.65345	.0000	
2	UPLPLGTH		2	.48857	.0000	
3	POSFACHT		3	.34689	.0000	
4	SNB		4	.28025	.0000	
5	LOWRLIPE		5	.25259	.0000	
6	MANPROGN		6	.22822	.0000	
7	UPPER1FH		7	.20975	.0000	

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr	After Fcn	Wilks' Lambda	Chi-square	df	Sig
					0	.209752	85.120	7	.0000
1*	3.7675	100.00	100.00	.8890					

* Marks the 1 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

	Func 1
LOWRLIPE	.32334
MANPROGN	-.52596
PALPLANE	.67330
POSFACHT	-.74261
SNB	.88746
UPLPLGTH	1.00301
UPPER1FH	-.42047

Structure matrix:

Pooled within-groups correlations between discriminating variables and canonical discriminant functions
(Variables ordered by size of correlation within function)

	Func 1
PALPLANE	.37519
LOWRLIPE	.26918
OCCLPLAN	.26588
POSFACHT	-.24516
UPLPLGTH	.23686
MLSULCUS	-.19038
MANDLGTH	-.13854
MANPLAGL	.16067
SNB	.15827
SADANGLE	-.14924
UPPER1FH	-.13580
UFH_LFH	.13336
SNA	.12696
NASLBANG	.12250
MANPROGN	-.08207
FACLCNVX	-.08058
APTNPERP	-.02774
LOWR1MPL	-.02357
LOW1APO_	.01439

Unstandardized canonical discriminant function coefficients

	Func 1
LOWRLIPE	.1294304
MANPROGN	-.0717379
PALPLANE	.2122164
POSFACHT	-.1646623
SNB	.3159621
UPLPLGTH	.4548925
UPPER1FH	-.0671969
(Constant)	-15.6330280

Canonical discriminant functions evaluated at group means (group centroids)

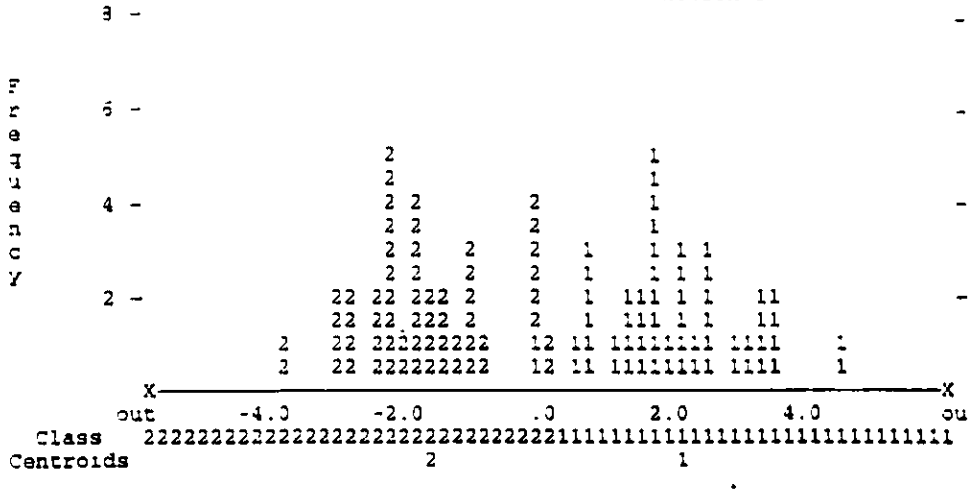
Group	Func 1
0	1.90839
1	-1.90839

Symbols used in plots

Case	Group	Label
1	1	
2	1	

All-groups Stacked Histogram

Canonical Discriminant Function 1



Classification results -

Actual Group		No. of Cases	Predicted Group Membership 0	1
Group	0	30	29 96.7%	1 3.3%
Group	1	30	1 3.3%	29 96.7%

Percent of "grouped" cases correctly classified: 96.67%

Classification processing summary

60 (Unweighted) cases were processed.
0 cases were excluded for missing or out-of-range group codes.
0 cases had at least one missing discriminating variable.
60 (Unweighted) cases were used for printed output.

APPENDIX G

DISCRIMINANT ANALYSIS: 6-18 YEAR OLD

```
Data written to the working file.
1 variables and 300 cases written.
Variable. B_NO        Type: String   Format: A9

>Warning # 9435.  Text: VAR1
>The format of the variable can't be translated.  The variable was dropped.


>Error # 9436
>There are no variables to copy.  Perhaps they were dropped.
>This command not executed.


>Error # 105.  Command name: EXECUTE
>This command is not valid before a working file has been defined.
>This command not executed.


Data written to the working file.
21 variables and 300 cases written.
Variable: B_NO        Type: String   Format: A8
Variable: GROUP       Type: Number   Format: F11.2
Variable: SADANGLE    Type: Number   Format: F11.2
Variable: SNA         Type: Number   Format: F11.2
Variable: SNB         Type: Number   Format: F11.2
Variable: POSFACHT    Type: Number   Format: F11.2
Variable: FACLCNVX    Type: Number   Format: F11.2
Variable: LOWRLIPE    Type: Number   Format: F11.2
Variable: LOW1APO_    Type: Number   Format: F11.2
Variable: UPLPLGTH    Type: Number   Format: F11.2
Variable: MANPLAGL    Type: Number   Format: F11.2
Variable: PALPLANE    Type: Number   Format: F11.2
Variable: OCCLPLAN    Type: Number   Format: F11.2
Variable: LOWR1MPL    Type: Number   Format: F11.2
Variable: UPPER1FH    Type: Number   Format: F11.2
Variable: APTNPERP    Type: Number   Format: F11.2
Variable: MANDLGTH    Type: Number   Format: F11.2
Variable: NASLBANG    Type: Number   Format: F11.2
Variable: MANPROGN    Type: Number   Format: F11.2
Variable: MLSULCUS    Type: Number   Format: F11.2
Variable: UFH_LFH     Type: Number   Format: F11.2

- - - - - - - -  D I S C R I M I N A N T   A N A L Y S I S  - - - - - - - -

On groups defined by GROUP

          300 (Unweighted) cases were processed.
            0 of these were excluded from the analysis.
          300 (Unweighted) cases will be used in the analysis.


Number of cases by group

                  Number of cases
  GROUP       Unweighted      Weighted  Label
        0            150         150.0
        1            150         150.0

    Total            300         300.0


Group means
```

GROUP	APTNPERP	FACLCNVX	LOW1APO_	LOWR1MPL
0	-2.90333	86.85467	-1.57467	89.11200
1	-1.13667	87.10367	-1.81933	92.89133
Total	-1.47000	86.93167	-1.17000	91.09667

GROUP	LOWRLIPE	MANDLGTH	MANPLAGL	MANPROGN
0	2.40333	110.27067	26.10400	-7.93133
1	.31800	113.55133	25.75867	-2.19333
Total	1.36067	111.91100	25.93133	-4.99733

GROUP	MLSULCUS	NASLBANG	OCCLPLAN	PALPLANE
0	4.45933	125.02200	10.13200	2.11733
1	5.40800	123.14600	8.46000	-1.96067
Total	4.93367	124.08400	9.29600	.07833

GROUP	POSFACHT	SADANGLE	SNA	SNB
0	71.64267	121.50800	82.25267	79.40800
1	60.75067	122.12400	81.14200	77.75467
Total	66.19667	121.81600	81.69733	78.58633

GROUP	UFH_LFH	UPLPLGTH	UPPER1FH
0	85.17467	22.11867	104.29467
1	79.93667	20.75667	112.54067
Total	82.55567	21.43767	108.41767

Group standard deviations

GROUP	APTNPERP	FACLCNVX	LOW1APO_	LOWR1MPL
0	3.25546	2.75709	1.61184	5.14396
1	5.24064	3.12747	2.59989	7.41435
Total	4.55536	2.95622	2.26051	6.61906

GROUP	LOWRLIPE	MANDLGTH	MANPLAGL	MANPROGN
0	2.58951	10.62578	3.28390	6.23943
1	2.65500	8.47189	5.18027	10.00256
Total	2.81870	9.73298	4.33320	8.81589

GROUP	MLSULCUS	NASLBANG	OCCLPLAN	PALPLANE
0	2.24631	11.14426	3.59766	3.15675
1	1.63369	14.30966	4.08927	3.35099
Total	2.01749	12.83796	3.93501	3.83837

GROUP	POSFACHT	SADANGLE	SNA	SNB
0	8.52704	4.09730	2.90204	2.73588
1	7.02312	5.37452	3.92301	3.75582
Total	9.51690	4.78074	3.48934	3.38185

GROUP	UFH_LFH	UPLPLGTH	UPPER1FH

Total				

- - - - - - - - - D I S C R I M I N A N T A N A L Y S I S - - - - - - - - -

On groups defined by GROUP

Analysis number 1

Direct method: all variables passing the tolerance test are entered

Minimum tolerance level..... .00100

Canonical Discriminant Functions

Maximum number of functions.. 1
Minimum cumulative percent of variance... 100.00
Maximum significance of Wilks Lambda... 1.0000

Prior probability for each group is .50000

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr	After Fcn	Wilks' Lambda	Chi-square	df	Sig
1*	7.1557	100.00	100.00	.9367	0	.122614	505.479	19	.0000

