Facial Differences Between Northern and Southern European Children

José Canut
Pascual M. Miñana
Eliseo Plasencia

Cephalometric comparison of Spanish and Scandinavian children with good occlusions finds a more horizontal mandible and more protrusive incisors in the Spanish sample.

KEY WORDS: • CEPHALOMETRICS • ETHNIC CHARACTERISTICS • • MANDIBLE • PROTRUSION •

Cephalometric norms are an important aid in orthodontic diagnosis, as has been extensively recognized in the literature since the early works of BROADBENT (1931). The strict value of norms and standards in the clinical analysis of individuals has been questioned, but the utilization of ethnic norms is widely accepted. Main factors in the selection of appropriate norms are age, sex and ethnic group.

It is obvious that to apply the same norms to people of different genetic origins can be misleading, and it is important to have adequate data on each ethnic group as a starting point in any study of interracial differences. Our interest in collecting data for the study and analysis of morphological characteristics of our own population is justified by the fact that there are few studies on adolescents and young adults in Spain.

Cephalometric roentgenography in *norma lateralis* is widely used in orthodontic analysis, and many population groups have been studied by means of various cephalometric methods, such as those of Downs, Tweed, Björk, Steiner and Ricketts. COTTEN ET AL. (1951) applied the Downs analysis to Black, Japanese and

Author Address:
Dr. José Canut
Escuela de Estomatología
Avda. Blasco Ibañez, 17
46010 Valencia
SPAIN

Dr. Canut is Chairman of the Department of Orthodontics and Director of the School of Stomatology, Faculty of Medicine, University of Valencia, Spain.

Dr. M. Miñana is in the private practice of Orthodontics and on the faculty of the Department of Orthodontics at the University of Valencia. He holds Doctor in Medicine and specialist in Stomatology degrees from the University of Madrid.

Dr. Plasencia is in the private practice of Orthodontics in Valencia and on the faculty of the Department of Orthodontics at the University of Valencia. He holds Doctor of Medicine and specialist in Stomatology degrees from the University of Madrid.

Chinese children residing in the United States, showing that the mean values of each group differed significantly and cannot readily be applied to other groups.

North American Blacks have been analyzed by ALTEMUS (1960), FONSECA (1978) and others. SAVAGE (1963) studied the facial pattern of Bauti children in Tanganyika, and British caucasians have been studied by Iver and LUTZ (1966).

Björk's cephalometric method has been used by different authors on several populations. KAYUKAWA (1957) combined the systems of Björk and Downs in a study of Japanese adolescents. A similar method was used by CRAVEN (1958) in the study of the morphology of Australian aborigines, and other Australian groups were studied by BARRETT ET AL. (1963).

On the Scandinavian population, LYSELL AND FILIPSSON (1958) studied medieval skulls in Sweden. HUMERFELT (1970) applied Björk's method to Norwegian children with normal occlusions. Recently, THILANDER (1982) compared the most popular cephalometric methods in Scandinavia and applied Björk's system to a group or 10yr- old Swedish children.

A large number of norms for different races are available in the literature. In Spain, ideal occlusion groups have been studied by COSTA (1972) and M. MIÑANA (1981), using the cephalometric systems of Steiner and Ricketts.

We considered it appropriate to apply Björk's method to compare the morphology of our own population with the Scandinavian, in an attempt to determine facial pattern differences between children from northern and southern Europe.

The purposes of the present study were to —

1 Identify a group of Spanish children with clinically excellent occlusion in young permanent dentition,
2 Describe craniofacial characteristics of the sample,
3 Compare, if possible, some of the data with Scandinavians, and
4 Propose cephalometric values which can be used for comparison of cases with the same ethnic origin.

— Material and Methods —

A group of 860 children of both sexes from a private school in Valencia were examined. Of these, 45 were selected on the basis of excellent occlusion in the young permanent dentition. This represents 5.23% of the total, which is quite close to the percentage found in the "Nittedal" material (PLATOU AND ZACHRISSON, 1983), where 30 (5.3%) of 568 children were chosen for their clinically excellent occlusion.

Ages in the selected sample range from 12 to 18 years, with a mean decimal age of 15.4±1.3yrs; 31 were female and 14 male.

In addition to the occlusal normality, the selection criteria included the balance of the facial profile, which met the following conditions:

1 Lips both functionally and morphologically competent,
2 Centric occlusion labial sealing showing no effort or muscular contraction,
3 Labial protrusion or retrusion within esthetically acceptable limits. This was subjectively determined by two observers who independently selected the sample, with concurrence of their judgments required for a case to be accepted.