* Marks the 1 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

	Func 1
APTNPERP	37199
FACLCNVX	1.00248
LOW1APO_	.13368
LOWR1MPL	-.29130
LOWRLIPE	.13045
MANDLGTH	-2.54400
MANPLAGL	.74892
MANPROGN	-.77119
MLSULCUS	-.05691
NASLBANG	-.14876
OCCLPLAN	-.00890
PALPLANE	.48956
POSFACHT	2.26035
SADANGLE	.34091
SNA	-.52744
SNB	.64253
UFH_LFH	.00826
UPLPLGTH	.25214
UPPER1FH	.11142

Structure matrix:

Pooled within-groups correlations between discriminating variables and canonical discriminant functions
(Variables ordered by size of correlation within function)

	Func 1
POSFACHT	.26131
PALPLANE	.23494
LOWRLIPE	.14913
UFH_LFH	.13631
MANPROGN	-.13067
LOW1APO_	.11573
APTNPERP	-.11464
UPPER1FH	-.11051
LOWR1MPL	-.10549
SNB	.09360
MLSULCUS	-.09059
UPLPLGTH	.08870
OCCLPLAN	.08142
MANDLGTH	-.06403
SNA	.06037
FACLCNVX	-.03524
NASLBANG	.02743
SADANGLE	-.02417
MANPLAGL	.01493

Unstandardized canonical discriminant function coefficients

	Func 1
APTNPERP	.0852698
FACLCNVX	.3400422
LOW1APO_	.3618037
LOWR1MPL	-.3456518
LOWRLIPE	.0497422
MANDLGTH	-.2647418
MANPLAGL	.1726806
MANPROGN	-.3925117
MLSULCUS	-.0289748
NASLBANG	-.0115993
OCCLPLAN	-2.31068630E-03
PALPLANE	.1503866
POSFACHT	.2893665
SADANGLE	.0713383
SNA	-.1528599
SNB	.1355541
UFH_LFH	1.14654868E-03
UPLPLGTH	.0875553
UPPER1FH	8.17837219E-03
(Constant)	-32.5414934

Canonical discriminant functions evaluated at group means (group centroids)

Group	Func 1
0	2.66608
1	-2.66608

Case Number	Mis Val	Sel	Actual Group	Highest Group	Probability P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
1			0	0	.2490	.9997	1	.0003	1.5134
2			0	0	.6290	1.0000	1	.0000	3.1492
3			0	0	.9473	1.0000	1	.0000	2.7321
4			0	0	.7144	1.0000	1	.0000	3.0320
5			0	0	.4534	1.0000	1	.0000	3.4159
6			0	0	.6833	1.0000	1	.0000	2.2581
7			0	0	.7069	1.0000	1	.0000	3.0421

Case Number	Mis Val	Sel	Actual Group	Highest Group	Probability P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
1			0	0	.3143	[illegible]	[illegible]	[illegible]	[illegible]
2			0	0	.3281	[illegible]	[illegible]	[illegible]	[illegible]
3			0	0	.7161	[illegible]	[illegible]	[illegible]	[illegible]
4			0	0	.8220	[illegible]	[illegible]	[illegible]	[illegible]
5			0	0	.9369	1.0000	[illegible]	[illegible]	[illegible]
6			0	0	.9994	1.0000	[illegible]	[illegible]	[illegible]
7			0	0	.7881	[illegible]	[illegible]	[illegible]	[illegible]
8			0	0	.8129	1.0000	[illegible]	[illegible]	[illegible]
9			0	0	.8513	[illegible]	[illegible]	[illegible]	[illegible]
10			0	0	.2461	.9999	[illegible]	[illegible]	[illegible]
11			0	0	.8737	1.0000	[illegible]	[illegible]	[illegible]
12			0	0	.8886	1.0000	[illegible]	[illegible]	[illegible]
13			0	0	.9924	1.0000	[illegible]	[illegible]	[illegible]
14			0	0	.9130	1.0000	[illegible]	[illegible]	[illegible]
15			0	0	.4625	1.0000	[illegible]	[illegible]	[illegible]
16			0	0	.5449	1.0000	[illegible]	[illegible]	[illegible]
17			0	0	.9298	1.0000	[illegible]	[illegible]	[illegible]
18			0	0	.3051	1.0000	[illegible]	[illegible]	[illegible]
19			0	0	.6250	1.0000	[illegible]	[illegible]	[illegible]
20			0	0	.9165	1.0000	[illegible]	[illegible]	[illegible]
21			0	0	.9273	1.0000	[illegible]	[illegible]	[illegible]
22			0	0	.4031	.9999	[illegible]	[illegible]	[illegible]
23			0	0	.3849	.9999	[illegible]	[illegible]	[illegible]
24			0	0	.1953	.9993	[illegible]	[illegible]	[illegible]
25			0	0	.3154	1.0000	[illegible]	[illegible]	[illegible]
26			0	0	.6806	1.0000	[illegible]	[illegible]	[illegible]
27			0	0	.5743	1.0000	[illegible]	[illegible]	[illegible]
28			0	0	.7892	1.0000	[illegible]	[illegible]	[illegible]
29			0	0	.8630	1.0000	[illegible]	[illegible]	[illegible]
30			0	0	1.0000	1.0000	[illegible]	[illegible]	[illegible]
31			0	0	.0133	.7343	[illegible]	[illegible]	[illegible]
32			0	0	.1217	.9974	[illegible]	[illegible]	[illegible]
33			0	0	.9190	1.0000	[illegible]	[illegible]	[illegible]
34			0	0	.9122	1.0000	[illegible]	[illegible]	[illegible]
35			0	0	.0133	1.0000	[illegible]	[illegible]	[illegible]
36			0	0	.8384	1.0000	[illegible]	[illegible]	[illegible]
37			0	0	.0563	.9827	[illegible]	[illegible]	[illegible]
38			0	0	.8392	1.0000	[illegible]	[illegible]	[illegible]
39			0	0	.6584	1.0000	[illegible]	[illegible]	[illegible]
40			0	0	.5850	1.0000	[illegible]	[illegible]	[illegible]
41			0	0	.2262	.9996	[illegible]	[illegible]	[illegible]
42			0	0	.4778	1.0000	[illegible]	[illegible]	[illegible]
43			0	0	.4092	1.0000	[illegible]	[illegible]	[illegible]
44			0	0	.3908	1.0000	[illegible]	[illegible]	[illegible]
45			0	0	.6738	1.0000	[illegible]	[illegible]	[illegible]
46			0	0	.4666	1.0000	[illegible]	[illegible]	[illegible]
47			0	0	.9563	1.0000	[illegible]	[illegible]	[illegible]
48			0	0	.7616	1.0000	[illegible]	[illegible]	[illegible]
49			0	0	.8453	1.0000	[illegible]	[illegible]	[illegible]
50			0	0	.1788	.9991	[illegible]	[illegible]	[illegible]
51			0	0	.4468	1.0000	[illegible]	[illegible]	[illegible]
52			0	0	.0619	1.0000	[illegible]	[illegible]	[illegible]
53			0	0	.6125	1.0000	[illegible]	[illegible]	[illegible]
54			0	0	.9824	1.0000	[illegible]	[illegible]	[illegible]
55			0	0	.8881	1.0000	[illegible]	[illegible]	[illegible]
56			0	0	.2542	.9997	[illegible]	[illegible]	[illegible]
57			0	0	.4080	.9999	[illegible]	[illegible]	[illegible]
58			0	0	.2362	1.0000	[illegible]	[illegible]	[illegible]
59			0	0	.8502	1.0000	[illegible]	[illegible]	[illegible]
60			0	0	.8471	1.0000	[illegible]	[illegible]	[illegible]
61			0	0	.0984	.9955	[illegible]	[illegible]	[illegible]
62			0	0	.2044	.9994	[illegible]	[illegible]	[illegible]
63			0	0	.6465	1.0000	[illegible]	[illegible]	[illegible]
64			0	0	.5627	1.0000	[illegible]	[illegible]	[illegible]
65			0	0	.7089	1.0000	[illegible]	[illegible]	[illegible]
66			0	0	.0517	.9790	[illegible]	[illegible]	[illegible]
67			0	0	.9389	1.0000	[illegible]	[illegible]	[illegible]
68			0	0	.4778	1.0000	1	.0000	1.9562
69			0	0	.4092	1.0000	1	.0000	3.4914
70			0	0	.3908	1.0000	1	.0000	3.5243
71			0	0	.6738	1.0000	1	.0000	3.0870
72			0	0	.4666	1.0000	1	.0000	1.9391
73			0	0	.9563	1.0000	1	.0000	2.7208
74			0	0	.7616	1.0000	1	.0000	2.3627

75				[illegible]				
76				6389	[illegible]			
77				2228	9996			
78				3400	1.0000			
79				8231	1.0000			
80				1683	1.0000			
81				4584	1.0000			
82				4032	1.0000			
83				8930	1.0000			
84				8127	1.0000			
85				3940	1.0000			
86				3800	.9999			
87				7325	1.0000			
88				.7819	1.0000			
89				.3355	1.0000			
90				6602	1.0000			
91				.8950	1.0000			
92				.2454	1.0000			
93				.0876	1.0000			
94				.7775	1.0000			
95				.5133	1.0000			
96				.2526	.9997			

Case Number	Mis Val	Sel	Actual Group	Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
97				0	.0575	.9835	1	.0165	.7665
98				0	.3447	1.0000	1	.0000	3.6111
99				0	.7246	1.0000	1	.0000	2.3138
100				0	.0267	.9167	1	.0833	.4497
101				0	.6467	1.0000	1	.0000	2.2078
102				0	.7610	1.0000	1	.0000	2.3619
103				0	.9557	1.0000	1	.0000	2.6105
104				0	.7917	1.0000	1	.0000	2.9302
105				0	.8174	1.0000	1	.0000	2.8970
106				0	.5057	1.0000	1	.0000	2.0005
107				0	.4126	.9999	1	.0001	1.8468
108				0	.4371	1.0000	1	.0000	3.4432
109				0	.9569	1.0000	1	.0000	2.7201
110				0	.8672	1.0000	1	.0000	2.8333
111				0	.2763	.9998	1	.0002	1.5774
112				0	.2684	1.0000	1	.0000	3.7729
113				0	.5617	1.0000	1	.0000	2.0857
114				0	.6174	1.0000	1	.0000	3.1657
115				0	.3240	1.0000	1	.0000	3.6523
116				0	.7560	1.0000	1	.0000	2.3553
117				0	.7734	1.0000	1	.0000	2.9540
118				0	.2389	.9996	1	.0004	1.4883
119				0	.2405	1.0000	1	.0000	3.8397
120				0	.2402	1.0000	1	.0000	3.8406
121				0	.1244	1.0000	1	.0000	4.2027
122				0	.8107	1.0000	1	.0000	2.4265
123				0	.0132	1.0000	1	.0000	5.1443
124				0	.2654	.9997	1	.0003	1.5524
125				0	.8733	1.0000	1	.0000	2.5066
126				0	.0444	1.0000	1	.0000	4.6767
127				0	.7253	1.0000	1	.0000	3.0179
128				0	.6711	1.0000	1	.0000	3.0909
129				0	.1524	1.0000	1	.0000	4.0972
130				0	.9546	1.0000	1	.0000	2.6091
131				0	.0565	.9828	1	.0172	.7591
132				0	.1849	.9992	1	.0008	1.3404
133				0	.7275	1.0000	1	.0000	3.0145
134				0	.8161	1.0000	1	.0000	2.8986
135				0	.5572	1.0000	1	.0000	3.2532
136				0	.2827	.9998	1	.0002	1.5918
137				0	.6555	1.0000	1	.0000	2.2200
138				0	.5939	1.0000	1	.0000	3.1992
139				0	.5413	1.0000	1	.0000	2.0552
140				0	.0077	1.0000	1	.0000	5.3325
141				0	.2821	.9998	1	.0002	1.5905

Case Number	Mis Val	Sel	Actual Group	Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
145			1	1	.6619	1.0000	0	.0000	3.1172
146			1	1	.1035	1.0000	0	.0000	4.1859
147			1	1	.5979	1.0000	0	.0000	3.0542
148			1	1	.3974	.9954	0	.0046	1.0086
149			1	1	.1994	1.0000	0	.0000	3.9493
150			1	1	.3862	1.0000	0	.0000	3.5325
151			1	1	.6901	1.0000	0	.0000	3.0648
152			1	1	.4094	.9999	0	.0001	-1.8410
153			1	1	.3892	.9999	0	.0001	-1.8050
154			1	1	.1436	1.0000	0	.0000	-4.1285
155		**	1	0	.0205	.8660	1	.1340	.3499
156			1	1	.7112	1.0000	0	.0000	-2.2958
157			1	1	.9094	1.0000	0	.0000	-2.5522
158			1	1	.2020	1.0000	0	.0000	-3.9420
159			1	1	.8521	1.0000	0	.0000	-2.4796
160			1	1	.8381	1.0000	0	.0000	-2.4618
161			1	1	.4338	1.0000	0	.0000	-3.4488
162			1	1	.3527	.9999	0	.0001	-1.7366
163			1	1	.3339	.9999	0	.0001	-1.6998
164			1	1	.2217	.9995	0	.0005	-1.4441
165			1	1	.7024	1.0000	0	.0000	-3.0482
166			1	1	.8924	1.0000	0	.0000	-2.8014
167			1	1	.4715	1.0000	0	.0000	-3.3861
168			1	1	.1754	1.0000	0	.0000	-4.0212
169			1	1	.9827	1.0000	0	.0000	-2.9195
170			1	1	.3021	.9998	0	.0002	-1.6340
171			1	1	.9501	1.0000	0	.0000	-2.6035
172			1	1	.0681	.9889	0	.0111	-.8415
173			1	1	.6205	1.0000	0	.0000	-3.1612
174			1	1	.8233	1.0000	0	.0000	-2.8894
175			1	1	.6417	1.0000	0	.0000	-3.1314
176			1	1	.6486	1.0000	0	.0000	-3.1218
177			1	1	.5757	1.0000	0	.0000	-2.1063
178			1	1	.9217	1.0000	0	.0000	-2.5679
179			1	1	.4651	1.0000	0	.0000	-3.3965
180			1	1	.4155	1.0000	0	.0000	-3.4804
181			1	1	.3611	.9999	0	.0001	-1.7529
182			1	1	.6238	1.0000	0	.0000	-3.1565
183			1	1	.5378	1.0000	0	.0000	-3.2922
184			1	1	.4220	1.0000	0	.0000	-3.4690
185			1	1	.6937	1.0000	0	.0000	-3.0599
186			1	1	.1798	1.0000	0	.0000	-4.0074
187			1	1	.0352	1.0000	0	.0000	-4.7723
188			1	1	.7053	1.0000	0	.0000	-2.2879
189			1	1	.3814	.9999	0	.0001	-1.7907
190			1	1	.0326	.9438	0	.0562	-.5289
191			1	1	.1173	1.0000	0	.0000	-4.2322
192			1	1	.2112	.9995	0	.0005	-1.4157

Case Number	Mis Val	Sel	Actual Group	Highest Probability Group	P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
193			1	1	.3997	1.0000	0	.0000	-3.5082
194			1	1	.2315	1.0000	0	.0000	-3.8627
195			1	1	.8754	1.0000	0	.0000	-2.8229
196			1	1	.9746	1.0000	0	.0000	-2.6979
197			1	1	.5129	1.0000	0	.0000	-3.3204
198			1	1	.3671	1.0000	0	.0000	-3.5680
199			1	1	.9179	1.0000	0	.0000	-2.7691
200			1	1	.2201	.9995	0	.0005	-1.4399
201			1	1	.1344	1.0000	0	.0000	-4.1631
202			1	1	.7337	1.0000	0	.0000	-2.3259

Case Number	Mis Val	Sel	Actual Group	Highest Group	Probability P(D/G)	Probability P(G/D)	2nd Highest Group	2nd Highest P(G/D)	Discrim Scores
211			1	1	.8791	1.0000	0	.0000	-2.7775
212			1	1	.1628	.9999	0	.0001	-1.6113
213			1	1	.8422	1.0000	0	.0000	-3.1671
214			1	1	.9974	1.0000	0	.0000	-5.9611
215			1	1	.8038	1.0000	0	.0000	-3.4628
216			1	1	.8527	1.0000	0	.0000	-3.6944
217			1	1	.1148	.9925	0	.0075	-2.3514
218			1	1	.2833	.9998	0	.0002	-2.2293
219			1	1	.5452	1.0000	0	.0000	-2.5932
220			1	1	.4403	1.0000	0	.0000	-2.3611
221			1	1	.1126	.7130	0	.2870	-1.8943
222			1	1	.4219	1.0000	0	.0000	-2.7737
223			1	1	.1821	.9992	0	.0008	-1.9629
224			1	1	.2714	.9998	0	.0002	-2.3117
225			1	1	.8904	1.0000	0	.0000	-1.5662
226	1		1	1	.3024	1.0000	0	.0000	-2.5283
227	1		1	1	.2568	1.0000	0	.0000	-3.6974
228	1		1	1	.8740	1.0000	0	.0000	-3.8001
229	1		1	1	.3705	1.0000	0	.0000	-2.9246
230	1		1	1	.7847	1.0000	0	.0000	-3.5616
231	1		1	1	.5956	1.0000	0	.0000	-2.3929
232	1		1	1	.5063	1.0000	0	.0000	-3.1968
233	1		1	1	.8187	1.0000	0	.0000	-3.3107
234	1		1	1	.2220	1.0000	0	.0000	-2.4369
235	1		1	1	.5796	1.0000	0	.0000	-3.8872
236	1		1	1	.7033	1.0000	0	.0000	-3.2201
237	1		1	1	.5817	1.0000	0	.0000	-2.2852
238	1		1	1	.4880	1.0000	0	.0000	-3.2169
239	1		1	1	.7919	1.0000	0	.0000	-1.9726
240	1		1	1	.9614	1.0000	0	.0000	-2.9429
241	1		1	1	.2853	.9998	0	.0002	-2.7144
242	1		1	1	.1497	1.0000	0	.0000	-1.5977
243	1		1	1	.6610	1.0000	0	.0000	-2.3479
244	1		1	1	.9140	1.0000	0	.0000	-2.2275
245	1		1	1	.1471	.9985	0	.0015	-2.5581
246	1		1	1	.2657	.9997	0	.0003	-1.2163
247	1		1	1	.4418	1.0000	0	.0000	-1.5530
248	1		1	1	.5309	1.0000	0	.0000	-1.8969
249	1		1	1	.8091	1.0000	0	.0000	-2.0394
250	1		1	1	.5203	1.0000	0	.0000	-2.9077
251	1		1	1	.1728	.9990	0	.0010	-2.0233
252	1		1	1	.1873	.9992	0	.0008	-1.3029
253	1		1	1	.5172	1.0000	0	.0000	-1.3474
254	1		1	1	.3733	1.0000	0	.0000	-3.3138
255	1		1	1	.0490	1.0000	0	.0000	-3.5564
256	1		1	1	.8306	1.0000	0	.0000	-4.6350
257	1		1	1	.0205	1.0000	0	.0000	-2.3801
258	1		1	1	.5089	1.0000	0	.0000	-4.9838
259	1		1	1	.2619	.9997	0	.0003	-3.3266
260	1		1	1	.6865	1.0000	0	.0000	-1.5441
261	1		1	1	.1426	.9983	0	.0017	-2.2625
262	1		1	1	.6931	1.0000	0	.0000	-1.1998
263	1		1	1	.4295	1.0000	0	.0000	-2.2156
264	1		1	1	.0181	1.0000	0	.0000	-3.4562
265	1		1	1	.3149	.9999	0	.0001	-5.0305
266	1		1	1	.1927	.9993	0	.0007	-1.6610
267	1		1	1	.7464	1.0000	0	.0000	-1.3635
268	1		1	1	.5611	1.0000	0	.0000	-2.3427
269	1		1	1	.8320	1.0000	0	.0000	-2.0848
									-2.4539
									-2.9703
									-4.0742
									-3.3292
									-3.4067
									-4.4570
									-2 3455
									-3.1718
									-4.6854