Dental occlusion criteria included:

1 Every tooth anterior to the first permanent molar fully erupted,
2 Bilateral Class I occlusal relationship both at first molars and cuspids,

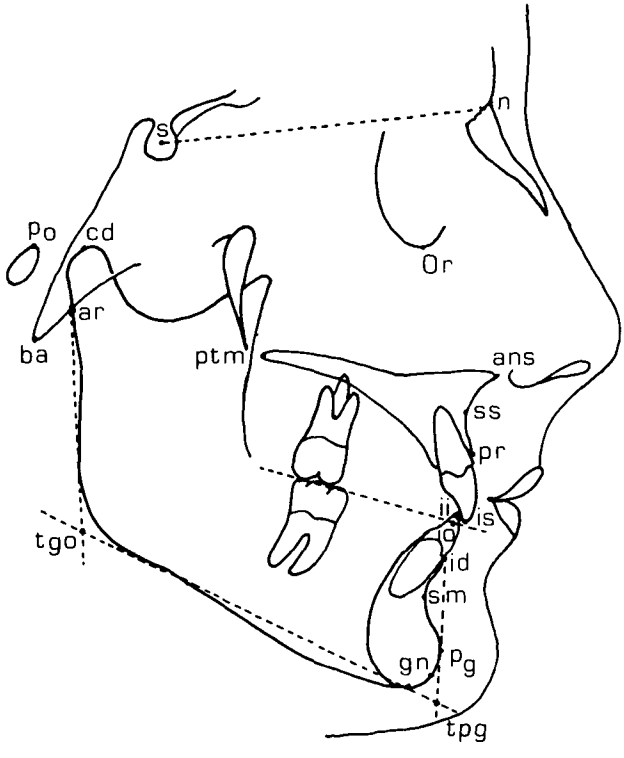

Fig. 1 **Reference points used for measurement (after** BJÖRK (1947) **and** KROGMAN AND SASSOUNI (1957)).

3 No crossbite of the posterior teeth,
4 Incisal edges of the lower incisors occluding incisally to the cingulum of the maxillary incisors, and
5 Negligible rotations or spacing (less than 1.5mm).

None of the children had previous orthodontic treatment, and the group may be considered representative of present-day social middle class in eastern Spain.

Dental casts from alginate impressions and lateral teleradiographic cephalographs were made of each subject. Radiographs were exposed in centric occlusion with the lips in relaxed contact. The cephalographs presented a magnification calculated at about 6%.

All radiographs were traced on acetate film. A series of reference points were selected by inspection in accordance with definitions of BJÖRK (1947) and KROGMAN AND SASSOUNI (1957) (Fig. 1).

The landmarks were marked with a sharp pencil by one investigator and then checked by the other. In case of question, the final position was chosen by mutual agreement.

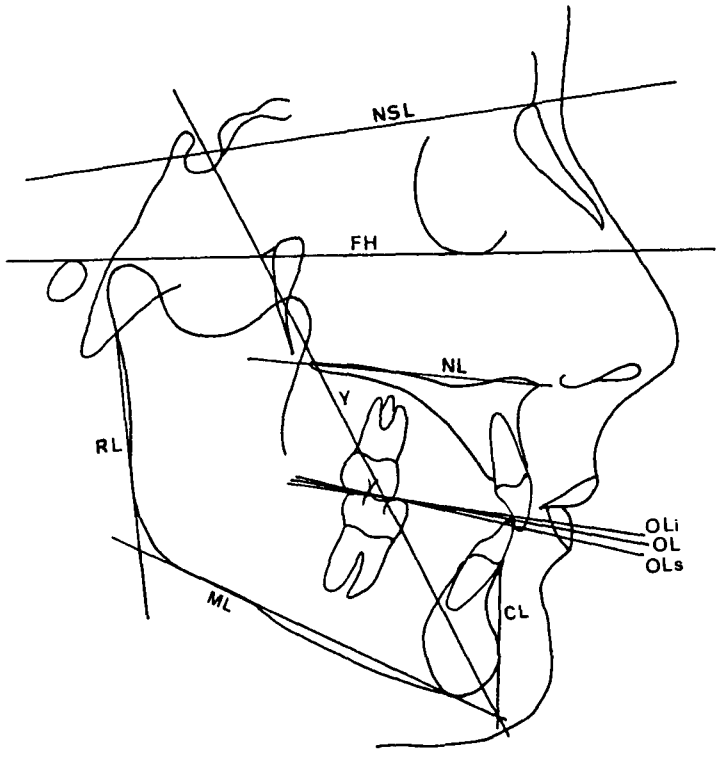

Fig. 2 Planes used in this study (after BJÖRK (1947) and HUMERFELT (1970)).

Planes and angles were then drawn according to BJÖRK (1947) and HUMERFELT (1970) (Fig. 2). Measurements were made on the tracing with a ruler and protractor calibrated in increments of 0.5mm and 0.5 degrees. All measurements were repeated later to avoid reading errors.