284		2	1	9589	1.0000	0	.0000	-2.7177
285		2	1	.7491	1.0000	0	.0000	-2.3462
286		2	1	5036	1.0000	0	.0000	-1.9972
287		2	1	4720	1.0000	0	.0000	-3.3854
288		1	1	2768	.9998	0	.0002	-1.5785

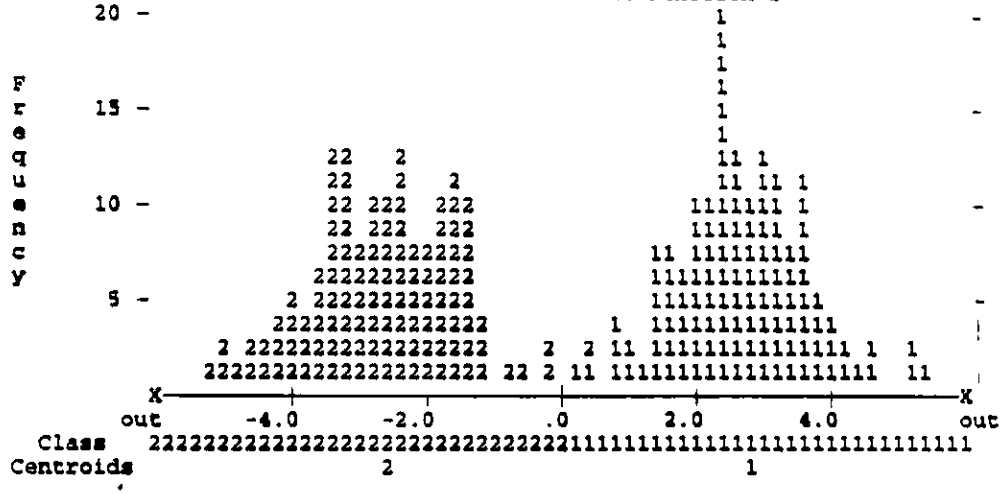
Case Number	Mis Val	Sel	Actual Group	Highest Group	Probability P(D/G)	P(G/D)	2nd Highest Group	P(G/D)	Discrim Scores
289			1	1	.0811	1.0000	0	.0000	-4.4106
290			1	1	.0120	1.0000	0	.0000	-5.1775
291			1	1	.3755	.9999	0	.0001	-1.7799
292			1	1	.7294	1.0000	0	.0000	-3.0121
293			1	1	.4084	.9999	0	.0001	-1.8394
294			1	1	.8422	1.0000	0	.0000	-2.4670
295			1	1	.1384	1.0000	0	.0000	-4.1477
296			1	1	.5399	1.0000	0	.0000	-3.2791
297			1	1	.6367	1.0000	0	.0000	-3.1384
298			1	1	.8042	1.0000	0	.0000	-2.4182
299			1	1	.8331	1.0000	0	.0000	-2.8768
300			1	1	.2239	.9996	0	.0004	-1.4497

Symbols used in plots

Symbol	Group	Label
1	0	
2	1	

All-groups Stacked Histogram

Canonical Discriminant Function 1



Classification results -

Actual Group	No. of Cases	Predicted Group Membership 0	1
Group 0	150	150 100.0%	0 .0%
Group 1	150	1 .7%	149 99.3%

Percent of 'grouped' cases correctly classified: 99.67%

Classification processing summary

300 (Unweighted) cases were processed.
0 cases were excluded for missing or out-of-range group codes.
0 cases had at least one missing discriminating variable.
300 (Unweighted) cases were used for printed output.

- - - - - - - - D I S C R I M I N A N T A N A L Y S I S - - - - - - - -

On groups defined by GROUP

300 (Unweighted) cases were processed.
0 of these were excluded from the analysis.
300 (Unweighted) cases will be used in the analysis.

Number of cases by group

GROUP	Number of cases Unweighted	Weighted	Label
0	150	150.0	
1	150	150.0	
Total	300	300.0	

- - - - - - - - D I S C R I M I N A N T A N A L Y S I S - - - - - - - -

On groups defined by GROUP

Analysis number 1

Stepwise variable selection
Selection rule: minimize Wilks' Lambda
Maximum number of steps..... 38
Minimum tolerance level..... .00100
Minimum F to enter..... 3.84000
Maximum F to remove..... 2.71000

Canonical Discriminant Functions

Maximum number of functions..... 1
Minimum cumulative percent of variance... 100.00
Maximum significance of Wilks' Lambda.... 1.0000

Prior probability for each group is .50000

---------- Variables not in the Analysis after Step 0 ----------

Minimum

Variable	Tolerance	Tolerance	F to Enter	Wilks	Lambda
APTNPERP	1.0000000	1.0000000	28.0241614		9141427
FACLCNVX	1.0000000	1.0000000	2.6484729		9911913
LOW1APO_	1.0000000	1.0000000	28.8547213		9125576
LOWR1MPL	1.0000000	1.0000000	23.7311468		9252392
LOWRLIPE	1.0000000	1.0000000	47.4237034		8627286
MANDLGTH	1.0000000	1.0000000	8.7416923		9718015
MANPLAGL	1.0000000	1.0000000	.4755089		9984069
MANPROGN	1.0000000	1.0000000	16.4071648		.8911292
MLSULCUS	1.0000000	1.0000000	17.4981113		9445381
NASLBANG	1.0000000	1.0000000	1.5047589		9946437
OCCLPLAN	1.0000000	1.0000000	14.1356370		9547102
PALPLANE	1.0000000	1.0000000	117.6979984		.7168666
POSFACHT	1.0000000	1.0000000	145.8221133		6714402
SADANGLE	1.0000000	1.0000000	1.2462069		9958355
SNA	1.0000000	1.0000000	7.7708114		9745862
SNB	1.0000000	1.0000000	18.7613991		.9407712
UFH_LFH	1.0000000	1.0000000	39.6271862		8826303
UPLPLGTH	1.0000000	1.0000000	16.7764449		9467036
UPPER1FH	1.0000000	1.0000000	27.4752135		9155843

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At step 1, POSFACHT was included in the analysis.

		Degrees of Freedom		Signif.	Between Groups
Wilks' Lambda	.67144	1	1	298.0	
Equivalent F	145.82211		1	298.0	.0000

---------- Variables in the Analysis after Step 1 ----------

Variable	Tolerance	F to Remove	Wilks' Lambda
POSFACHT	1.0000000	145.8221	

---------- Variables not in the Analysis after Step 1 ----------

Variable	Tolerance	Minimum Tolerance	F to Enter	Wilks' Lambda
APTNPERP	.9981440	.9981440	22.6625187	.6238383
FACLCNVX	.9214252	.9214252	18.2462566	.6325776
LOW1APO_	.9902490	.9902490	28.8695976	.6119556
LOWR1MPL	.9213875	.9213875	49.5192633	.5754882
LOWRLIPE	.8986753	.8986753	6.8934619	.6562094
MANDLGTH	.2715858	.2715858	433.4279643	.2730149
MANPLAGL	.9003887	.9003887	15.0556143	.6390455
MANPROGN	.9695240	.9695240	45.7555549	.5818074
MLSULCUS	.8629921	.8629921	58.0574372	.5616492
NASLBANG	.9916749	.9916749	.0183686	.6713987
OCCLPLAN	.8803003	.8803003	47.8960213	.5781967
PALPLANE	.9720330	.9720330	53.6698406	.5686766
SADANGLE	.9982822	.9982822	1.7523549	.6675018
SNA	.9527028	.9527028	.0182996	.6713988
SNB	.8911691	.8911691	.0907983	.6712350
UFH_LFH	.9980291	.9980291	31.2887124	.6074462
UPLPLGTH	.7536137	.7536137	3.1992990	.6642845
UPPER1FH	.9859201	.9859201	30.2379244	.6093968

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At step 2, MANDLGTH was included in the analysis.

		Degrees of Freedom			Signif.	Between Groups
Wilks' Lambda	.27111	2	1	198.0		
Equivalent F	196.42631		2	197.0	.0000	

---------- Variables in the Analysis after Step 2 ----------

Variable	Tolerance	F to Remove	Wilks' Lambda
MANDLGTH	.2718358	433.4280	.6714402
POSFACHT	.2718358	759.8514	.9718015

---------- Variables not in the Analysis after Step 2 ----------

Variable	Tolerance	Minimum Tolerance	F to Enter	Wilks' Lambda
APTNPERP	.9948535	.2702008	14.4223412	.2603305
FACLCNVX	.7788130	.2295515	7.3631303	.2663884
LOWLAPO_	.9407811	.2580187	.2210526	.2728112
LOWRIMPL	.8029867	.2198670	97.7654080	.2052299
LOWRLIPE	.8867359	.2679776	10.3711498	.2637729
MANPLAGL	.8662823	.2425392	26.5008306	.2505805
MANPROGN	.9560225	.2678037	7.6251999	.2661585
MLSULCUS	.8591656	.2655196	15.8151286	.2591677
NASLBANG	.9709391	.2636953	3.4209779	.2698956
OCCLPLAN	.8569682	.2643874	5.1910180	.2683095
PALPLANE	.9691959	.2707931	29.0248996	.2486345
SADANGLE	.9896640	.2692411	.1524054	.2728744
SNA	.9522605	.2690154	.1382146	.2728875
SNB	.9153333	.2484746	17.9983071	.2573658
UFH_LFH	.9921713	.2699917	6.5177706	.2671328
UPLPLGTH	.7491015	.2576421	.0128774	.2730030
UPPERLFH	.9362976	.2579165	.2927349	.2727452

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At step 3, LOWRIMPL was included in the analysis.

		Degrees of Freedom			Signif.	Between Groups
Wilks' Lambda	.20523	3	1	298.0		
Equivalent F	382.09510		3	296.0	.0000	

---------- Variables in the Analysis after Step 3 ----------

Variable	Tolerance	F to Remove	Wilks' Lambda
LOWRIMPL	.8029867	97.7654	.2730149
MANDLGTH	.2366862	534.0181	.5754882
POSFACHT	.2188670	1010.9574	.9061712

---------- Variables not in the Analysis after Step 3 ----------

Variable	Tolerance	Minimum Tolerance	F to Enter	Wilks' Lambda
APTNPERP	.9947815	.2178590	11.2896245	.1976652
FACLCNVX	.7785392	.2031541	6.2980853	.2009399
LOWLAPO_	.7639074	.1944796	13.4430907	.1962852
LOWRLIPE	.8460258	.2128917	.9533022	.2045688
MANPLAGL	.7953919	.2110321	4.3894655	.2022209
MANPROGN	.9420602	.2184037	11.9000943	.1972720
MLSULCUS	.8345632	.2180281	4.0929190	.2024214
NASLBANG	.9591636	.2100355	6.5483262	.2007731
OCCLPLAN	.8456904	.2188660	.9937221	.2045408

PALPLANE	.9689894	.2184351	20.5997593	.9318342
SADANGLE	.9664781	.2157156	2.7908499	.2033135
SNA	.9411042	.2185159	1.8869134	.2041018
SNB	.8119317	.2184464	10.9416698	.1979900
UFH_LFH	.9820840	.2188579	.5383224	.1988019
UPLPLGTH	.7430142	.2107203	.4869914	.2049124
UPPER1FH	.8400867	.2038055	5.7688752	.2012935

* *

At step 4, PALPLANE was included in the analysis.

		Degrees of Freedom		Signif.	Between Groups
Wilks' Lambda	.19183	4	1	298.0	
Equivalent F	311.69670		4	295.0	.0000

---------- Variables in the Analysis after Step 4 ----------

Variable	Tolerance	F to Remove	Wilks' Lambda
LOWR1MPL	.8028156	37.3469	.2486345
MANDLGTH	.2362019	477.6467	.5024407
PALPLANE	.9689894	20.5998	.2052299
POSFACHT	.2184353	696.4550	.6447285

---------- Variables not in the Analysis after Step 4 ----------

Variable	Tolerance	Minimum Tolerance	F to Enter	Wilks' Lambda
APTNPERP	.9941484	.2173974	9.8186295	.1856346
FACLCNVX	.6219371	.1924526	24.0906140	.1773056
LOW1APO_	.7630333	.1939302	11.5094126	.1846072
LOWRLIPE	.8339407	.2127664	.1779382	.1917181
MANPLAGL	.7118965	.2084666	.4060262	.1915696
MANPROGN	.9420550	.2179717	11.0176083	.1849049
MLSULCUS	.8313367	.2175205	2.8342328	.1900025
NASLBANG	.9568119	.2097981	7.2364087	.1872258
OCCLPLAN	.6798634	.2183518	1.1889726	.1910615
SADANGLE	.9634037	.2154139	3.4575629	.1896043
SNA	.9403802	.2181050	1.2175217	.1910430
SNB	.8112841	.2179663	8.7151832	.1863112
UFH_LFH	.7467476	.2182076	.9201507	.1912356
UPLPLGTH	.6764213	.2106897	4.2366942	.1891090
UPPER1FH	.8139695	.2035024	9.8582289	.1856104

* *

At step 5, FACLCNVX was included in the analysis.

		Degrees of Freedom		Signif.	Between Groups
Wilks' Lambda	.17731	5	1	298.0	
Equivalent F	272.83088		5	294.0	.0000

---------- **Variables in the Analysis after Step 5** ----------

Variable	Tolerance	F to Remove	Wilks' Lambda
FACLCNVX	.6219371	24.0906	.1918341
LOWR1MPL	.8026659	80.3201	.2257450
MANDLGTH	.1924526	525.3909	.4941584
PALPLANE	.7740786	39.1894	.2009399

POSFACHT [illegible] [illegible] [illegible]

---------- Variables not in the Analysis after Step 5 ----------

Variable	Tolerance	Minimum Tolerance	F to Enter	Wilks Lambda
APTNPERP	9128650	.[illegible]963634	20.6483344	1656330
LOW1APO_	.74[illegible]1[illegible]5	.[illegible]61[illegible]4[illegible]8	18.[illegible]962024	1682411
LOWRLIPE	.7649[illegible]02	1904026	9835830	1767124
MANPLAGL	3727831	1533683	28.4943883	1618909
MANPROGN	7828309	1894163	31.5748561	1600572
MLSULCUS	8293852	1907483	3.4083017	1752668
NASLBANG	.9557888	.1866718	7.4927288	.1728845
OCCLPLAN	4857344	.1924123	3.0273345	1754923
SADANGLE	.9447472	1854827	6.0718753	1737098
SNA	7961388	.1894425	.7295587	.1768652
SNB	5399071	1924353	.0178052	.1772948
UFH_LFH	.6841084	1855537	.2148872	1771756
UPLPLGTH	.6205661	.1814465	12.3806188	1702846
UPPER1FH	7991804	1793080	5.7616754	.1738862

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At step 6, MANPROGN was included in the analysis.

		Degrees of Freedom		Signif.	Between Groups
Wilks' Lambda	.16006	6	1	298.0	
Equivalent F	256.26600		6	293.0	.0000

---------- Variables in the Analysis after Step 6 ----------

Variable	Tolerance	F to Remove	Wilks' Lambda
FACLCNVX	.5168186	45.4861	1849049
LOWR1MPL	.7872966	87.2627	.2077262
MANDLGTH	1894163	499.6679	.4330108
MANPROGN	.7828309	31.5749	.1773056
PALPLANE	.7443131	49.6578	.1871837
POSFACHT	.2073722	673.1899	.5278007

---------- Variables not in the Analysis after Step 6 ----------

Variable	Tolerance	Minimum Tolerance	F to Enter	Wilks' Lambda
APTNPERP	.2971336	.1860992	.0138797	.1600496
LOW1APO_	.7442708	.1586552	16.9516643	.1512751
LOWRLIPE	.7584162	.1878365	.2018482	.1599466
MANPLAGL	.3680690	.1493157	32.4735861	.1440385
MLSULCUS	.8274232	.1875409	2.2308763	.1588436
NASLBANG	.9468214	.1829746	9.7796730	.1548702
OCCLPLAN	.4856826	.1893699	2.9084990	.1584786
SADANGLE	.9438494	.1823898	6.2634382	.1566960
SNA	.7955448	.1863379	.9141035	.1595577
SNB	.5386683	.1893711	.0166089	.1600481
UFH_LFH	.6060058	.1784131	5.6669121	.1570100
UPLPLGTH	.6027608	.1765898	18.1565833	.1506874
UPPER1FH	.7990829	.1765450	5.4555970	.1571216

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At step 7, MANPLAGL was included in the analysis.