— Results and Discussion —

Pertinent findings are summarized in Table 1. In studying the results and comparing them with similar works from Scandinavia, it is necessary to point out the differences in age. Our sample consisted of adolescents from 12 to 18 years (mean 15.4yr, S.D. 1.3yr), whereas the comparison groups were mostly in the 10–12yr range (HUMERFELT 1970, THILANDER ET AL. 1982).

Because of this chronological difference and possible differences in the maturation level of children from northern and southern Europe, no attempt has been made to test the statistical significance of the differences.

This consideration should be kept in mind when observing the differences among the values of the facial angle (S-N-Pg), which is $81.5 \pm 3.4°$ in the Valencia sample, $79.5 \pm 3.0°$ for the Oslo

Table 1

Comparison of Relevant Measurements

in Spanish, Norwegian, and Swedish Children

Measurement*	Norwegian (Humerfelt)**	Swedish (Thilander et al.)**	Spanish (Canut et al.)
Facial Angle (S–N–Pg)	79.48±3	79.59±3	81.53±3.43
Facial Convexity (N–SS–Pg)	174.14±4.4	174.41±4.35	178.45±5.00
Mandibular Plane (NSL/ML)	32.72±4.32	31.42±4.9	28.02±4.97
Gonial Angle (ML/RL)	125.81±4.4	125.29±5.2	118.12±6.55
Interincisal Angle	131.17±6.14	131.67±7.6	129.98±7.32

* To conserve space, only data discussed in the text is reported here. Copies of eight tables of raw data for all measurements are available on written request to Dr. Canut.

** Computed average between girl and boy means reported by the authors, with approximate S.D.

group, and 79.6±3.0° for the Swedish children.

Similar findings are observed in the facial convexity angle (N–ss–Pg), where the Spanish group presents a flatter profile than the Scandinavians (Fig. 3).

A noticeable mean difference is found in the mandibular plane angle NSL/ML, which is 28±5° in the Valencia group and 33±4° in the Norwegian group. This value is not considered to be dependent on sex or age, and in these samples it shows a tendency toward a more brachiocephalic pattern in the Spanish group.

The same tendency appears in the gonial angle (ML/RL), which averaged 118.1±6.5° in the Spanish group versus 126±4° in the Norwegians and slightly less in the Swedish sample. Here again, there is a tendency toward a more square mandible typical of the brachiocephalic pattern in the Spanish group.

The interincisal angle measured 129.7±7.3° in the Valencia sample, slightly less than for the Norwegian and Swedish children. This suggests a tendency toward more anterior dental protrusion in the Spanish group in spite of the higher age range.

The age differences between the Scandinavian and Spanish groups make it difficult to compare the upper-face linear measurements, even though the roentgenographic magnification is quite similar.

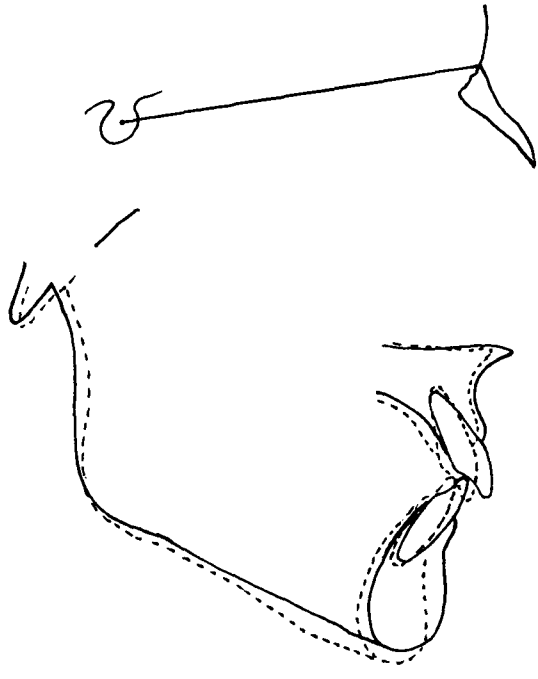

Fig. 3 Composite illustration based on mean figures, showing the most notable differences between Scandinavian (dashed lines) and Spanish (solid lines) samples.

— Summary and Conclusions —

Comparison of 45 individuals selected from 860 Valencia school children on the basis of good occlusion and facial balance with previous studies of Scandinavian children leads to the following findings and conclusions:

1 Ideal occlusions were 5.23% of the total number of children examined.

2 The Spanish sample was older than the Scandinavian groups, which limited the measurements that could be compared.

3 The Spanish children present a more horizontal and prognathic pattern, with a more square mandible.

4 The interincisal angle is slightly less in the Valencia sample, indicating a tendency toward coronal biprotrusion.

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