		Degrees of Freedom		Signif.	Between Groups
Wilks' Lambda	.14434	7	1	298.0		
Equivalent F	247.39131		7	292.0	.0000	

---------------- Variables in the Analysis after Step 7 ----------------

Variable	Tolerance	F to Remove	Wilks' Lambda
FACLCNVX	.2794830	32.3413	.1349027
LOWR1MPL	.6791586	29.9127	.1587939
MANDLGTH	.1493157	574.5306	.4274691
MANPLAGL	.3680690	32.4736	.1600572
MANPROGN	.7729314	35.5926	.1615908
PALPLANE	.7437750	46.1724	.1668145
POSFACHT	.1676931	763.1666	.5204953

---------------- Variables not in the Analysis after Step 7 ----------------

Variable	Tolerance	Minimum Tolerance	F to Enter	Wilks' Lambda
APTNPERP	.2812997	.1417522	1.3589262	.1433690
LOW1APO_	.5327431	.1450176	1.4594454	.1433197
LOWRLIPE	.6788787	.1485578	1.9529684	.1430783
MLSULCUS	.8266328	.1477466	1.5581968	.1432713
NASLBANG	.9458601	.1459436	7.7897598	.1402833
OCCLPLAN	.4491181	.1473050	.0195168	.1440288
SADANGLE	.8573691	.1347342	17.6457598	.1358036
SNA	.7638507	.1429983	4.0937392	.1420403
SNB	.5342832	.1488580	.3738776	.1438537
UFH_LFH	.5369785	.1486028	.2116318	.1439338
UPLPLGTH	.5503661	.1475800	6.5428364	.1408712
UPPER1FH	.7990772	.1412791	4.8292920	.1416871

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At step 8, SADANGLE was included in the analysis.

		Degrees of Freedom			Signif.	Between Groups
Wilks' Lambda	.13580	8	1	298.0		
Equivalent F	231.47504		8	291.0	.0000	

---------------- Variables in the Analysis after Step 8 ----------------

Variable	Tolerance	F to Remove	Wilks' Lambda
FACLCNVX	.2529473	101.1848	.1830244
LOWR1MPL	.6781408	29.8517	.1497348
MANDLGTH	.1347342	623.8350	.4269343
MANPLAGL	.3343446	44.7683	.1566960
MANPROGN	.7693874	36.9032	.1530256
PALPLANE	.7310001	51.2693	.1597299
POSFACHT	.1557456	823.8890	.5202953
SADANGLE	.8573691	17.6458	.1440385

---------------- Variables not in the Analysis after Step 8 ----------------

Variable	Tolerance	Minimum Tolerance	F to Enter	Wilks' Lambda
APTNPERP	.2808179	.1292145	.9262990	.1353712
LOW1APO_	.5322010	.1316268	1.0850717	.1352974
LOWRLIPE	.6770892	.1343726	1.3157792	.1351902

MLSULCUS	.8188247	.1311356	[illegible]	[illegible]
NASLBANG	.9441371	.1314877	8.3048523	.1313223
OCCLPLAN	.4370825	.1309468	.8695283	.1316396
SNA	.5923233	.1309303	.0184559	.1320243
SNB	.3425069	.1292241	2.8126675	.1307503
UFH_LFH	.5083797	.1321806	1.4497054	.1313639
UPLPLGTH	.5480287	.1297363	6.0934935	.1292966
UPPER1FH	.7982867	.1296836	4.0122733	.1339503

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At step 9, NASLBANG was included in the analysis.

		Degrees of Freedom		Signif.	Between Groups
Wilks' Lambda	.13202	9	1	298.0	
Equivalent F	211.84335		9	290.0	.0000

---------- Variables in the Analysis after Step 9 ----------

Variable	Tolerance	F to Remove	Wilks' Lambda
FACLCNVX	.2525100	100.5081	.1777792
LOWR1MFL	.6671485	32.9786	.1470363
MANDLGTH	.1314577	643.4768	.4249663
MANPLAGL	.3342425	42.3738	.1513135
MANPROGN	.7623716	39.2306	.1498826
NASLBANG	.9441371	8.3049	.1358036
PALPLANE	.7261905	53.2532	.1562664
POSFACHT	.1504968	852.5565	.5201501
SADANGLE	.8558072	18.1449	.1402833

---------- Variables not in the Analysis after Step 9 ----------

Variable	Tolerance	Minimum Tolerance	F to Enter	Wilks' Lambda
APTNPERP	.2783884	.1268553	.4712238	.1318079
LOW1APO_	.5166606	.1293714	.3010250	.1318854
LOWRLIPE	.6672559	.1308066	2.1953510	.1310275
MLSULCUS	.8188247	.1304349	1.9207785	.1311511
OCCLPLAN	.4370825	.1310272	.8695283	.1316268
SNA	.5923233	.1309303	.0184559	.1320144
SNB	.3425069	.1292241	2.8126675	.1307503
UFH_LFH	.5058359	.1292960	1.4497054	.1313639
UPLPLGTH	.5438267	.1299170	6.0934935	.1292966
UPPER1FH	.7903373	.1264200	2.8797874	.1307202

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At step 10, UPLPLGTH was included in the analysis.

		Degrees of Freedom		Signif.	Between Groups
Wilks' Lambda	.12930	10	1	298.0	
Equivalent F	194.61705		10	289.0	.0000

---------- Variables in the Analysis after Step 10 ----------

Variable	Tolerance	F to Remove	Wilks' Lambda
FACLCNVX	.2511789	102.2234	.1750307
LOWR1MFL	.6352302	37.7753	.1461970
MANDLGTH	.1299170	651.8860	.4209459

MANPLAGL	31.8364	39 .569	.4211412
MANPROGN	7477321	42 5464	.4483116
NASLBANG	93689?9	6 8262	.1033836
PALPLANE	5946222	59 7393	.3612236
POSFACHT	1426251	511 4083	.3583959
SADANGLE	.8525866	-9 0278	.1178395
UPLPLGTH	5438267	6.0935	.1320228

---------- Variables not in the Analysis after Step 10 ----------

Variable	Tolerance	Minimum Tolerance	F to Enter	Wilks' Lambda
APTNPERP	2712151	.1244573	1.1743332	1287715
LOWIAPO_	.5166602	1279823	2912975	.1291660
LOWRLIPE	5483042	1289809	3.6174001	.1276927
MLSULCUS	9140525	1290909	2.4332472	.1282134
OCCLPLAN	4345868	1293646	.5461932	.1290519
SNA	.5840130	1291620	1315289	.1292152
SNB	3421590	.1278451	2.4957364	.1281858
UFH_LFH	.4763153	1284866	3927622	1291250
UPPER1FH	.7850184	1245279	3 5452268	.1277244

F level or tolerance or VIN insufficient for further computation.

Summary Table

Step	Action Entered	Removed	Vars in	Wilks' Lambda	Sig.	Label
1	POSFACHT		1	.67144	.0000	
2	MANDLGTH		2	.27301	0000	
3	LOWR1MPL		3	.20523	.0000	
4	PALPLANE		4	.19183	.0000	
5	FACLCNVX		5	.17731	.0000	
6	MANPROGN		6	.16006	.0000	
7	MANPLAGL		7	.14404	.0000	
8	SADANGLE		8	.13580	.0000	
9	NASLBANG		9	.13202	.0000	
10	UPLPLGTH		10	.12930	.0000	

Canonical Discriminant Functions

Fcn	Eigenvalue	Pct of Variance	Cum Pct	Canonical Corr	After Fcn	Wilks' Lambda	Chi-square	df	Sig
					: 0	.129297	599.374	10	.0000
1*	6.7342	100.00	100.00	.9331	:				

* Marks the 1 canonical discriminant functions remaining in the analysis.

Standardized canonical discriminant function coefficients

	Func 1
FACLCNVX	1.09304
LOWR1MPL	-.45717
MANDLGTH	-2.47485
MANPLAGL	.58190
MANPROGN	-.44397
NASLBANG	-.16819
PALPLANE	.57521
POSFACHT	2.26827
SADANGLE	.28847
UPLPLGTH	.20883

Structure matrix:

Pooled within-groups correlations between discriminating variables
and canonical discriminant functions
(Variables ordered by size of correlation within function)

	Func 1
POSFACHT	.26956
PALPLANE	.24218
UPPER1FH	- .22236
UFH_LFH	.16749
LOW1APO_	.14378
MANPROGN	- .13469
LOWR1MPL	- .10875
UPLPLGTH	.09143
SNA	.08279
APTNPERP	- .08253
MANDLGTH	- .06600
LOWRLIPE	.05702
OCCLPLAN	.05316
SNB	.03833
FACLCNVX	- .03633
NASLBANG	.02828
SADANGLE	- .02492
MANPLAGL	.01539
MLSULCUS	- .00450

Unstandardized canonical discriminant function coefficients

	Func 1
FACLCNVX	.3707605
LOWR1MPL	-.0716463
MANDLGTH	-.2575456
MANPLAGL	.1341711
MANPROGN	-.0532583
NASLBANG	-.0131139
PALPLANE	.1766976
POSFACHT	.2903809
SADANGLE	.0603652
UPLPLGTH	.0725154
(Constant)	-27.1070800

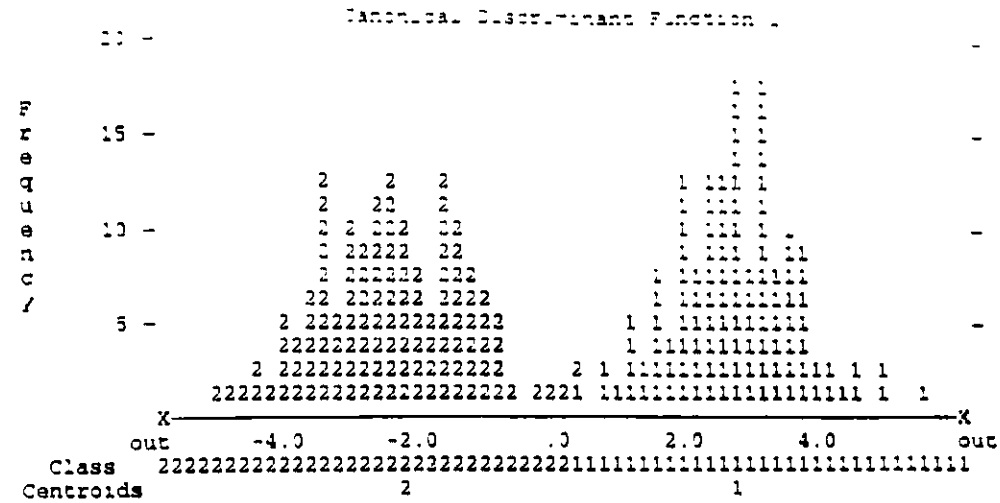
Canonical discriminant functions evaluated at group means (group centroids)

Group	Func 1
0	2.58636
1	-2.58636

Symbols used in plots

Symbol	Group	Label
1	0	
2	1	

All-groups Stacked Histogram



Classification results -

Actual Group	No. of Cases	Predicted Group Membership 0	1
Group 0	150	150 100.0%	0 .0%
Group 1	150	2 1.3%	148 98.7%

Percent of "grouped" cases correctly classified: 99.33%

Classification processing summary

300 (Unweighted) cases were processed.
0 cases were excluded for missing or out-of-range group codes.
0 cases had at least one missing discriminating variable.
300 (Unweighted) cases were used for printed output.

REFERENCES

Adeli-Nadjafi, H. 1977. Principal component analysis applied in craniofacial growth. University of Illinois, Master of Science Thesis.

Anderson, TW. 1958. An Introduction to Mulivariate Statistical Analysis. New York, John Wiley and Sons. 34-63.

Begg, PR. 1956. Differential force in orthodontic treatment. Am J Orthod Dentofacial Orthop 42:481.

Benfer, RA. 1975. Morphometric analysis of Cartesian coordinates of the human skull. Am J Phys Anthropol 74: 371-382.

Bishara, SE and LC Peterson. 1984. Changes in facial dimensions and relationships between the ages of 5 and 25 years. Am J Orthod Dentofacial Orthop 85:238-251.

Bjork, A. 1947. The face in profile. Svensk Tandl-Tidskr. Suppl. 40, No. 5B.

Bjork, A. 1951. The nature of facial prognathism and its relation to normal occlusion of the teeth. Am J Orthod Dentofacial Orthop 37:106-124.

Bjork, A. 1955. Facial growth in man, studied with the aid of metallic implants. Acta Odontol Scand 13:9-34.

Bjork, A. 1966. Sutural growth of the upper face studied by the implant method. Acta Odontol Scand 24:109-127.

Blueher, WA. 1959. Cephalometric analysis of treatment with cervical anchorage. Am J Orthod Dentofacial Orthop 29:45-53.

Broadbent, BH. 1931. A new x ray technique and its application to orthodontia. Angle Orthod 1:45-66.

Broadbent, BH. 1937. Bolton standards and technique in orthodontic practice. Angle Orthod 7:209-233.

Broadbent, BH. 1937. The face of the normal child. Angle Orthod 7:183-208.

Brodie, AG. 1940. Some recent observations on the growth of the face and their implications to the orthodontist. Am J Orthod Dentofacial Orthop 26:741-757.

Brook, PH and WC Shaw. 1989. The development of an index of orthodontic treatment priority. Eur J Orthod 11:309-320.

Brown, T and MJ Barret. 1964. A roentgenographic study of facial morphology in a tribe of Central Australian Aborigines. Am J Phys Anthropol 22:33-42.

Brown, T, MJ Barret and JN Darroch. 1965. Factor analysis in cephalometric research. Growth 29:97-107.

Brown, T, MJ Barret and JN Darroch. 1965. Craniofacial factors in two ethnic groups. Growth 29:109-123.

Brown, P. 1978. A cephalometric evaluation of high-pull molar headgear and face-bow neck strap therapy. Am J Orthod Dentofacial Orthop 74:621-632.

Buranarugsa, M and P Houghton. 1981. Polynesian head form: an interpretation of a factor analysis of Cartesian co-ordinate data. J Anat 133 (3):333-350.

Burstone, CJ. 1958. Integumental profile. Am J Orthod Dentofacial Orthop 44 (1):1-25.

Burstone, CJ. 1959. Integumental contour and extension patterns. Angle Orthod 29 (2):93-104.

Burstone, CJ. 1967. Lip posture and its significance in treatment planning. Am J Orthod Dentofacial Orthop 33:262-284.

Burstone, CJ, RB James, HL Legan, GA Murphy and LA Norton. 1978. Cephalometrics for orthognathic surgery. J Oral Surg 36:269-277.

Carlos, JP. 1970. Evaluation of different indices of maloccusion. Int Dent J 20:606-617.

Chebib, FS, JF Cleall and KJ Carpenter. 1976. On-line computer system for the analysis of cephalometric radiographs. Angle Orthod 46 (4):305-311.

Cleall, JF, FS Chebib and H Adeli-Nadjafi. 1976. Facial type. J Dent Res 55:199.

Dentofacial Planner™ User Manual. 1990. Dentofacial Software Inc., P.O.Box 950, Station 'A', Toronto, Ontario, M5W 1G5.

Doppel, DM, WM Damon, DR Joondeph and RM Little. 1994. An investigation of maxillary superimposition techniques using metallic implants. Am J Orthod Dentofacial Orthop 105:161-168.

Downs, WB. 1948. Variations in facial relationships: Their significance in treatment and prognosis. Am J Orthod Dentofacial Orthop 34:812-840.

Downs, WB. 1952. The role of cephalometrics in orthodontic case analysis and diagnosis. Am J Orthod Dentofacial Orthop 38:162-182.

Downs, WB. 1956. Analysis of the dentofacial profile. Angle Orthod 26:191-211.

Draker, HL. 1960. Handicapping labio-lingual deviations: a proposed index for public health purposes. Amer J Orthod Dentofacial Orthop 46:295-315.

Elias, AC. 1980. The importance of the nasolabial angle in the diagnosis and treatment of malocclusions. Int J Orthod 18 (2):7-12.

Ellis, E and J McNamara. 1984. Components of adult Class III open-bite malocclusion. Am J Orthod Dentofacial Orthop 85:277-289.

Fitzgerald JP, RS Nanda and GF Currier. 1992. An evaluation of the nasolabial angle and the relative inclinations of the nose and upper lip. Am J Orthod Dentofacial Orthop 102 (4):328-334.

Grainger, RM. 1967. Orthodontic Treatment Priority Index. Public Health Service Publication No 1000, Series 2, No. 25. Washington DC, U.S. Government Printing Office.

Gramling, JF. 1995. The Probability Index. Am J Orthod Dentofacial Orthop 107 (2):165-171.

Harris, JE. 1963. A multivariate analysis of the variability of the craniofacial complex.University of Michigan, Ann Arbor, Master's Thesis.

Harris, JE. 1965. Cranio-facial growth and malocclusion: A multivariate approach to the study of the skeletal contribution to Class II malocclusion. Europ Orthod Soc. Rep Cong 41:103-119.

Harvold, EP. 1974. The Activator in Interceptive Orthodontics. St. Louis. C.V. Mosby Co. 111-125.

Holdaway, RA. 1957. A consideration of the soft-tissue outline for diagnosis and treatment planning. (Paper read before the Angle Society in Pasadena, CA).

Holdaway, RA. 1983. A soft-tissue cephalometric analysis and its use in orthodontic treatment planning. Part I. Am J Orthod Dentofacial Orthop 84 (1):1-28.

Holdaway, RA. 1984. A soft-tissue cephalometric analysis and its use in orthodontic treatment planning. Part II. Am J Orthod Dentofacial Orthop 85 (4):279-293.

Howells, WW. 1957. The cranial vault: Factors of size and shape. Am J Phys Anthropol 31:311-314.

Isaacson, JR, RJ Isaacson, TM Speidel and FW Worms. 1971. Extreme variation in vertical facial growth and associated variation in skeletal and dental relations. Angle Orthod 41:219-229.

Jacobson, A. 1975. The 'Wits' appraisal of jaw disharmony. Am J Orthod Dentofacial Orthop 67:125-138.

Jacobson, A. 1976. Application of the 'Wits' appraisal. Am J Orthod Dentofacial Orthop 70:179-189.

Jarabak, JR and JA Fizzell. 1972. Technique and Treatment with Light-Wire Edgewise Appliances. Volume 1. St. Louis. C.V. Mosby Co. 76-99.

Jarvinen, S. 1980. Relation of the SNA angle to the saddle angle. Am J Orthod Dentofacial Orthop 78 (6):670-673.

Jarvinen, S. 1984. Saddle angle and maxillary prognathism: A radiological analysis of the association between the NSAr and SNA angles. Br J Orthod 11 (4):209-213.

Johnston, L. 1968. A statistical evaluation of cephalometric prediction. Angle Orthod 38:497-499.

Julius, RB. 1971. A serial cephalometric study of the metallic implant technique and methods of maxillary and mansibular superimposition.University of Washington, Master of Science Thesis.

Kim, YH. 1974. Overbite depth indicator with particular reference to anterior open-bite. Am J Orthod Dentofacial Orthop 65 (6):586-611.

Kleinbaum, DG, LL Kupper and KE Muller. 1988. "Two-group Discriminant Analysis," in Applied Regression Analysis and Other Multivariate Methods. Boston. PWS-KENT Publishing Co., 560-594.

Klien, DL. 1957. An evaluation of cervical traction of the maxilla and the upper first permanent molar. Angle Orthod 27:61.

Lachenbruch, PA. 1975. Discriminant Analysis. New York. Hafner Press. 1-23.

Landauer, CA. 1962. A factor analysis of the facial skeleton. Hum Biol 34:239-253.

Lawley, DN and AE Maxwell. 1971. Factor Analysis as a Statistical Method. Ed. 2 London.Butterworth's Mathematical Texts. 26-52.

Legan, HL and CH Burstone. 1980. Soft-tissue cephalometric analysis for orthognathic surgery. J Oral Surg 38:744-751.

Lewis, AB and AF Roche. 1977. The saddle angle: Constancy or change? Angle Orthod 47 (1):46-54.

Margolis, HI. 1940. Standardization x-ray cephalometrics. Am J Orthod Dentofacial Orthop 26:725-740.

Margolis, HI. 1943. Axial inclination of mandibular incisors. Am J Orthod Dentofacial Orthop 28:571-594.

Masumoto, GT. 1970. An analysis of the use of the metallic implant method in superimposition of the maxilla. University of Washington, Master of Science Thesis.

McNamara, JA. 1984. A method of cephalometric evaluation. Am J Orthod Dentofacial Orthop 86 (6):449-469.

Merrifield, LL. 1966. The profile line as an aid in critical evaluation of facial esthetics. Am J Orthod Dentofacial Orthop 52 (11):804-822.

Moore, AW. 1938. "Roentgenographic Cephalometrics," Chapter 3 in Principles of Orthodontic Treatment. ed. Salzmann, JA. Philadelphia. J.B.Lippincott. 111-123.

Moore, JW. 1976. Variation of the sella-nasion plane and its effect on SNA and SNB. J Oral Surg 34 (1):24-26.

Nahoum, HI. 1971. Vertical proportions and the palatal plane in anterior open-bite. Am J Orthod Dentofacial Orthop 59:273-242.

Nahoum, HI, SL Horowitz and EA Benedicato. 1972. Varieties of anterior open-bite. Am J Orthod Dentofacial Orthop 61:486-492.

Nanda, RS. 1955. The rates of growth of several facial components measured from serial cephalometric roentgenograms. Am J Orthod Dentofacial Orthop 30:658-673.

Nanda, RS. 1971. Growth changes in skeletal facial profile and their significance in orthodontic diagnosis. Am J Orthod Dentofacial Orthop 59:501-513.

Nanda, RS, HP Meng, S Kapila and Y Goorhuis. 1990. Growth changes in the soft tissue facial profile. Angle Orthod 60:177-190.

Nanda, RS and RM Merrill. 1994. Cephalometric assessment of sagittal relationship between maxilla and mandible. Am J Orthod Dentofacial Orthop 105 (4):328-344.

Norusis, MJ. 1990. "Discriminant Analysis," in SPSS/PC+ Advanced Statistics 4.0 for the IBM PC/XT/AT and PS/2. Chicago. SPSS Inc. 1:B1-37.

Pancherz, H and MA Pancherz. 1993. The headgear effect of the Herbst appliance: A cephalometric long-term study. Am J Orthod 103 (6):510-520.

Petraitis, BJ. 1957. A Cephalometric study of excellent occlusion and Class I malocclusion of children and adults. University of Washington, Master of Science Thesis.

Pickering, EA and P Vig. 1976. The occlusal index to assess orthodontic treatment. Br J Orthod 2:47-51.

Richardson, A. 1969. Skeletal factors in anterior open-bite and deep overbite. Am J Orthod Dentofacial Orthop 56:114-127.

Ricketts, RM. 1960. A foundation for cephalometric communication. Am J Orthod Dentofacial Orthop 46:330-357.

Ricketts, RM. 1960. Cephalometric synthesis. Am J Orthod Dentofacial Orthop 46:647-673.

Ricketts, RM. 1961. Cephalometric analysis and synthesis. Angle Orthod 31 (3):141-156.

Ricketts, RM. 1968. Esthetics, environment, and the law of lip relation. Am J Orthod Dentofacial Orthop 54 (4):272-289.

Ricketts, RM. 1981. Perspectives in the clinical application of cephalometrics--The first fifty years. Angle Orthod 51 (2):115-150.

Riedel, RA. 1952. The relation of maxillary structures to cranium in malocclusion and in normal occlusion. Angle Orthod 22:140-145.

Riedel, RA. 1957. An analysis of dentofacial relationships. Am J Orthod Dentofacial Orthop 43:103-119.

Salzmann, JA. 1967. Malocclusion severity assessment. Am J Orthod Dentofacial Orthop 53:109-119.

Salzmann, JA. 1968. Handicapping malocclusion assessment to establish treatment priority. Am J Orthod Dentofacial Orthop 54:749-765.

Sassouni, VA. 1955. A roentgenographic cephalometric analysis of cephalofacial -dental relationships. Am J Orthod Dentofacial Orthop 41:735-764.

Sassouni, VA and RS Nanda. 1964. Analysis of dentofacial vertical proportions. Am J Orthod Dentofacial Orthop 50:801-823.

Sassouni, VA. 1969. A classification of skeletal facial types. Am J Orthod Dentofacial Orthop 55:109-123.

Schudy, FF. 1964. Vertical growth versus anteroposterior growth as related to function and treatment. Am J Orthod Dentofacial Orthop 34(2):75-93.

Solow, B. 1966. The pattern of craniofacial associations. A morphological and methodological correlation and factor analysis study on young male adults. Acta Odontol Scand 24 (46):1-174.

Solow, B. 1969. Automatic processing of growth data. Angle Orthod. 39:186-197.

Solow, B. 1971. "Factor analysis of craniofacial variables," Chapter 7 in Craniofacial Growth in Man, ed. Moyers, RE and WM Krogman. London, Pergamon Press, Oxford. 239-245.

Spiedel, TD and MM Stoner. 1944. Variation in mandibular incisor axis in adult 'Normal' Occlusions. Am J Orthod Dentofacial Orthop 30:536-542.

Spillas, G. 1993. Application of factor analysis to cephalometric technique. Case Western Reserve University, Master of Science Thesis.

Spradley, FL, JD Jacobs and DP Crowe. 1981. Assessment of the anteroposterior soft-tissue contour of the lower facial third in the ideal young adult. Am J Orthod Dentofacial Orthop 79 (3):316-325.

Steiner, CC. 1953. Cephalometrics for you and me. Am J Orthod Dentofacial Orthop 39:729-755.

Steiner, CC. 1959. Cephalometrics in clinical practice. Angle Orthod 29:8-29.

Steiner, CC. 1960. The use of cephalometrics as an aid to planning and assessing orthodontic treatment. Am J Orthod Dentofacial Orthop 46:721-735.

Subtenly, JD. 1961. The soft-tissue profile, Growth and treatment changes. Angle Orthod 31:105-122.

Summers, CJ. 1971. The occlusal index: A system for identifying and scoring occlusal disorders. Am J Orthod Dentofacial Orthop 57:552-567.

Tweed, CH. 1946. The Frankfort-mandibular plane angle in orthodontic diagnosis, classification, treatment planning and prognosis. Am J Orthod Dentofacial Orthop 32 (4):175-230.

Tweed, CH. 1954. The Frankfort-mandibular incisor angle (FMIA) in orthodontic diagnosis, treatment planning and prognosis. Angle Orthod 24:121-169.

Tweed, CH. 1969. The diagnostic facial triangle in the control of treatment objectives. Am J Orthod Dentofacial Orthop 55:651-667.

Vohries, JM and JW Adams. 1951. Polygonal interpretation of cephalometric findings. Angle Orthod 21:194..

Waldo, CM. 1936. Orthodontic research as a component part of a balanced longitudinal study of 100 children. Int J Orthod 22:659-673.

Walker, GF and CJ Kowalski. 1971. A two-dimensional coordinate model for the quantification, description, analysis, prediction and simulation of craniofacial growth. Growth 35:191-211.

Walker, GF. 1972. A new approach to the analysis of craniofacial morphology and growth. Am J Orthod Dentofacial Orthop 61:221-230.

Wisth, PJ and OE Boe. 1975. The reliability of soft tissue measurements. Arch Oral Biol 20:595-599.

Wylie, WL. 1947. An assessment of anteroposterior dysplasia. Angle Orthod 17:97-109.

Zylinski, CG, RS Nanda and S Kapila. 1992. Analysis of soft tissue facial profile in white males. Am J Orthod Dentofacial Orthop 101 (6):514-518.

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